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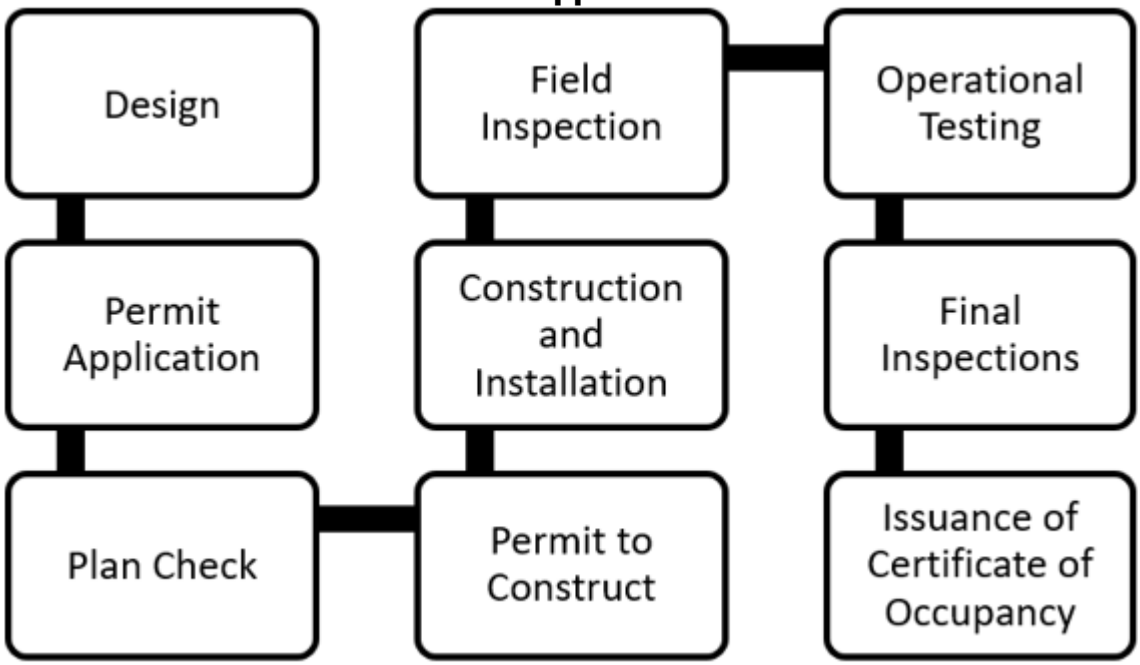
Compliance and Enforcement

Overview

The Energy Commission does not directly enforce California's 2025 Building Energy Efficiency Standards (Energy Code). Authorities having jurisdiction (AHJ) have the responsibility of issuing building permits for newly constructed buildings or additions and alterations to existing buildings and enforcing the California Building Code (CBC), Title 24 of the California Code of Regulations in totality, including the Energy Code. Most AHJs are local enforcement agencies, typically associated with a city or county government, but can also include other agencies such as the Division of the State Architect (for schools).

This chapter of the *Single-Family Compliance Manual* will show how compliance and enforcement of the Energy Code is achieved in the typical single-family residential building project permitting process used by most AHJs, which follow some version of the permitting process prescribed by the International Code Council (ICC). Figure 2-1: Idealized International Code Council Permitting Process for Building Permit Applications shows an idealized version of the ICC permitting process.

Figure 2-1: Idealized International Code Council Permitting Process for Building Permit Applications



Source: California Energy Commission staff

To assist the enforcement agency, the CEC created three categories of compliance documents for single-family construction projects used to demonstrate compliance with the Energy Code:

- Certificate of compliance documents (CF1R) are completed by the project proponent and submitted to the enforcement agency during the plan check phase (Section 10-103(a)1).
- Certificates of installation (CF2R) are completed by the installing technician or contractor during construction and submitted to the enforcement agency during field inspections throughout the construction phase (Section 10-103(a)3).

- Certificates of verification (CF3R) are completed by an Energy Code Compliance (ECC)-Rater certified by an Energy Commission-approved ECC-Provider and submitted to the enforcement agency during the final inspection phase and prior to the enforcement agency issuing the certificate of occupancy (Section 10-103(a)5).

ECC-Raters are independent, third-party agents, made available through the Energy Commission's ECC program. The ECC program consists of ECC-Providers, approved by the CEC to train, certify, and oversee ECC-Raters, who perform field verification and diagnostic testing as required for compliance with the Energy Code.

ECC-Verification ensures the proposed ECC measures are installed and comply with the Energy Code. The compliance and enforcement process requires participation from the architect, building designer, engineers, energy consultants, builders, contractors, the owner, ECC-Raters, and others. This chapter describes the overall compliance and enforcement process and responsibilities throughout the permit process.

Manufacturer Certification for Equipment, Products, and Devices

During the permit application phase, certain equipment, products, and devices must be selected for installation or use that are certified to be compliant with the Energy Code. These items are identified on the CF1Rs and are verified during inspection by the enforcement agency. The equipment, products, and devices must be certified to the Energy Commission by the manufacturer that it meets requirements under the Energy Code. The Energy Commission makes no claim that the listed equipment, products, or devices meet the indicated requirements or, if tested, will confirm the indicated results.

Inclusion on these lists only confirms that a manufacturer certification has been submitted to and accepted by the Energy Commission. Additional information about the required information for manufacturers to certify products and for lists of certified products may be found at http://www.energy.ca.gov/title24/equipment_cert/.

In single-family buildings, the following equipment must be certified by the manufacturer:

- Airflow measurement apparatus — forced air systems, ventilation systems, and whole house fan systems (RA3)
- Battery and energy storage systems (JA12)
- Central heat pump water heater (JA14)
- Drain water heat recovery (RA3.6.9)
- Ducted variable-capacity heat pump
- Intermittent mechanical ventilation systems (RA3.7.4.2)
- Heat pump water heater demand management system (JA14)
- Low leakage air-handling unit (JA9)
- Occupant-controlled smart thermostats (JA5)
- Residential fault indicator display (JA6)

Energy Code Compliance Program Compliance Document Registration

Reference: Section 10-103, Reference Residential Appendix RA2, Reference Joint Appendix JA7

The Energy Commission developed the ECC program in part to help ensure compliance with the Energy Code for residential projects that require field verification and diagnostic tests (ECC-Verification). Registration of compliance documentation (CF1Rs, CF2Rs, and CF3Rs) is required for any residential construction project for which a CF3R is required. (Not all residential construction projects require a CF3R.) Reference Residential Appendix RA2 and Reference Joint Appendix JA7 provide detailed descriptions of procedures and responsibilities for the registration of CF1R, CF2R, and CF3R.

Compliance document registration is required for all newly constructed homes, most additions, and many alterations. When registration is required, compliance documents must be electronically submitted to an Energy Commission approved ECC-Provider. ECC-Provider services include an ECC data registry (ECC registry) for the registration and retention of compliance documents.

All compliance documents (CF1Rs, CF2Rs, and CF3Rs) submitted to the ECC registry must be certified and signed by the applicable responsible person (Section 10-103) as well as any other required signatories. The ECC registry will assign a unique registration number to each document when completed, and certification (by an electronic signature) is provided by all signatories. The ECC registry will retain the unique registered documents, which are available via secure Internet access to authorized users. This allows authorized users to download unalterable electronic certificates or to make paper copies of the registered documents for purposes such as submittal to the enforcement agency, posting in the field for inspections, or sharing with the building owner (see Approval for Occupancy).

Types of ECC registry users include energy consultants, builders, building owners, construction contractors and installers, ECC-Raters, enforcement agencies, and the Energy Commission. Document authors are typically employed by the person responsible for the document, with specific exceptions. Authorized users are granted access rights to the electronic data associated with the projects under their direct control.

Compliance Phases

Compliance Documentation

Complying with and enforcing the Energy Code in residential buildings involves many parties. Those involved may include the architect or designer, builder/developer, purchasing agent, general contractor, subcontractor/installer, energy consultant, plan examiner, inspector, REALTOR®, and owner/first occupant. All these parties must communicate and cooperate for the compliance and enforcement process to run efficiently.

The Energy Code specifies detailed reporting requirements intended to provide design, construction, and enforcement parties with the information to ensure that the energy features are properly installed. Each party is accountable to ensure that the features that it is responsible for are correctly installed. This section outlines each phase of the process, responsibilities, and requirements.

