



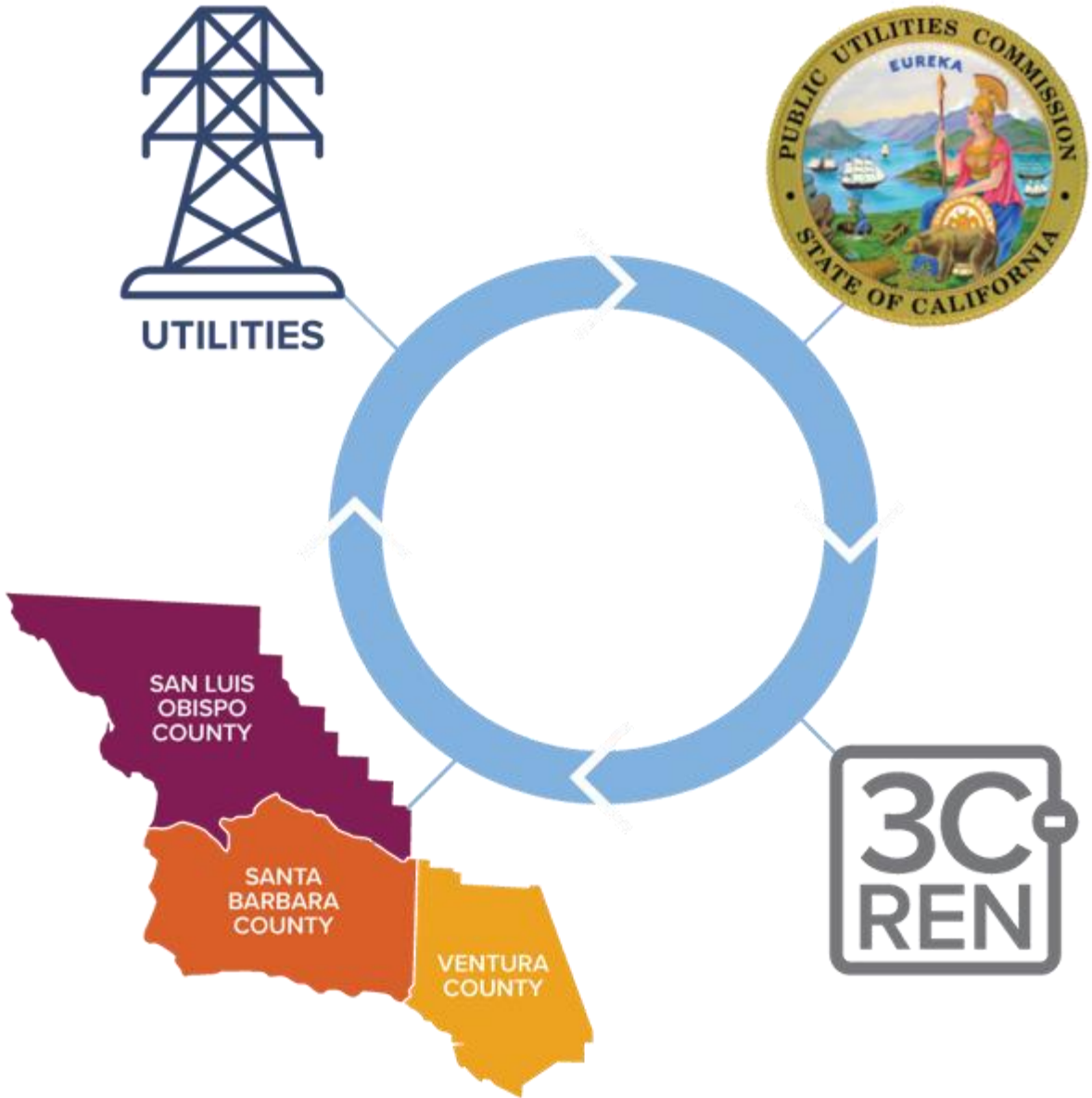
TRI-COUNTY
REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

Retrofit Ready? Navigating the 2025 Energy Code for Aging Buildings

April 29, 2026





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





Moderator

Mindy Flynn Craig
BluePoint Planning

Before We Begin

- Questions will be answered by the speakers during the Q&A portions. Use the "**Chat**" or raise your hand to verbally ask your question.
- This forum will be **recorded** and posted to 3C-REN's on-demand page
- Slides/recording will be **shared** a few days after the forum.