The energy compliance documentation has been revised and reorganized. Prescriptive (Chapter 1.6) versions of the certificate of compliance (CF1R) have been designed to be used specifically with:

- Single-family residential newly constructed buildings (CF1R-NCB-01).

- Single-family residential additions (CF1R-ADD-01).
- Single-family residential additions that do not require ECC-Verification (CF1R-ADD-02)
- Single-family residential alterations (CF1R-ALT-01).
- Single-family residential HVAC changeouts (CF1R-ALT-02).
- Single-family residential alterations that do not require ECC-Verification (CF1R-ALT-05).

The certificate of installation (CF2R) is separated into:

- Envelope (CF2R-ENV).
- Lighting (CF2R-LTG).
- Mechanical (CF2R-MCH).
- Plumbing (CF2R-PLB).
- Photovoltaic and battery storage, solar-ready zone area, and solar thermal water heating (CF2R- PVB, SRA, and STH, respectively).

These categories and most compliance measures have a separate CF2R form that is specific to a particular installation. CF2R forms also incorporate references to applicable mandatory requirements. The ECC certificate of verification (CF3R) forms are categorized and organized in the same way as the CF2R forms. Refer to Appendix A of this manual for more information about the forms and to view samples of the forms. Additional information about the compliance documents will be provided throughout this manual.

When ECC-Verification is required for compliance, the Energy Code requires all residential energy compliance documents to be registered with an ECC registry. This registration accomplishes retention of a completed and signed copy of the submitted energy compliance documentation. To simplify the permit process for HVAC changeouts, Section 10-103 of the Energy Code allows the registered CF1R-ALT-02 document to be submitted to an enforcement agency at final inspection and not before obtaining a permit. More details are in Chapter 9 of this manual. Document retention is vital to compliance and enforcement follow-up and other quality assurance follow-up processes that ensure energy savings from installed energy features. Reference Residential Appendix RA2 and Reference Joint Appendix JA7 have more details about document registration procedures building energy code compliance and enforcement process.

Design Phase

Please refer to Chapter 2.2.2 of the *2022 Single-Family Residential Compliance Manual*.

Permit Application

Reference: Section 10-103(a)2, Section 10-103(a)1C

When the design is complete, the compliance documents are prepared (CF1Rs), and other approvals (planning department, water, and so forth) are secured, the owner, builder or contractor applies for a building permit with the enforcement agency. This application is the last step in the planning and design process.

To help the enforcement agency verify that the proposed building complies with the Energy Code, the CF1R documents are submitted with the building permit application, as required by the Energy Code. (See Section 10-103.) The length and complexity of the CF1R documentation varies depending on the scope of the project. For example, the number and type of components being installed/replaced (windows, space conditioning equipment, roof replacement, ceiling insulation, and so forth), the number of buildings being constructed/altered, the size of an addition, whether an orientation-independent permit is being requested, and whether the performance approach or the prescriptive approach is being used will all need to be documented in the CF1Rs. An energy consultant who understands the code and is able to help the builder or owner comply with the standards often prepares the CF1Rs.

The forms used to demonstrate compliance must be readily legible and shall conform to a format and informational order and content approved by the Energy Commission. If registration is required, the CF1R that is submitted to the enforcement agency must be a registered copy from an approved ECC registry.

Plan Check

The registration process requires the builder or designer to submit the certificate of compliance information and an electronic signature to an approved ECC registry to produce a completed, signed, and dated electronic CF1R that is retained by the ECC registry. Copies of the registered CF1R are available to authorized users of the ECC registry for use in making electronic or paper copies of the registered document(s) for submitting to the enforcement agency as described in Section 10-103.

Local enforcement agencies check plans to ensure that the building design conforms to the Energy Code. This plan check focuses primarily on the fire, life, and safety requirements of the CBC and secondarily on the building energy efficiency requirements. Vague, missing, or incorrect information on the construction documents are identified by the plans examiner. The permit applicant is required to make corrections or clarifications then resubmit revised plans and specifications.

Submitting complete and accurate plans and specifications provides the plans examiner with the information needed to complete the plan check quickly.

The plans examiner verifies that the information on the construction documents is consistent with the requirements specified on the CF1R. Examples of features detailed on the CF1R that the plans examiner will verify are specified in the respective sections of the building plans include:

- The window and skylight U-factor and solar heat gain coefficient (SHGC) values from the CF1R on the structural/architectural plans in a window/skylight schedule, window/skylight legend for the floor plan.
- The HVAC equipment and distribution information from the CF1R is clearly documented on the plans, such as SEER, EER, AFUE, mandatory, prescriptive, and elective ECC measures, and other values necessary to verify compliance.

The plans examiner compares the data on the CF1Rs against the rest of the plans and documents submitted for the permit applications, including all the following subject areas:

- Envelope (walls, ceiling, floors)
    - U-factors, solar heat gain coefficients of windows, skylights, and doors
    - Insulation and air sealing
    - Advanced wall, ceiling, and raised-floor construction and insulation
- Roofing materials and construction
    - Roof-deck insulation
    - Radiant barrier
    - Vented or unvented attic
    - Cool roof reflectivity requirements
- Heating, ventilating, and air conditioning (HVAC)
    - SEER2, EER2 and AFUE (if applicable) for HVAC equipment
    - Ducting design and register placement
    - Ventilation and indoor air quality requirements
    - Duct insulation and placement (in or outside conditioned space)
    - Thermostat requirements
    - Manufacturer certification check
- Lighting requirements
    - Luminaire efficacy requirements
    - Switching and control devices
    - Outdoor lighting and controls
- Domestic hot water
    - Manufacturer certification check
    - Water piping design and insulation
- Solar PV and battery systems
    - PV system capacity, orientation and tilt, shading obstructions
    - Solar shading analysis
    - Battery system capacity, control strategies
    - Battery-ready requirements

The enforcement agency should clearly articulate to the builder/designer the acceptable methods of specifying energy features on the building plans for approval.

Since those buying building materials and the construction staff may rely solely on a copy of the approved plans and specifications, it is important that the building design represented on the approved plans and specifications complies with the Energy Code as specified on the CF1R.

The enforcement agency's plans examiner must also verify that the CF1R does not contain errors. Newly constructed buildings using the performance approach are required to use Energy Commission approved compliance software; additions and alterations generally use the prescriptive approach, with the option of using the performance approach. When the CF1R is produced by Energy Commission approved compliance software, there is a lower chance of computational errors. The plans examiner must still verify that the design on the plans is consistent with the energy features on the certificate of compliance documents (CF1Rs). A list of Energy Commission approved Energy Code compliance software applications is available online at the Energy Commission Compliance Software website (https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/energy-code-support-center/compliance).

The Building Energy Efficiency Standards Hotline at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/energy-code-hotline-submission or at 1-800-772-3300 can assist with locating and installing this software.

With production homes, where a builder may be constructing several identical houses at roughly the same time, the compliance documentation may be prepared in such a way that a house or model can be constructed in any orientation. The plans examiner will verify that the home complies facing all four main compass points (north, south, east, and west) on the CF1R form.

Building Permit

Please refer to Chapter 2.2.5 of the *2022 Single-Family Residential Compliance Manual*.

Construction Phase

Upon receiving a building permit from the enforcement agency, the contractor begins construction. The permit requires the contractor to follow the plans and specifications, but often there are variations. Some variations are formalized through change orders. When change orders are issued, the permit applicant and the AHJ are responsible for verifying that the changes do not compromise compliance with the code. Code compliance is clear in some cases such as when a single-glazed, metal-frame window is substituted for a high-performance double-pane, vinyl-frame window. It may be difficult to determine compliance of changes such as orientation of the house or the location of a window. Field changes that result in noncompliance require enforcement agency approval of revised plans and revised energy compliance documentation to confirm that the building still complies with the Energy Code.

During construction, the general contractor or specialty subcontractors are required to complete various CF2Rs. These certificates verify that the contractor is aware of the Energy Code requirements and has followed the Energy Commission approved procedures for installation. These certificates are to identify the energy efficiencies and features of the installed building components. The CF2Rs are a collection of energy compliance information forms that apply to each regulated energy feature that may be included in the construction. The certificates are required to be completed by each of the applicable specialty contractors when they install regulated energy features such as windows, water heater and plumbing, HVAC ducts and equipment, lighting, and insulation.