Construction During A Crisis

May 21, 2020

Mute Stop Video

Participants Chat Share Screen Record Reactions



AGENDA

Introductions:

**Danica Resurreccion, 3C-REN
Moderator: Mindy Flynn Craig, BluePoint**

Introducing the Part 6 Restructured Standards

**Gagandeep Randhawa,
California Energy Commission**

Q&A with Gagandeep

Energy Code and a Builder's Perspective in Residential Alterations

**Jennifer Rennick, In Balance Green Consulting
& Mike Horgan, Cairn Collaborative Design-Build**

Q&A with Jennifer & Mike

CALGreen & Electric Vehicle Charging in Alterations

Tatiana Soglin, In Balance Green Consulting

Q&A with Tatiana

Closing Remarks





Gagandeep Randhawa
California Energy Commission



Introducing the Part 6 Restructured Standards

Gagandeep Randhawa

Building Standards, Outreach & Education

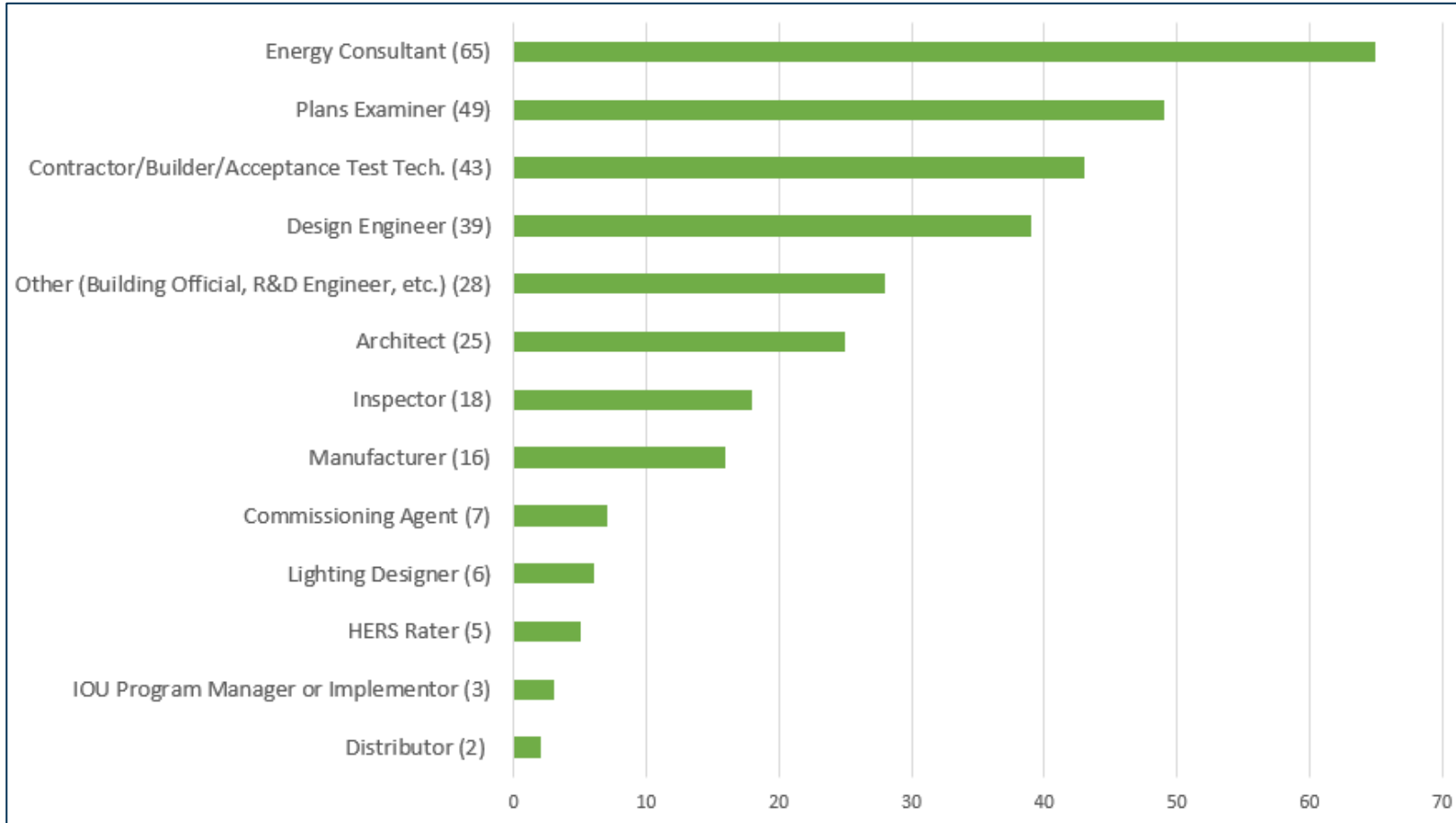


Agenda

- Background
- When & Where?
- Features
 - Reorganized by building system
 - Renumbered sections
 - Hyperlinks
 - Index
 - Italicized defined terms
- Next Directions: 2028 Energy Code Development

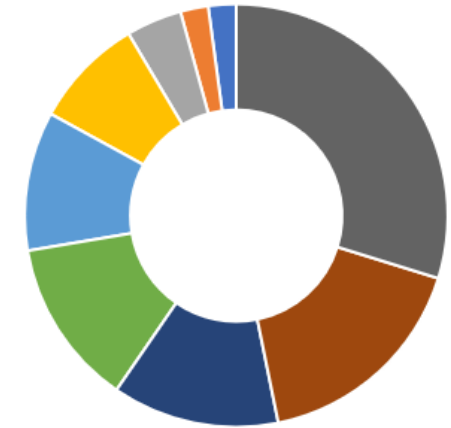


Public Input – Fall 2023



MS Excel generated based on CEC Survey Fall 2023

SURVEY
(306 total)



Energy Consultant (14)
Designer (8)
Contractor/ ATT (6)
Plans Examiner (6)
Other (BO, R&D Eng., etc.) (5)
Manufacturer (4)
Commissioning Agent (2)
HERS Rater (1)
Inspector (1)

FOCUS GROUPS & INTERVIEWS
(47 total)



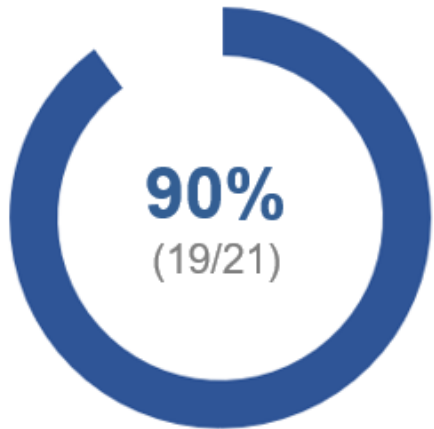
Survey Results

- CBC structure consistently identified with full address. (i.e., 10.25.2.4.2 = Chapter 10, Section 25, Sub-Section 2, etc.).
- CBC sections are organized logically; consistent with the order buildings are designed.
- CBC includes a reference standards chapter rather than included in the definitions chapter.
- Usually, code appendices = optional requirements AHJs can adopt. Part 6 uses appendices for its reference standards. Make it a regular chapter
- ASHRAE 90.1 has separate sections for envelope, lighting, HVAC, etc. that include relevant requirements.
- Indices provided in CBC and other Parts of Title 24.

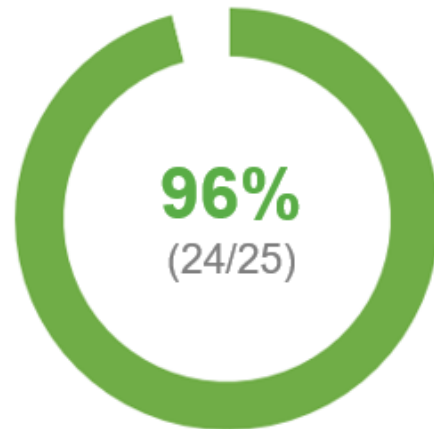


Focus Group Poll Results

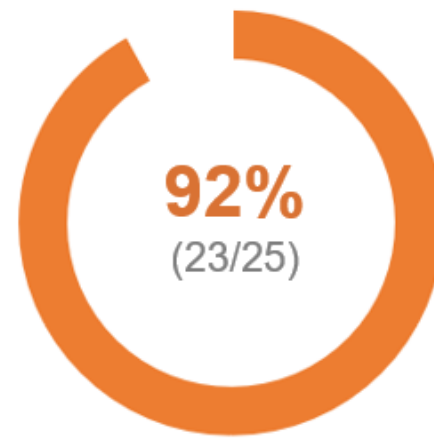
90% support renumbering to follow CBC/CRC



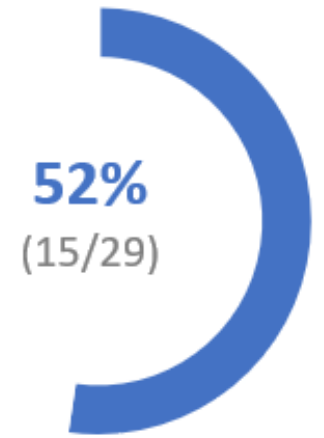
96% support tables after relevant code language



92% want hyperlinks within Standards & Ref. Appendices



52% want requirements to be repeated if they are the same



MS Excel generated based on Fall 2023 focus groups

Points Based on Borda Count Ranking

Ranked options for Standards organization in order of preference (1) being first choice and (3) being last choice:

Ranking calculated with “Borda Count” points system, where item ranked first gets 3 points, item ranked second gets 2, and item ranked third gets 1.