The licensed person responsible for the building construction or installation of an energy-related feature must ensure their work is done in accordance with the approved plans and

specifications for the building. The person must complete and sign a certificate of installation to certify that the installed features, materials, components, or manufactured devices for which they are responsible conform to the plans and specifications and the certificate of compliance documents approved by the enforcement agency for the building. A copy of the completed, signed, and dated CF2R must be posted at the building site for review by the enforcement agency in conjunction with requests for final inspection for the building. Copies of the registered CF2R forms shall be provided to the homeowner.

When any ECC-Verification is required for compliance, all CF2R forms must be registered with an approved ECC registry. When registration is required, the builder or installing contractor must submit information to an approved ECC registry to produce a completed, signed, and dated electronic CF2R that is retained by the ECC registry for use by authorized users of the ECC registry. After the information to complete the CF2R document is transmitted to the ECC registry and the form is electronically signed, the CF2R is assigned a registration number.

Copies of the unique registered CF2R are made available to authorized users of the ECC registry to make electronic or paper copies of the registered document(s) for submittal to the enforcement agency as required. The builder or installing contractor must provide a copy of the completed, signed, and registered CF2R to the ECC-Rater and post a copy at the building site for review by the enforcement agency in conjunction with requests for final inspection and provide copies of the registered CF2R forms to the homeowner.

More information about registering CF2R documents can be found in Reference Residential Appendix RA2 and Reference Joint Appendix JA7.

Enforcement Agency Field Inspection

Reference: Section 10-103(d)

Enforcement agency representatives inspect construction projects to ensure compliance with the Energy Code. Field construction changes and noncompliant energy features require parties associated with previous phases to repeat and revise their original energy compliance documents or reinstall building components that meet the building specifications and energy compliance documents.

Enforcement agencies make several visits to a building site to verify construction. The first visit is typically made before the slab or building foundation is poured. The building inspector verifies that the proper reinforcing steel is in place and necessary wiring and plumbing that will be embedded in the slab meet the requirements of the standards. The inspector should verify features that are to be installed in or under concrete slab floors, such as slab edge insulation or hot water recirculation loops that include piping in the slab. The inspector should also verify the front orientation and floor assembly types (such as slab on grade, raised floor, and others) of the building during this construction phase. Details of how the inspector should verify these components are in Chapter 3 of this manual.

The second visit occurs after the walls have been framed, and the HVAC equipment and ducting, fenestration, lighting cans, electrical wiring, plumbing, and other services have been constructed or installed. This inspection should be done before insulation is installed to ensure sealing and caulking around windows are completed, and the caulking and sealing of any holes bored through the framing members for installation of hot and cold water piping and electrical wiring.

During the rough frame inspection, the inspector should also verify the installation of the high-efficacy lighting so that the contractor can make any necessary corrections before the final inspection. This verification avoids having to remove drywall, insulation, and so forth to remove an incandescent can. The inspector should also verify the window/skylight U-factor and SHGC values, proper sealing/installation of HVAC ducts and duct insulation R-value, installation of exhaust fan housing and ducting in bathrooms and kitchens (ASHRAE 62.2), and installation of a radiant barrier or cool roof or a combination thereof when required. Details of how the inspector should verify these components will be discussed in the respective chapters of this manual.

The third visit is the insulation inspection, which takes place after the wall, ceiling, and floor insulation have been installed. This inspection occurs before the drywall is installed to verify that the insulation R-value matches the CF1R form, and the insulation has been properly installed without compressions, voids, or gaps. The inspector should verify that insulation is installed correctly around and behind piping and all exterior walls are insulated (especially behind obstructing objects like a bathtub). Details of how the inspector should verify these components are in Chapter 3 of this manual.

The next visit is a drywall inspection, where the inspector verifies that the drywall is installed properly to limit infiltration and exfiltration, especially at locations surrounding lighting cans, HVAC registers and vents, and electrical sockets.

The final inspection is conducted after the walls have been closed and the final electrical and plumbing fixtures are in place. The inspector should verify HVAC efficiency values, water heating efficiency values, exhaust fan and other ventilation system noise level ratings in bathrooms and kitchens (ASHRAE 62.2), filter MERV rating and thickness, exterior lighting and controls, and weather stripping on exterior/demising doors. The inspector will also verify that all required CF2R and CF3R forms have been completed, signed, and registered.

At final inspection, the inspector should verify that the builder has left in the building all applicable completed, signed, dated, and registered (when applicable) compliance documents (CF1R, CF2R, and CF3R if applicable) for the building owner at occupancy. These forms must be in paper or electronic format and must conform to the applicable requirements of Section 10-103(a). Details of how the inspector should verify these components is discussed in the Enforcement Agency section of this manual.

The typical enforcement agency inspection sequence can vary from jurisdiction to jurisdiction. It can be difficult for the enforcement agency to verify every energy efficiency measure required to be installed in the building. For example, exterior wall insulation will likely not be installed at the time of the framing inspection. If the enforcement agency does not include the insulation inspection in its field inspection schedule, the exterior wall insulation would be concealed from an inspector's view at the final inspection.

The CF2Rs and, when required, the CF3Rs are crucial for verifying code compliance. When inspection of an installed energy feature would be impossible because of subsequent construction, the enforcement agency may require the CF2R for the concealed feature to be posted at the site or made available to the inspector upon completion/installation of the feature. To simplify the inspection, the inspector would reference the efficiency values and building components specified on the submitted CF2R form to verify compliance with the Energy Code.

When registration is required, all certificates of installation must be registered through an approved ECC registry. For all measures requiring field verification, a registered certificate of verification shall also be made available to the building inspector.

Field Verification and Diagnostic Testing

Some building features require field verification and diagnostic testing completed by an ECC-Rater as a condition for compliance with the Energy Code. For these features, a certified ECC-Rater is required to perform the test according to procedures in Reference Residential Appendix RA2 using the protocols in Reference Residential Appendix RA3.

There are mandatory requirements, prescriptive requirements, and performance credits (Chapter 1) that require ECC testing. Many requirements that require verification and testing involve air-conditioning equipment and forced-air ducts that deliver conditioned air to the dwelling. Examples of measures requiring ECC testing are refrigerant charge measurement and duct sealing. An example of an installed feature that does not require ECC testing is lighting control in spaces like a laundry room or bathroom.

The Energy Code mandates that all newly constructed homes with central HVAC systems have duct sealing (leakage testing), duct system airflow and fan watt draw (an installed hole for the placement of a static pressure probe (HSPP)/permanently installed static pressure probe (PSPP), and exhaust fans/systems (ASHRAE 62.2) verified by a ECC-Rater when those systems are installed. Details about these measures are in Chapter 4 of this manual.

Additional measures requiring field verification include reduced duct surface area, increased duct R-value, high-SEER2 and -EER2 cooling equipment, and quality installation of insulation (QII). A full list of measures requiring field verification or diagnostic testing is in Table RA2-1 of the *2025 Reference Residential Appendices*. The requirements for field verification and diagnostic testing apply only when equipment or systems are installed. If a house has no air distribution ducts, then an ECC-Rater does not have to test them.

The ECC-Rater must verify the required features and transmit all required data describing the feature and the test results to an approved ECC registry. The ECC-Rater must confirm that the installed energy feature being verified is consistent with the requirements for that feature as specified on registered copies of the CF1R approved by the enforcement agency for the dwelling.

The ECC-Rater must confirm the information on the CF2R is consistent with the CF1R. The test results reported on the CF2R by the person responsible for the installation must be consistent with the ECC-Verification results determined by the ECC-Rater's diagnostic verification and meet the criteria for standards compliance. A copy of the registered CF2R must be posted at the building site for review by the enforcement agency and made available for applicable inspections. A copy of the registered CF2R must also be left in the dwelling for the homeowner at occupancy.