Timeline

Restructured Standards developed based on adopted 2025 Standards





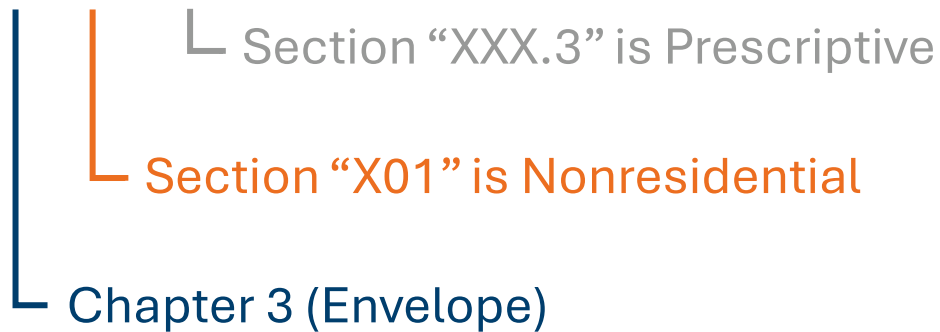
Including the Index

A

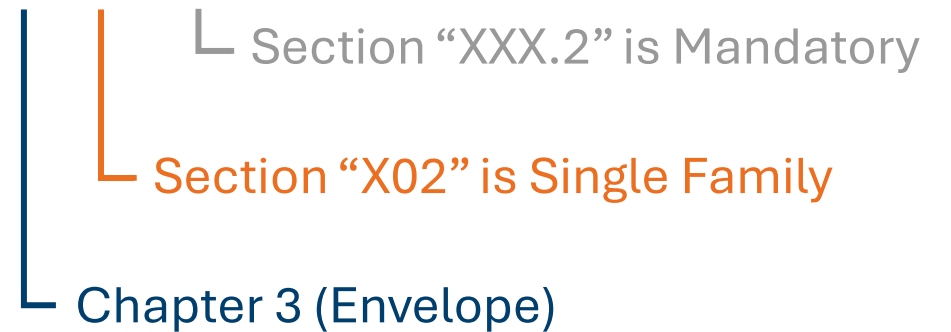
ABOVE GRADE WALL301.3.1.9 **[\$140.3(a)9]**, 302.2.3 **[\$150.0(c)]**, 303.2.2 **[\$160.1(b)]**
ACCENT LUMINAIRE 200.1 **[\$100.1]**, 601.3.1.3 **[\$140.6(c)2G]**, 603.3.2 **[\$170.2(e)4]**
ACCENT, DISPLAY AND FEATURE ...601.3.1.2 **[\$140.6(b)4]**

Language adapted from Title 24, Part 6 Standards Index

3 01 .3.1.9



3 02 .2.3





Implementation – 2025 & 2028 Cycles

SUBCHAPTER 3 – ENVELOPE

SECTION 300— MANDATORY REQUIREMENTS FOR ALL OCCUPANCIES

300.1 [§110.6] Mandatory requirements for fenestration products and exterior doors.

300.1.1 [§110.6(a)] Certification of fenestration products and exterior doors other than field-fabricated. Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the Commission, or if an independent certifying organization approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.

300.1.1.1 [§110.6(a)1] Air leakage. Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft² of window area, 0.3 cfm/ft² of door area for residential doors, 0.3 cfm/ft² of door area for nonresidential single doors (swinging and sliding), and 1.0 cfm/ft² for nonresidential double doors (swinging), when tested according to NFRC-400 or ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds/ft²), incorporated herein by reference.

Notes to Section 300.1.1.1 [§110.6(a)1]: Pet doors must meet 0.3 cfm/ft² when tested according to ASTM E283 at 75 pascals (or 1.57 pounds per square foot). AAMA/WDMA/CSA 101/I.S.2/A440-2011 specification is equivalent to ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds per square foot) and satisfies the air leakage certification requirements of this section.

Exception to Section 300.1.1.1 [§110.6(a)1]: Field-fabricated fenestration and field-fabricated exterior doors.

300.1.1.2 [§110.6(a)2] U-factor. The fenestration product and exterior door's U-factor shall be rated in accordance with NFRC 100, or use the applicable default U-factor set forth in Table 300.1.1-A [Table 110.6-A].

Language adapted from Title 24, Part 6 Standards

EXAMPLE FROM 2025 **RESTRUCTURED CODE**



Current vs. Reorganized Code

Chapter	Section	Subject.	Title
1	100.0-100.2	(a)(b)(c) 1.2.3. A.B.C. i.ii.iii a.b.c.	General Provisions All building types
2	110.0-110.12		Mandatory All building types
3	120.0-120.10		Mandatory Nonresidential, Covered Process
4	130.0-130.5		Mandatory Lighting & Electrical Nonresidential, Covered Process
5	140.0-140.10		Prescriptive and Performance Nonresidential, Covered Process
6	141.0-141.1		Additions, Alterations and Repairs Nonresidential, Covered Process
7	150.0		Mandatory Single-family
8	150.1		Prescriptive and Performance Single-family
9	150.2		Additions, Alterations and Repairs Single-family
10	160.0-160.9		Mandatory Multifamily
11	170.0-170.2		Prescriptive and Performance Multifamily
12	180.0-180.4		Additions, Alterations and Repairs Multifamily

CURRENT

Chapter	Section	Subject.	Title
1	100-102	1.2.3... 1.2.3... 1.2.3... 1.2.3... 1.2.3...	General Provisions All building types
2	200		Definitions All building types
3	300-303		Envelope All building types, Nonresidential, Single-family, Multifamily
4	400-403		HVAC and Ventilation All building types, Nonresidential, Single-family, Multifamily
5	500-503		Plumbing All building types, Nonresidential, Single-family, Multifamily
6	600-603		Electrical and Lighting All building types, Nonresidential, Single-family, Multifamily
7	700-703		Renewables and Storage All building types, Nonresidential, Single-family, Multifamily
8	800-803		Pool and Spa All building types, Nonresidential, Single-family, Multifamily
9	900-911		Process Systems and Equipment Covered Process
10	1000-10001		Design Review and Commissioning Nonresidential

REORGANIZED



Building System Chapter Structure

Existing 2022 §	Chapter 3 - ENVELOPE
	Section 300 – MANDATORY REQUIREMENTS FOR ALL OCCUPANCIES (NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS)
110.60	300.1 - Mandatory Requirements for Fenestration Products and Exterior Doors
110.70	300.2 - Mandatory Requirements to Limit Air Leakage
110.80	300.3 - Mandatory Requirements for Insulation, Roofing Products and Radiant Barriers
	Section 301 - NONRESIDENTIAL AND HOTEL/MOTEL OCCUPANCIES
120.00	301.1 - General
120.70	301.2 - Mandatory (New Construction, Additions, and Alterations)
140.30	301.3 - Prescriptive (New Construction)
	301.4 - Performance (New Construction)
141.0(a) & (b)	301.5 - Additions, Alterations, and Repairs to Existing Buildings
	Section 302 - SINGLE-FAMILY OCCUPANCIES
150.0	302.1 - General
150.0	302.2 - Mandatory (New Construction, Additions and Alterations)
150.1(c)	302.3 - Prescriptive (New Construction)
	302.4 - Performance (New Construction)
150.2(a) & (b)	302.5 - Additions, Alterations, and Repairs to Existing Buildings
	Section 303 - MULTIFAMILY OCCUPANCIES
160.0 & 170.0	303.1 - General
	303.2 - Mandatory (New Construction, Additions and Alterations)
160.1	<i>Reference applicable sections in NR and SF that are duplicative</i>
	303.3 - Prescriptive (New Construction)
170.2(a) & (b)	<i>Reference applicable sections in NR and SF that are duplicative</i>
	303.4 - Performance (New Construction)
	303.5 - Additions, Alterations, and Repairs to Existing Buildings
180.1(a) & (b) & 180.2(a) & (b)	<i>Reference applicable sections in NR and SF that are duplicative</i>



Adopted Section Numbers Included

SUBCHAPTER 3 – ENVELOPE

SECTION 300— MANDATORY REQUIREMENTS FOR ALL OCCUPANCIES

300.1 **[§110.6]** Mandatory requirements for fenestration products and exterior doors.

300.1.1 **[§110.6(a)] Certification of fenestration products and exterior doors other than field-fabricated.** Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the Commission, or if an independent certifying organization approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.

300.1.1.1 **[§110.6(a)1] Air leakage.** Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft² of window area, 0.3 cfm/ft² of door area for residential doors, 0.3 cfm/ft² of door area for nonresidential single doors (swinging and sliding), and 1.0 cfm/ft² for nonresidential double doors (swinging), when tested according to NFRC-400 or ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds/ft²), incorporated herein by reference.

Notes to Section 300.1.1.1 **[§110.6(a)1]:** Pet doors must meet 0.3 cfm/ft² when tested according to ASTM E283 at 75 pascals (or 1.57 pounds per square foot). AAMA/WDMA/CSA 101/I.S.2/A440-2011 specification is equivalent to ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds per square foot) and satisfies the air leakage certification requirements of this section.

Exception to Section 300.1.1.1 **[§110.6(a)1]:** Field-fabricated fenestration and field-fabricated exterior doors.

300.1.1.2 **[§110.6(a)2] U-factor.** The fenestration product and exterior door's U-factor shall be rated in accordance with NFRC 100, or use the applicable default U-factor set forth in Table 300.1.1-A **[Table 110.6-A]**.



Hyperlinks

- **SUBCHAPTER 3 – ENVELOPE**

- **SECTION 300— MANDATORY REQUIREMENTS FOR ALL OCCUPANCIES**

- **300.1 [§110.6] Mandatory requirements for fenestration products and exterior doors.**

- **300.1.1 [§110.6(a)] Certification of fenestration products and exterior doors other than field-fabricated.** Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the Commission, or if an independent certifying organization approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.
- [...]
- **300.1.1.5 [§110.6(a)5] Labeling.** Fenestration products and exterior doors shall:
 - Have a temporary label for manufactured fenestration products and exterior doors or a label certificate when the Component Modeling Approach (CMA) is used and for site-built fenestration meeting the requirements of [Section 10-111\(a\)1](#). The temporary label shall not be removed before inspection by the enforcement agency; and
 - Have a permanent label or label certificate when the Component Modeling Approach (CMA) is used and for site-built fenestration meeting the requirements of [Section 10-111\(a\)2](#) if the product is rated using NFRC procedures.
- **300.1.1.6 [§110.6(a)6] Fenestration acceptance requirements.** Before an occupancy permit is granted site-built fenestration products in other than single-family buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified in the [Reference Nonresidential Appendix NA7](#) to ensure that site-built fenestration meets Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location. A certificate of acceptance certifying that the fenestration product meets the acceptance requirements shall be completed, signed and submitted to the enforcement agency.



Italicized Defined Terms

- **SUBCHAPTER 3 – ENVELOPE**

- **SECTION 300— MANDATORY REQUIREMENTS FOR ALL OCCUPANCIES**

- **300.1 [§110.6] Mandatory requirements for *fenestration products* and exterior doors.**

- **300.1.1 [§110.6(a)] Certification of *fenestration products* and exterior doors other than *field-fabricated*.** Any *fenestration product* and exterior door, other than *field-fabricated fenestration products* and *field-fabricated* exterior doors, may be installed only if the manufacturer has *certified to the Commission*, or if an independent *certifying organization* approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.