Results from the ECC-Rater's field verification or diagnostic test are reported to the ECC registry with "pass" or "fail." If the results are "pass," the ECC registry will make a registered copy of the CF3R available. A copy of the registered CF3R must be posted at the building site for review by the enforcement agency and made available for all applicable inspections. Copies must be given to the builder and left in the dwelling for the homeowner at occupancy. If results are "fail," that failure must be entered into the ECC registry. ECC-Providers shall not

permit any user of the ECC registry to print or access forms for noncompliant entries unless the CF3R form contains a watermark with the word "FAIL" or "FAILURE." Corrective action on the failed requirement shall be taken by the builder or installer. The ECC-Rater will retest the requirement to verify that the corrective action was successful. Once the correction is made, the passing CF3R shall be entered into the ECC registry.

Approval for Occupancy

For newly constructed buildings and additions, the final step in the permitting process is for the enforcement agency to issue an occupancy permit so occupants can move in. Single-family homes and duplexes are often approved for occupancy without an occupancy permit being issued. Often a signed-off final inspection serves as an approval for occupancy, but this approval depends on the enforcement agency. When ECC-Verification is required before occupancy approval, the ECC-Rater must post paper copies of the registered CF3Rs for site review by the building owner, installers, and inspectors.

For alterations to existing buildings, the signed-off final inspection is all that is required. Since the project is in a building with an existing occupancy permit, the enforcement agency is not required to issue a new occupancy permit. It should be noted that the extent of the alteration is limited by the Energy Code and, typically, the local codes and standards. If an alteration is too extensive, it can be considered a newly constructed building. For example, a project that removes all wallboards, insulation, and exterior walls from a building could be considered a newly constructed building and not an alteration by the enforcement agency.

Occupancy

At the occupancy phase, the enforcement agency must require the builder to leave all compliance documentation in the building, which includes at a minimum the CF1R and all applicable CF2R forms. When ECC-Verification is required, copies of the registered CF3Rs must be left on site with the compliance documentation.

When registration is required, the CF1R and all required CF2R compliance documentation shall be registered copies. The builder is required to provide the homeowner with a manual that contains instructions for efficiently operating and maintaining the features of their building.

Compliance Documentation

Compliance documentation includes the forms, reports, and other information that are submitted to the enforcement agency with an application for a building permit. It also includes documentation completed by the contractor or subcontractors to verify that certain systems and equipment have been installed correctly. It may include reports and test results by ECC-Raters. The compliance documentation (CF1R, CF2R, and CF3R) is included with a homeowner's manual so that the end user knows what energy features are installed in the house.

Compliance documentation is completed at the building permit phase, the construction phase, the field verification and diagnostic testing phase, and the final inspection phase. The required forms and documents are listed in Appendix A. When registration is required, all the compliance documentation shall be registered copies from an approved ECC registry.

Building Permit Phase Documentation

Reference: Section 10-103(a)

The compliance documentation required at the building permit phase consists of the CF1R and is based on the building plans. Depending on the compliance approach, the energy compliance documentation package may also include the area weighted average calculation worksheet (CF1R-ENV-02-E), the solar heat gain coefficient (SHGC) worksheet (CF1R-ENV-03-E), and the cool roof and solar reflectance index (SRI) worksheet (SRI-WS). Blank copies of these worksheets for use in the prescriptive approach are in Appendix A of this manual. When the performance approach is used, only the registered CF1R-PRF documents are required on the building plans.

The compliance documentation enables the plans examiner to verify that the building design shown in the plans and specifications complies with the Energy Code. It enables the field inspector to identify which building features are required for compliance and will be verified in the field.

Certificate of Compliance (CF1R)

The Energy Code requires the CF1R to be incorporated into the plans for the building and submitted to the enforcement agency during the building permit phase. The CF1R form identifies the minimum energy performance specifications selected by the building designer or building owner for code compliance and must include the results of the heating and cooling load calculations. The information submitted on the CF1R must be consistent with the building design features in the plans and specifications for the building submitted to the enforcement agency.

To meet the requirement for filing a copy of the CF1R with the building plans for a permit application, builders/contractors should ask the enforcement agency for information about their preferences or requirements for document submittal procedures. Most local enforcement agencies may require the CF1R to be embedded in the building design computer-aided drafting (CAD) file for plotting on sheets that are the same size as the plan set sheets of the building design. Thus, the CF1R documentation would be submitted as energy compliance design sheets integral to the entire plan set for the building. Some jurisdictions may allow taping CF1R document sheets to the submitted design drawings for the building. Others may allow attaching 8½-inch x 11-inch printed CF1R document reports to the submitted design drawing package.

When the prescriptive approach is used for additions and alterations, the applicable prescriptive version of the CF1R shall be submitted with the building plans or with the permit application when no plans are required. In these instances, a CF1R- ADD form is required to be submitted for additions, a CF1R-ALT-01 form is required for alterations, and a CF1R-ALT-02 form is required for HVAC changeouts. More details are in Chapter 9.

For single-family residential buildings where compliance requires field verification and diagnostic testing by an ECC-Rater, the CF1R submitted to the enforcement agency must be a registered copy from an approved ECC registry. More information is in the Reference Residential Appendix RA2 and Reference Joint Appendix JA7.

Construction Phase Documentation (CF2R)

The CF2Rs are separated into envelope (CF2R-ENV), lighting (CF2R-LTG), mechanical (CF2R-MCH), plumbing (CF2R-PLB), and solar (CF2R-PVB and CF2R- STH) categories. Most compliance requirements have a separate CF2R form that is specific to a particular installation. The CF2R forms must be completed during the construction or installation phase. The documents must be completed by the applicable contractors responsible for installing regulated energy features such as windows (fenestration), the air distribution ducts and the HVAC equipment, the exhaust fans/ventilation system, the measures that affect building envelope tightness, the lighting system, and the insulation. The CF2Rs must be posted at the job site in compliance with instructions from the enforcement agency. Most typically, these forms will be with the building permit folder in a window or other accessible location.

When ECC-Verification of a feature is required for compliance (as shown in the ECC required certification section of the CF1R), the builder or the builder's subcontractor must perform the initial field verification or diagnostic testing of the installation to confirm and document the applicable CF2R compliance with the standards using the applicable procedures specified in Reference Residential Appendix RA3. The builder, the builder's subcontractor, or authorized representative must submit the CF2R information to an approved ECC registry. All CF2R information submittals must be done electronically when ECC-Verification/testing is required.

Field Verification and Diagnostic Testing Documentation (CF3R)

Reference: Section 10-103(a)5

Within the Energy Code, some mandatory requirements, some prescriptive requirements, and some requirements that may be used for compliance credit in the performance approach may require field verification or diagnostic testing or both.

This testing must be performed by an ECC-Rater who is specially trained by an ECC-Provider to perform field verification and diagnostic testing pursuant to the requirements of Section 10-103.3, and is independent from the builder or general contractor.

When ECC-Verification is required, the ECC-Rater must complete, register, and sign/certify the CF3R. The CF3R documents include information about the measurements, tests, and field verification results that were required to be performed. The ECC-Rater must verify that the requirements for compliance have been met.

The ECC-Rater chosen for the project must transmit the CF3R information to an approved ECC registry. This must be the same ECC registry through which the previous compliance documents (CF1R, CF2R) for the project were registered. The ECC-Rater used for the project must be certified by the ECC-Provider. A registered CF3R is made available to the enforcement agency and the builder when ECC testing confirms compliance. The builder ensures that the enforcement agency has received the CF3R. The enforcement agency cannot issue the certificate of occupancy before receiving all required compliance documents, including the CF3Rs.

The ECC-Rater shall provide a separate registered CF3R form for each house that the ECC-Rater determines has passed the ECC-Verification performed for compliance. The ECC-Rater shall not sign a CF3R for a house that does not have a registered CF2R that has been signed/certified by the installer. The only exception is for homes or projects within a sample group.

Sampling is a process where a builder or contractor may coordinate with an ECC-Rater to allow the ECC-Verification for one newly constructed home or project to stand for all homes or projects within the sample group. Sample groups may include similar homes or projects from one builder, contractor, or installer for a particular ECC-Verification. For example, an HVAC contractor, after installing a ducted HVAC system, may request up to seven existing homes in one sample group. Working with one ECC-Rater, the contractor will test only one of the seven homes for fan watt draw, duct air leakage, and refrigerant charge. If it passes, the ECC-Verification on this one home will stand for all seven installations in the sample group.

If the building was included in a sample group, the CF3R will identify whether the requirement passed compliance by testing or by sampling. The CF3R form for the tested home of a sample group will include the ECC test results, but the CF3Rs for the untested homes will not. CF3Rs for tested and untested homes in a sample group will still have a registration number, date, time, and watermark of the ECC-Provider's seal as for the CF3R of any other building that is not included in sampling. Refer to Reference Residential Appendix RA2 for more details on ECC-Verification and CF3R documentation procedures.

Compliance, Operating, Maintenance, and Ventilation Information to BE Provided by Builder

Please refer to Chapter 2.3.5 of the *2022 Single-Family Residential Compliance Manual*.

Roles and Responsibilities

Designer

Reference: 5537 and 6737.1 of California Business and Professions Code

The designer is responsible for the overall building design. The designer specifies the building features that determine compliance with the Energy Code and other applicable building codes. The designer is required to sign the certificate of compliance (CF1R) to certify that the building complies with the Energy Code.

The designer may personally prepare or delegate preparation of the energy analysis and certificate of compliance documents to an energy documentation author or energy consultant (see description of documentation author below). If preparation of the compliance documentation is delegated, the designer must remain in charge of the building design specifications, energy calculations, and all building feature information represented on the certificate of compliance. The designer's signature on the certificate of compliance affirms their responsibility for the information submitted. When the designer is a licensed professional, such as an architect or engineer, the signature block on the certificate must include the designer's license number.

A licensed design professional may not always be required for single-family residential buildings. The California Business and Professions Code allows unlicensed designers to prepare design documentation for wood-framed single-family residential buildings if the dwellings are no more than two stories high, not counting a possible basement. For homes that do not require a licensed design professional, the builder may sign the CF1R in the "Responsible Building Designer" signature block (see description of builder below). The ECC-Rater is not eligible to sign the CF1R as the Responsible Designer.

When registration is required, the certificate of compliance must be submitted to an approved ECC registry. All submittals to the ECC registry must be made electronically.

Documentation Author

Reference: Section 10-103(a)1

The person who designs the building may delegate preparation of the energy analysis and certificate of compliance documents to an energy documentation author or energy consultant.

The documentation author is not subject to the same limitations and restrictions of the *Business and Professions Code* as is the building designer because the documentation author is not responsible for specification of the building design features. The documentation author may provide the building designer with recommendations for building energy features. If building designer approves the recommendations, the features must be incorporated into the design plans and specification documents submitted to the enforcement agency at plan check.

The documentation author's signature on the certificate of compliance certifies that the documentation is accurate and complete but does not indicate documentation author's responsibility for the specification of the features that define the building design. The documentation author provides completed certificate of compliance documents to the building designer, who must sign the certificate before submitting it to the enforcement agency at plan check.

If registration of the CF1R is required, it must be submitted to an approved ECC registry and signed electronically by the designer and documentation author before submitting to the enforcement agency. When document registration is required, only registered certificates of compliance that display the registration number assigned to the certificate by an approved ECC registry are acceptable for submittal to the enforcement agency at plan check.

A list of Certified Energy Analyst (CEA) documentation authors is available through the California Association of Building Energy Consultants' (CABEC) homepage at https://cabec.org/.

Builder or General Contractor

Chapter 9 of the *Business and Professions Code* specifies the term "contractor" is synonymous with the term "builder." This manual uses "builder" to refer to the general contractor responsible for construction. For additions and alterations to existing homes, the contractor can act as the builder (typically for smaller projects). For production homes, the builder may also be the developer responsible for arranging financing, acquiring the land, subdividing the property, securing the necessary land planning approvals, and attending to the other necessary tasks that are required before the start of actual construction. Many production builders are involved in marketing and sales of homes after they are constructed.

During construction, the builder usually hires specialty subcontractors to provide specific services, such as installing insulation, designing, and installing HVAC systems, installing windows and skylights, installing water heating systems, and others (see description of specialty contractors below). For homes that do not require a licensed design professional, the builder may sign the CF1R in the "Responsible Building Designer" signature block.

The builder must ensure that CF2Rs are submitted to the enforcement agency by the person(s) responsible for the construction/installation of regulated features, materials,

components, or manufactured devices. The builder may sign the CF2R on behalf of the specialty subcontractors they hire, but the preparation and signature responsibility reside with the specialty subcontractor who provided the installation services. The CF2R identifies the installed features, materials, components, or manufactured devices detailed in the plans and specifications, and the CF1R approved by the enforcement agency. If the installation requires ECC-Verification, the CF2R must report the results of the installer's testing of the regulated installations to measure performance. The CF1R and the CF2R shall be submitted to an approved ECC registry. A copy of the registered CF2R is required to be posted at the building site for review by the enforcement agency in conjunction with requests for intermediate and final inspections.

When the Energy Code requires registration of the compliance documents, the builder must:

- Ensure the transmittal/submittal of the required information to an approved ECC registry.
- Arrange for the services of a certified ECC-Rater if the CF1R indicates that ECC-Verification is required.
- Ensure that a copy of the CF1R that was approved by the designer/owner and submitted to the enforcement agency during the permitting phase is transmitted to the ECC registry. The CF1R should be made available to the ECC-Rater, who will perform any required ECC-Verification and diagnostic testing.

When installation is complete, the builder must ensure that the persons responsible for the installation have transmitted/submitted the required CF2R to the ECC registry. The builder must ensure that the ECC-Rater receives a copy of the completed CF2R or is provided access to the ECC registry where the CF2R signed by the builder or subcontractors responsible for the installation has been registered. When registration of the CF2R is required, the completed and signed copies that are posted at the building site for review by the enforcement agency, in conjunction with requests for final inspection, are required to be registered copies.

At final inspection, the builder is required to leave in the building all applicable completed, signed, dated, and registered (when applicable) compliance documents (CF1R, CF2R, and CF3R if applicable) for the building owner at occupancy. These forms must be in paper or electronic format and must conform to the applicable requirements of Section 10-103(a).

Specialty Subcontractors

Specialty subcontractors provide the builder with services from specific building construction trades for installation of features such as wall and ceiling insulation, fenestration, HVAC and air-distribution systems, or water heating and plumbing. These subcontractors may perform other trade-specific specialty services during construction. The builder is responsible for all aspects of building construction and has the authority to complete and sign/certify all sections of the required CF2Rs. The licensed specialty subcontractor, however, must complete and sign/certify all applicable CF2Rs that document the completion of the work they have performed.

The subcontractor's responsibility for documentation should include providing a registered (when applicable) and signed copy of all applicable CF2Rs to the builder and posting a registered (when applicable) and signed copy of all applicable CF2Rs at the building site for

review by the enforcement agency. The subcontractors should make the registered and signed copies of the applicable CF2Rs available to the ECC-Rater if ECC-Verification is required for compliance, as specified on the CF1R or any CF2R.

When the Energy Code requires document registration, all copies of the CF2Rs submitted to the builder, the enforcement agency, and the ECC-Rater are required to be registered copies prepared by following the procedures in Reference Residential Appendix RA2, Reference Joint Appendix JA7, and Compliance Documentation of this manual.

Enforcement Agency

Please refer to Chapter 2.4.5 of the *2022 Single-Family Residential Compliance Manual*.

Plan Check

See additional detail, see description of Plan Check in Compliance Phases section. When the Energy Code requires document registration, the CF1R submitted for a plan check must be a registered document from an approved ECC registry. The one exception is the CF1R-ALT-02-E for HVAC changeouts. If approved by the enforcement agency, permit applicants may use unregistered CF1R-ALT-03-E or CF1R-ALT-04-E documents (dependent upon climate zone) to apply for permits and present the registered CF1R-ALT-02-E to the inspector at the time of the final permit.

Construction Inspection

For more detail, see description of Enforcement Agency Field Inspection in Compliance Phases section. During building construction, the enforcement agency should make several visits to the construction site to verify that the building is being constructed in accordance with the approved plans, specifications, and CF1R. At each site visit, the agency should review any applicable CF2Rs that have been posted or made available with the building permit(s). The enforcement agency should confirm that the energy efficiency features installed in the house are consistent with the requirements given in the CF1R for the building approved during plan check, that the installed features are described accurately on the CF2R, and that all applicable sections of the CF2R have been signed by the responsible licensed person(s). The enforcement agency should not approve a dwelling unit until it has received the applicable certificate(s). When the Energy Code requires registration of the energy compliance documents, the CF2R must be registered with an approved ECC registry.