-

- **300.1.1.5 [§110.6(a)5] Labeling. *Fenestration products* and exterior doors shall:**

- Have a temporary label for *manufactured fenestration products* and exterior doors or a label certificate when the *Component Modeling Approach (CMA)* is used and for site-built fenestration meeting the requirements of Section 10-111(a)1. The temporary label shall not be removed before inspection by the enforcement agency; and
- Have a permanent label or label certificate when the *Component Modeling Approach (CMA)* is used and for site-built fenestration meeting the requirements of Section 10-111(a)2 if the product is rated using NFRC procedures.

- **300.1.1.6 [§110.6(a)6] Fenestration acceptance requirements.** Before an occupancy permit is granted site-built fenestration products in other than *single-family buildings* shall be certified as meeting the *Acceptance Requirements for Code Compliance*, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meets Standards requirements, including a matching label certificate for product(s) installed and be readily *accessible* at the project location. A certificate of acceptance certifying that the *fenestration product* meets the acceptance requirements shall be completed, signed and submitted to the *enforcement agency*.



Restructured Codes

- **Comments**

- The CEC invites public comments on the [Restructured 2025 Energy Code](#), which reorganizes the adopted regulatory language to group related requirements together and renumbers sections for easier navigation. This draft is a resource for feedback only and is not an official code
- Comments can be submitted via [docket 24-BSTD-05](#) and are due by **May 26, 2026**.



Next Directions: 2028 Energy Code Development



How Does Energy Code Development Work?

Statewide Utility CASE Initiative

- Codes and Standards Enhancement (CASE) Initiative works with industry experts to generate preliminary proposals, analyze feasibility and technical merit, and present final recommendations to CEC
- Funded by California utility customers
- Administered by PG&E, SDG&E, SoCal Edison under CPUC, managed in coordination with LADWP and SMUD
- Prepares and submits code change proposals for cost-effective enhancements to improve building energy efficiency and performance



How Does Energy Code Development Work?

CASE Reports

- CASE Reports present justification for code change proposal
 - Technical and cost-effectiveness info needed to assess impact on design practices and tech
 - CEC provides measure proposal template for any entity to submit a CASE Report to CEC
- CASE Team helps develop and submit completed code change proposals to CEC for consideration
- Upon review, CEC may include proposals for public process, where proposals may be refined further before CEC votes to adopt revisions
- Developed by CASE Author
 - Often small group of subject matter experts (SMEs) from various technical backgrounds
- CASE Author and CASE initiative team make up Statewide CASE Team for each code change proposal



Code Development Process

Pre-Rulemaking

- CASE Team helps CEC find code change opportunities to pursue
- When CEC selects measures, CASE Team conducts research to develop documentation that CEC can use to evaluate proposals
 - CASE Reports
 - Estimates & assessments of energy savings, cost-effectiveness, market, economics, material and water use impacts
 - Draft code language
 - Recommended processes for compliance verification
 - Final Reports submitted to CEC near end of pre-rulemaking
- CASE Team engages with interested persons to ensure awareness, encourage dialogue, identify and address issues, and improve research and analyses
 - Conducts personalized outreach, hosts meetings, and provides info about proposed changes and opportunities to provide input



Code Development Process

2&3 – Rulemaking and Post-Adoption

- Rulemaking
 - CASE Team takes part in CEC rulemaking workshops and tracks all comments submitted to CEC public docket
 - Work with CEC to resolve issues that arise during rulemaking
 - Review each language draft and recommend revisions to address concerns, fine-tune requirements, fix editorial and clarity issues
- Post- Adoption
 - Standards adopted
 - CASE Team supports updates to Compliance Manuals, ACM Reference Manuals, and compliance software



CASE Team Milestones

Est. Timeframe	Event
Jan-Mar 2026	Draft CASE Reports published
Feb-Mar 2026	Utility-sponsored meetings (with CASE Team), Round 2
May 2026	Final CASE Reports published
Aug 2025 - Sep 2026	CEC Pre-Rulemaking Workshops <ul style="list-style-type: none">• Aug 2025-Jul 2026: CEC Workshops• Sept 2026: Pre-rulemaking Language Comment Period
Q1 2027	Start 45-Day Public Comment Period
Q1/Q2 2027	Start 15-Day Public Comment Period <ul style="list-style-type: none">• May 2027: 2028 Energy Code adopted
Q4 2027	<ul style="list-style-type: none">• CBSC Review & Approval of 2028 Energy Code• CASE Study Results Reports Complete
Jan 1, 2029	2028 Energy Code in Effect



Energy Code Support Center



<https://www.energy.ca.gov/energy-code-support-center>

Energy Code FAQs

Expand All

Where are the compliance documents (forms)?
How can I get a copy of the Energy Code, Reference Appendices, Manuals?
Who do I contact for compliance modeling software questions?
Where do I find my climate zone?
How do I participate in the upcoming Energy Code rulemaking?
What local ordinances are approved?
Are there any regulatory advisories?
Is there help with finding incentives, rebates, and financing?
Where do I report an issue with a contractor or business professional?
Where can I ask an Energy Code question that is not answered here or on a specific project?