Corroboration of Field Verification and Diagnostic Testing Procedures

As described in Reference Residential Appendix Section RA2.4.4, at its discretion, the enforcement agency may require that ECC-Verification by the builder or subcontractors or the ECC-Rater be scheduled so that the enforcement agency's field inspector can observe the ECC-Verification procedures to corroborate the results reported on the CF2R and CF3R.

Sampling Within Enforcement Agency Jurisdictions

When sampling is used for ECC testing for newly constructed buildings, all dwellings in a designated sample group must be located within the same enforcement agency jurisdiction and subdivision as specified in Reference Residential Appendix Section RA2.6.3.1

Final Approval

The enforcement agency may approve the dwelling at the final inspection phase if all field inspections have determined the following:

- The dwelling conforms to the requirements of the plans and specifications as approved by the enforcement agency.
- The dwelling conforms with the CF1R approved by the enforcement agency.
- The dwelling conforms with all other applicable codes and standards requirements.
- The enforcement agency is in receipt of all CF2R required by the Energy Code and as identified by the CF1R for the dwelling unit.
- The CF1R and CF2R are signed and registered (when applicable) by the builder or subcontractor.
- For dwelling units requiring ECC testing, the enforcement agency has received a copy of the CF3R as registered with an ECC registry.
- The CF3R has been signed and dated by the ECC-Rater.

The builder must ensure that all the required energy compliance documentation has been completed properly and posted at the job site or submitted to the enforcement agency in conjunction with the required inspections. However, the enforcement agency, in accordance with Section 10-103(d), as a prerequisite to approval of the building, must examine all required copies of the CF1R, CF2R, and CF3R posted at the site or made available with the building permits for the required inspections. This examination confirms that these compliance documents have been properly prepared and are consistent with the plans and specifications approved by the enforcement agency.

The enforcement agency may conditionally approve a building using the CF2R testing performed and documented by a Third Party Quality Control Program (TPQCP) contractor. (See Third Party Quality Control Program.) TPQCP contactors may not use group sampling for additions or alteration but may perform the CF2R testing and documentation required by the Energy Code for individual addition or alteration projects. TPQCP contractors may use group sampling (limited to no more than 30 members each) for newly constructed buildings as provided by the Energy Code. However, if subsequent ECC testing determines that resampling, full testing, or corrective action is necessary for such conditionally approved dwellings, the corrective work must be completed and retested. Additional information is in Reference Residential Appendix RA2.4.3, RA2.7, and RA2.8.

Corroboration of Information Provided for the Owner/Occupant

At final inspection, the enforcement agency shall require the builder to leave in the building (for the building owner at occupancy) Energy Code compliance documents, operating and maintenance manuals, and ventilation information, as specified by Section 10-103(b).

Compliance documents for the building shall include all valid certificates of compliance (CF1R), certificates of installation (CF2R), and certificates of verification (CF3R). These documents must conform to the applicable requirements of Section 10-103(a).

Three types of information operating and maintenance materials shall be provided for the owner/occupant:

- Operating information shall include instructions on how to operate or maintain the energy features, materials, components, and mechanical devices of the building correctly and efficiently.
- Maintenance information shall be provided for all features, materials, components, and manufactured devices that require routine maintenance for efficient operation. Required routine maintenance actions shall be clearly stated and incorporated on a readily accessible label. The label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of feature, material, component, or manufactured device.
- Ventilation information shall include a description of the quantities of outdoor air that the ventilation system(s) are designed to provide to the conditioned space of the building and instructions for proper operation and maintenance of the system.

All such information shall be in paper or electronic format, and in a folder or otherwise bound to provide all information in Section 10-103(b). For dwelling units, buildings, or tenant spaces that are not individually owned and operated, or are centrally operated, such information shall be provided to the person(s) responsible for operating the feature, material, component, or mechanical device installed in the building.

ECC-Provider

An ECC-Provider is an organization that the Energy Commission has approved to administer a ECC program. The ECC-Provider certifies, trains, and oversees ECC-Raters. ECC-Raters provide ECC-Verification on installed energy efficiency features in dwellings when required for compliance with the Energy Code. Visit the Energy Commission website for the list of approved ECC-Providers at https://www.energy.ca.gov/programs-and-topics/programs/energy-code-compliance-program.

The ECC-Provider must also maintain an ECC registry that incorporates a website-based user interface that accommodates the needs of the authorized users of the ECC registry who administer ECC compliance document registration. The ECC registry must receive and record information required by ECC testing in a specific dwelling. The ECC registry must have the capability to verify that the recorded information complies with the Extensible Markup Language (XML) schema developed by the Energy Commission.

When the input data are verified, the ECC registry must make available a unique registered certificate available to authorized users. These registered certificates (CF1R, CF2R, and CF3R) are used in complying with document submittal requirements to local enforcement agencies, builders, building owners, ECC-Raters, and other interested parties. The ECC registry helps simplify electronic submittal of the registered certificates to an Energy Commission document repository for retention of the certificates for use in regulations enforcement.

The ECC-Provider must make available (via phone or Internet communications interface) a way for authorized users of the ECC registry to verify the information displayed on copies of registered documents. Refer to Reference Residential Appendices Section RA2.4.2 and Reference Joint Appendix JA7 for additional information.

ECC-Rater

The ECC-Rater is trained and certified by an Energy Commission approved ECC-Provider to perform the ECC-Verification that may be required to demonstrate and document compliance with the Energy Code. ECC-Raters receive special training in diagnostic techniques and building science as part of the certification administered by the ECC-Providers. The ECC-Raters operate independently from the ECC-Providers and are to act as independent, third-party agents to the contractor installing the energy efficiency requirements for the construction project.

ECC-Raters shall be considered "special inspectors" by enforcement agencies, which is not to be confused with the same term used by local enforcement agencies regarding inspectors with specific ICC training and certification. ECC-Raters are not special inspectors for the local enforcement agencies; they are special inspectors for the project proponents, including the installing contractor. ECC-Raters may be required to attain business licenses in some jurisdictions.

The Energy Commission has determined that an ECC-Rater may act as a document author for the CF2R for a residential project with no violation of the provisions of "Conflict of Interest" (Title 20, Section 1673(j)). If requested to do so by the builder or subcontractor, the ECC-Rater may aid the builder or subcontractor to register the CF2R with an ECC registry. However, the ECC-Rater may not certify the information on a CF1R as the responsible person (that is, sign the CF1R as if they were the builder or subcontractor).

The builder or subcontractor responsible for the installation must provide the certification by electronic signature to confirm the information submitted to the ECC registry. Refer to Reference Residential Appendix Section RA2.5 and Reference Joint Appendix JA7 for more information. The ECC-Rater may not certify the information on a CF2R as the responsible person unless the ECC-Rater and installer have signed a written agreement that the ECC-Rater is an authorized representative that may sign on behalf of the installer. The installing contractor remains the responsible person. Qualifications for delegation of signature authority are detailed in Section 10-103(a)3A.

The ECC-Rater conducts the ECC-Verification of the installed energy efficiency features when required by the CF1R or CF2R. The ECC-Rater must transmit the results of the ECC-Verification to the ECC registry. The ECC-Rater must provide to the ECC registry all information required to complete the CF3R and must certify those data as accurate and complete to the ECC registry. The ECC registry will make available registered copies of the CF3R to authorized users. Printed copies, electronic or scanned copies, and photocopies of the completed, signed, and registered CF3R are allowed for document submittals, subject to verification that the information contained on the copy conforms to the registered document information on file in the ECC registry for the dwelling. A copy of the registered CF3R must be posted at the building site or made available to the inspector for review by the enforcement agency in conjunction with requests for final inspection for each dwelling unit.

Go to Reference Residential Appendix Section RA2.4.2 for more information.

Example 2-1

Question

Can a certified ECC-Rater who performs and registers the ECC testing for a dwelling also perform the ECC-Verification required of the builder or installer to certify compliance with the Title 24, Part 6, installation requirements on the CF2R?

Answer

Yes. This approach is allowed when the ECC-Rater is doing ECC-Verification for every dwelling (100 percent testing), but it is not allowed when the ECC-Rater performs verification using a designated sample group of dwellings.