Information, Training, and Resources

Expand All

Training classes, Energy Code overviews, and the Blueprint newsletter	+
Solar PV systems, solar-ready, and electric-ready	+
Battery, energy storage systems (ESS), and ESS-ready	+
Heating, ventilation, and air conditioning (HVAC) mechanical systems	+
Water heating systems	+
Lighting systems (indoor, outdoor, signs)	+
Envelope components (window, roof, insulation, etc.)	+
Electrical power distribution	+
Building commissioning	+
Covered processes	+
HERS raters	+
Acceptance test technicians (ATTs)	+

- **FAQs**
- **Handouts**
 - Fact sheets
 - Guides
- **Tools**
 - Checklists
 - Blueprint newsletter
- **Training**
 - Presentations
 - Videos
- **Links**
 - Internal resources
 - External resources



Energy Code Hotline

Energy Code Hotline Submission Form

Please submit your Energy Code questions through the Energy Code Inquiry Submission Form.

Contact and General Information

What is your name? *

What is your email address? *

What is your question about? *

What is your role?

Building and Project Information

What is the building type? *

What is project type/scope of the building? *

Is the building conditioned (heating and/or cooling) or unconditioned (no heating or cooling)? *

Please list the climate zone of the project. Alternatively, please enter the address of the project. *

- Monday through Friday
 - 8:00 a.m. to 12:00 p.m.
 - 1:00 p.m. to 4:30 p.m.
- Call
 - 800-772-3300 in CA
 - 916-654-5106 outside CA
- Contact
 - [Hotline Submission Form](#)



Thank You!



**Q&A with Gagandeep Randhawa,
California Energy Commission**





Jennifer Rennick
In Balance Green Consulting



Mike Horgan
Cairn Collaborative Design-Build



Energy Code and a Builder's Perspective in Residential Alterations

Our Top 5 Focus Areas

- Upgrading Crawl Spaces
- Attic and Ceiling Alterations
- Wall Alterations and Upgrades
- Window Replacements
- Added or Replacement HPWH



Upgrading Crawlspace

Assessment / Ques to Ask?

- Is the flooring being replaced?
- Does the site drain properly?
- Is moisture in crawlspace an issue?
- Is the crawl space easily accessible?
- What is the condition of the existing floor insulation?
- Are there signs of rodent activity?

Goals and Opportunities

- Air-Sealing –Energy Saving and/or Fire Hardening
- Vapor Barriers
- Floor &/or Foundation Insulation
- Ventilation Openings: NFA and Type
- Controlled Ventilation Crawl Space



Energy Code (Part 6) and the Residential Code (Part 2.5)

Raised Floors

- Insulate to R-19 min at the Floor joists
- Part 2.5 Res Code for NFA ventilation
 - 1:150 with one opening within 3 ft of each external corner (R408.2)
 - 1:1500 if installed w/ Class I vapor barrier at grade
 - Or follow Unvented Crawl Space (R408.3)

Side Bar: Part 2.5 Res Code, Section R408.8 Under-floor vapor retarder. Climate Zones 1A, 2A and 3A are *not* applicable to California regions.

Excerpt from the Energy Code

Section 150.0(d) Raised-floor Insulation.

Raised floors separating conditioned space from unconditioned space or ambient air shall have an overall assembly U-factor not exceeding U-0.037. In a wood framed assembly, compliance with the U-factor may be demonstrated by installing insulation with an R-value of 19 or greater.

Exception to Section 150.0(d): A building with a controlled ventilation or unvented crawl space may omit raised floor insulation if all of the following are met:

- i. The foundation walls are insulated to meet the wall insulation minimums as shown in Table 150.1-A; and
- ii. A Class I or Class II vapor retarder is placed over the entire floor of the crawlspace; and
- iii. Vents between the crawlspace and outside air are fitted with automatically operated louvers that are temperature actuated; and
- iv. The requirements in Reference Residential Appendix RA4.5.1.



Energy Code (Part 6) and the Residential Code (Part 2.5)

Controlled Ventilation Crawlspace

- Insulate Foundation walls with R-5 rigid appropriate for ground contact
- Install Class I or II vapor barrier
- Install actuated ventilation:
 - closed at approx. 40 deg F, and
 - open at approx. 70 deg F

Unventilated Crawlspace

- Insulate per Energy Code
- Install Class I vapor barrier
- Install mechanical ventilation and/or dehumidification

Excerpt from the Residential Code

R408.3 Unvented Crawl Space

1. Exposed earth shall be covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.
2. One of the following shall be provided for the under-floor space:
 - 2.1 Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille).
 - 2.2 Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille).
 - 2.3 Plenum in existing structures complying with the California Mechanical Code, if under-floor space is used as a plenum.
 - 2.4 Dehumidification sized in accordance with manufacturer's specifications.



Floor as the Air Barrier – Air-Seal from Below or Above?