When 100 percent testing is used for ECC-Verification, the builder or the installer may use the information from the ECC-Rater's ECC test results when completing the CF2R. When doing so, builders or installers signing the certification statement on the CF2R assume responsibility for the information in the form and certify that the installation conforms to all applicable codes and regulations. The ECC-Rater may sign using the installer's delegated signature authority but cannot be assigned the responsibilities of the builder or installer, as stated on the CF2R and as prescribed by the Energy Code. Refer to Section 10-103(a)3A for authorized representation.

If the ECC-Rater determines that the compliance requirements are not met (in other words, the ECC-Verification results in a failure), the ECC-Rater will submit the data of the failed ECC testing to the ECC registry for retention. The builder or installer must make the needed corrections. Once corrections have been made and the ECC-Rater determines that all compliance requirements are met, the builder or installer may certify the work by completing and signing the applicable section of the CF2R. The ECC-Rater can complete the CF3R documentation for the dwelling.

Example 2-2

Question

I heard that there are conflict of interest requirements that ECC-Raters must abide by when doing ECC-Verification. What are these requirements?

Answer

ECC-Raters are expected to be objective, independent third parties as field verifiers and diagnostic testers. By law, ECC-Raters must be independent from the builder or subcontractor installer of the energy efficiency features being tested and verified. They can have no financial interest in the installation of the improvements. ECC-Raters cannot be employees of the builder or subcontractor whose work they are verifying. Also, they cannot have a financial interest in the builder's or contractor's business, or advocate or recommend the use of any product or service that they are verifying.

The Energy Commission expects ECC-Raters to enter into a contract with the builder (not with subcontractors) to provide independent, third-party ECC-Verification. The procedures adopted by the Energy Commission call for direct reporting of results to the ECC registry where the project has been established by the builder.

ECC-Providers must have a system for receiving queries and complaints. Additionally, the ECC-providers must have a system to respond to, investigate and resolve queries and complaints related to the ECC program according to the rules in Section 10-103.3. The ECC-Provider is

responsible for ensuring objective, accurate reporting of ECC testing results in compliance with the Energy Code to protect consumers from poor construction and installations.

Enforcement agencies have authority to require ECC-Raters to demonstrate their competence to the satisfaction of the building official. When the ECC-Rater's independence is in question, building officials can prohibit a particular ECC-Rater from being used in their jurisdiction or disallow practices that the building official believes will compromise the ECC-Rater's independence. For additional information please contact the Energy Commission Hotline.

Third-Party Quality Control Program

A TPQCP is a service that verifies the work of participating installers by gathering extensive diagnostic data and flagging potentially noncompliant installations.

The Energy Commission may approve TPQCPs that serve some of the functions of ECC-Verification by ECC-Raters, but TPQCPs do not have the authority of an ECC-Rater to sign compliance documentation. A TPQCP:

- Trains installers, contractors, technicians, and specialty subcontractors about compliance requirements for features that require field verification and diagnostic testing.
- Collects more data than would be required to demonstrate compliance with the Energy Code from participating installers for each installation.
- Performs validation and analysis of information from diagnostic ECC-Verification performed on a participating contractor's installation work to evaluate the validity and accuracy of the data and independently determine whether compliance has been achieved.
- Provides direction to the installer to retest and correct problems when data checking indicates that compliance has not been achieved.
- Ensures that the installer submits updated data when retesting and correction are directed.
- Maintains a database of all data submitted by the participating TPQCP contractor in a format that is acceptable and made available to the Energy Commission upon request.
- May arrange sample group of no more than 30 members for newly constructed buildings.
- May perform the CF2R testing and documentation for additions and alterations but may not place them into a sample group.

The ECC-Provider must arrange for an independent ECC-Rater to conduct independent ECC-Verification of the installation performed by the participating TPQCP contractor. If group sampling is used for ECC-Verification for jobs completed by a participating TPQCP contractor, the sample from the group that is tested for compliance by the ECC-Rater may be selected from a group composed of up to 30 dwellings for which the same participating contractor has performed the installation. Installations performed by TPQCP contractors may be approved at the enforcement agency's discretion and on the condition that, if subsequent ECC-Verification shows the installation(s) to fail CF3R testing and that retesting, resampling, full testing, or corrective action is necessary for such conditionally approved dwellings, either individually or in the group), the corrective work must be completed.

Refer to Reference Residential Appendix RA2.4.3, RA2.7, and RA2.8 for additional information.

Owner

Please refer to Chapter 2.4.9 of the *2022 Single-Family Residential Compliance Manual*.

ECC Field Verification and Diagnostic Testing

This section describes some procedures and requirements for ECC-Verification of energy efficiency features.

Measures Requiring ECC Field Verification and Diagnostic Testing

ECC-Verification is required only when certain regulated efficiency requirements or equipment features are installed. If such efficiency requirements or equipment features are not installed, then ECC-Verification is not required. For example, if a dwelling that must comply with the Energy Code does not have air distribution ducts, then ECC-Verification for duct leakage is not required for compliance.

The following features require ECC-Verification (see Tables RA2-1, RA2-2, RA2-3, RA2-4, RA2-5, RA2-6 for more details):

- Duct sealing
- Duct location, surface area, and R-value
- Low-leakage ducts entirely in conditioned space
- Low-leakage air handlers
- Verification of return duct design
- Verification of air filter device design, filter MERV rating, and labeling
- Verification of prescriptive bypass duct requirements
- Refrigerant charge in ducted split-system and ducted packaged unit air conditioners and heat pumps, and mini-split systems
- Installation of fault indicator display
- Verified system airflow
- Air handler fan efficacy
- Verified energy efficiency ratio 2(EER2)
- Verified seasonal energy efficiency ratio 2(SEER2)
- Verified heating seasonal performance factor 2(HSPF2)
- Heat pump-rated heating capacity
- Evaporatively cooled condensers
- Variable-capacity heat pump credit
- Whole-house fan
- Central fan ventilation cooling systems
- Continuous whole-building mechanical ventilation airflow
- Intermittent whole-building mechanical ventilation airflow
- Kitchen exhaust (including vented range hoods)
- HRV/ERV system heat recovery efficiency or fan efficacy

- Building envelope air leakage
- Quality insulation installation (QII)
- Quality insulation installation for spray polyurethane foam
- Verified pipe insulation for single dwelling
- Verified central parallel piping (PP-H)
- Verified compact hot water distribution system expanded credit (CHWDS-H-EX)
- Demand recirculation: manual control (R-DRmc-H)
- Demand recirculation: sensor control (R-DRsc-H)
- Verified drain water heat recovery system (DWHR-H)

Verification Testing and Sampling

At the builder's option, ECC testing may be completed for each newly constructed dwelling unit (100 percent testing) or for a group of newly constructed dwelling units (sampling). Sampling is permitted only for newly constructed units when multiple dwelling units of similar design are constructed within the same subdivision by the same subcontractor.

More details are in Reference Residential Appendix Section RA2.6 and RA2.8.

To be included in a sample group, the builder or subcontractor must provide the ECC-Rater with a copy of the registered CF1R and CF2R as specified in Reference Residential Appendix Section RA2.5. The building owner or installer must give the ECC-Rater project access on the ECC registry to simplify planning and execution of sampling.

The installer must self-test every requirement and sign as the responsible person on the appropriate CF2Rs. The ECC-Rater may test a representative home (referred to as the "model") to help the installer identify any issues before self-testing the remaining homes. (See Initial ECC Testing for Subdivision Projects.)

Before performing any ECC-Verification, the ECC-Rater must confirm that the CF1R and CF2Rs have been registered for each dwelling unit to be tested. The ECC-Rater simplifies dwelling unit grouping without direction from the installer or builder. The ECC-Rater also chooses the first of each type of ECC requirement to test without any forewarning.

The ECC-Rater will transmit all test results to the ECC registry and sign as the responsible person on the CF3Rs. The ECC-Provider will make available a registered copy of the completed and signed CF3Rs to all approved authorized users of the ECC registry. Printed copies, electronic or scanned copies, and photocopies of the registered CF3Rs will be allowed for document submittals, subject to authentication between the copy and the registered certificate. A registered copy of the CF3R must be posted at the building site or made available for review by the enforcement agency in conjunction with requests for final inspection for each dwelling unit.

The ECC-Provider will provide, via phone or Internet, a way for authorized users of the ECC registry to verify the information displayed on copies of registered documents on file in the ECC registry for the dwelling unit.

If the builder chooses the sampling option, the procedures in Reference Residential Appendix Sections RA2.6 and RA2.8 must be followed.

Initial ECC Testing for Subdivision Projects

The ECC-Rater must perform the required ECC-Verification on the first dwelling unit of each model within a subdivision. To be considered the same model, dwelling units must have the same basic floor plan layout, energy design, and compliance features as shown on the CF1Rs. Variations in the basic floor plan layout, energy design, compliance features, zone floor area, or zone volume that do not change the features to be verified, the heating or cooling capacity of the HVAC unit(s), or the number of HVAC units specified for the dwelling units will not cause dwelling units to be considered a different model.

ECC-Verification of the initial model allows the builder to identify and correct any potential construction flaws or practices in the build-out of each model. If ECC-Verification determines that the requirements for compliance are met, the ECC-Rater will transmit the ECC-Verification results to the ECC registry.

Group Sample ECC Testing for Subdivision Projects

After ECC-Verification of the initial model is completed, the builder or the builder's authorized representative determines which sampling procedure is to be used for the group of dwellings that require ECC testing. There are two procedures for ECC testing using group sampling:

- Sampling a closed group of up to seven dwellings
- Sampling of an open group of up to five dwellings

The group sampling requirements for each procedure will be discussed in this section. If available, a TPQCP allows up to 30 dwelling units to be grouped.

Transmittal/submittal of the CF2R information, for at least one dwelling, to the ECC registry is required to open a new group. Additional dwellings may be entered into the ECC registry and included in an "open" group over a specific period, subject to transmittal/submittal of the CF2R to the ECC registry for each additional dwelling.

However, the group shall not remain open to receive additional dwellings for a period longer than six months from the earliest date shown on any CF2R for a dwelling included in a group. A group may be closed at any time after the group has been opened at the option of the builder or builder's authorized representative. The size of a closed group may range from a minimum of one dwelling to a maximum of seven dwellings. When a group is closed, no additional dwellings shall be added to the group.

To receive a CF3R for a closed group of up to seven dwellings requires the following conditions to be met:

- All the dwelling units in the sample group have been identified. Up to seven dwellings are allowed to be included in a closed sample group.
- Installation and diagnostic testing of all the features that require ECC-Verification have been completed by the installer in all dwellings in the group, and all CF2Rs are registered.
- The group has been classified as a closed group in the ECC registry.
- At the request of the builder or the builder's authorized representative, an ECC-Rater will randomly select one dwelling unit from the closed sample group to begin ECC-Verification. If the dwelling unit meets the compliance requirements, this tested dwelling and each of

the other nontested dwellings in the group will receive a registered certificate of verification. Alternatively, the rater may test and verify requirements in different dwelling units in the group.

ECC-Verification of an open group of up to five dwellings requires the following conditions to be met:

- At least one dwelling unit from the sample group has been identified. Up to five dwellings are allowed to be included in an open sample group.
- Installation of all the features that require ECC testing shall be completed by the installer in all dwellings. Registration of the CF2Rs for all the dwellings has been completed.
- At the request of the builder or the builder's authorized representative, an ECC-Rater will randomly select one dwelling unit from the open sample group for ECC-Verification. If the dwelling unit meets the compliance requirements, the tested dwelling and each of the other nontested dwellings shall receive a registered CF3R. If there are fewer than five dwelling units, the group shall be allowed to remain open and eligible to receive additional dwelling units. Dwelling units entered into the open group after the successful ECC-Verification of the tested dwelling shall also receive a registered CF3R as a nontested dwelling subject to receipt by the ECC registry of the registered CF2R for the dwelling. The group shall be closed when it reaches the limit of five dwellings, when the six-month limit for open groups has been exceeded, or when the builder requests that the group be closed.

The ECC-Rater must confirm that the CF2Rs have been registered and are consistent with the CF1R for the dwelling unit.

The ECC-Rater must perform one or more ECC-Verification on the selected dwelling unit and enter the results into the ECC registry regardless of whether the results indicate a pass or fail. If the test fails, then the failure must be entered into the ECC registry, even if the installer immediately corrects the problem. In addition, any applicable procedures for resampling, full testing, and corrective action must be followed as described in Resampling Full Testing and Corrective Action below.

If ECC-Verification determines that the requirements for compliance are met, the ECC-Rater will enter the test results into the ECC registry. The ECC-Provider will make available to approved users of the ECC registry a registered copy of the CF3R for the tested requirement and for all other nontested requirements in the group at the time of the sample test. To avoid confusion by listing test results for untested requirements, the ECC registry will not report the results of tested requirements on the corresponding CF3Rs for untested requirements in the sample group. The results will be reported only on the CF3R for the tested requirements within the sample group. However, CF3Rs for untested features will conform to all other registration requirements and specify that the feature was not tested but has passed compliance as part of a sample group.

The ECC-Provider must close any open group within six months after the earliest signature date shown on any CF2R for a dwelling entered in the group. When such group closure occurs, the ECC-Provider shall notify the builder that the group has been closed and require that a

sample dwelling be selected for ECC-Verification by an ECC-Rater if ECC-Verification has not yet been conducted on a sample dwelling entered in the group.

Resampling Full Testing and Corrective Action

When a failure is encountered during sample testing, the failure must be entered into the ECC registry for retention by the ECC-Rater. Corrective action must be taken on the failed dwelling unit. The dwelling unit must be retested to verify that corrective action was successful and the dwelling complies. Corrective action and retesting on the dwelling unit must be repeated (and registered) until the testing determines that the dwelling complies and the successful compliance results have been entered into the ECC registry. A registered CF3R for the dwelling shall be made available to authorized users of the ECC registry.

In addition, the ECC-Rater must resample and test a second randomly selected dwelling within the sample group to assess whether the first failure is unique or if the rest of the dwelling units are likely to have similar failings. "Resampling" is the procedure that requires testing of additional dwellings within a group when the initial selected sample dwelling from a group fails to pass ECC-Verification.

When resampling in a closed group, if the testing of a second randomly selected dwelling in the group confirms that the requirements for compliance credit are met for that unit, then the unit with the initial failure does not indicate failure in the remaining untested units. A copy of the CF3R will be made available for the remaining dwelling units in the group, including the unit in the resample. If the second sample results in a failure, the ECC-Rater must report the second failure to the ECC registry. All the nontested units in the group must be individually ECC-Verified.

Additional information is in Reference Residential Appendix RA2.6.

Installer Requirements and ECC Procedures for Alterations

When compliance for an alteration requires ECC-Verification by a certified ECC-Rater, the building owner may choose the same installing company that completed the work for ECC-Verification compliance. The building owner or its agent must arrange for registration of the CF1R information to the ECC registry, identifying the altered HVAC system and features that require ECC-Verification. The building owner must also submit a registered copy of the CF1R to the ECC-Rater.

When the installation is complete, the person responsible for the performance of the installation must complete the CF2Rs.

After confirming that the CF1R and all required CF2Rs are registered, the ECC-Rater must perform the ECC-Verification for each ECC requirement. Retesting and corrective action must be completed, if necessary, as specified by Reference Residential Appendix RA2.6.4.

The enforcement agency(ies) cannot approve the alteration until the agency has a registered CF1R, CF2R, and CF3R for the altered HVAC system. The agency will also verify that the installing contractor provides copies of all these forms to the homeowner.

TPQCP, as specified in Reference Residential Appendix RA2.7, may also be used with alterations but may not be used in sample groups. When a TPQCP is used, the enforcement agency may approve compliance based on the CF2Rs where data checking has indicated that

the unit complies, on the condition that if the required ECC testing procedures determine that resampling, full testing, or corrective action is necessary, such work shall be completed.

For More Information

More details on ECC-Verification and ECC registries are in the *2025 Reference Residential Appendices* and *2025 Reference Joint Appendices,* as described below:

- Reference Joint Appendix JA7 — Data Registry Requirements
- Reference Residential Appendix RA2 — Residential ECC Verification, Testing, and Documentation Procedures
- Reference Residential Appendix RA3 — Residential Field Verification and Diagnostic Test Protocols