Existing Floor was not an Effective Air-Barrier

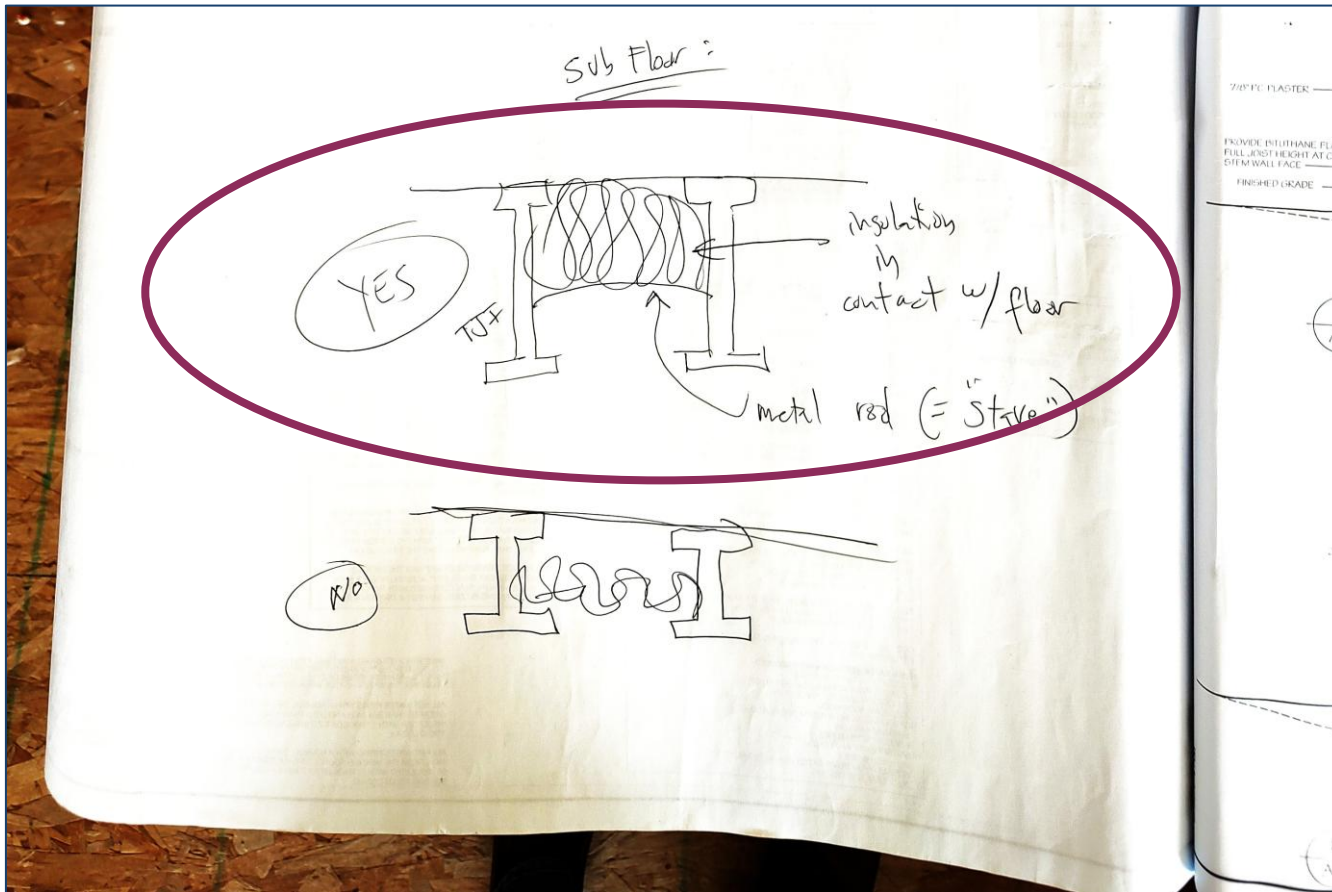


Specialized Tape for Air-Sealing Seams



Existing Raised Floor without Insulation nor Air-Sealing

Insulation Contact with the Air Barrier – Typically the Floor



Insulation should be in contact with the floor deck



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



Adjoining New to Old and Steps in Foundations



Gap was large enough for mice and fire brands

- *Expose the voids*
- *Apply liquid membrane, and tapes, etc. as needed*
- *Fill large voids with solid material and/or backer rod*
- *Fill gaps with fire-rated foam sealant*



Vapor Barrier – Seams Sealed and Adhered to Foundation Walls



*Class I Vapor Barrier < 0.1 perms
Prevents Vapor Drive and Moisture Migration*



Use specialized tape and/or mechanical fasteners – typically sold with the vapor barrier -- securely attached to the foundation



Use specialized tapes to temporarily hold the vapor barrier to the foundation prior to a slab pour



Attic and Ceiling Alterations

Assessment / Ques to Ask?

- Is the existing roof/attic insulated?
- Will the roofing be replaced?
- What is the condition of the existing insulation?
- Will the remodel include new or replaced recessed lighting?
- Or recessed ductless units?

Goals and Opportunities

- Air-Sealing –Energy Saving
- Insulation –Type and Location
- Attic Ventilation –Fire Hardening
- Roof Top Solar



Existing R-19 Ceiling? – Add More!?



Existing R-19 Ceiling Insulation –Fiberglass Batt

- Leave as is and add more over the top.
- or
- Remove and air-seal, then re-insulate.



Blown-in Cellulose
DIY Solutions at
Lowes and Home
Depot



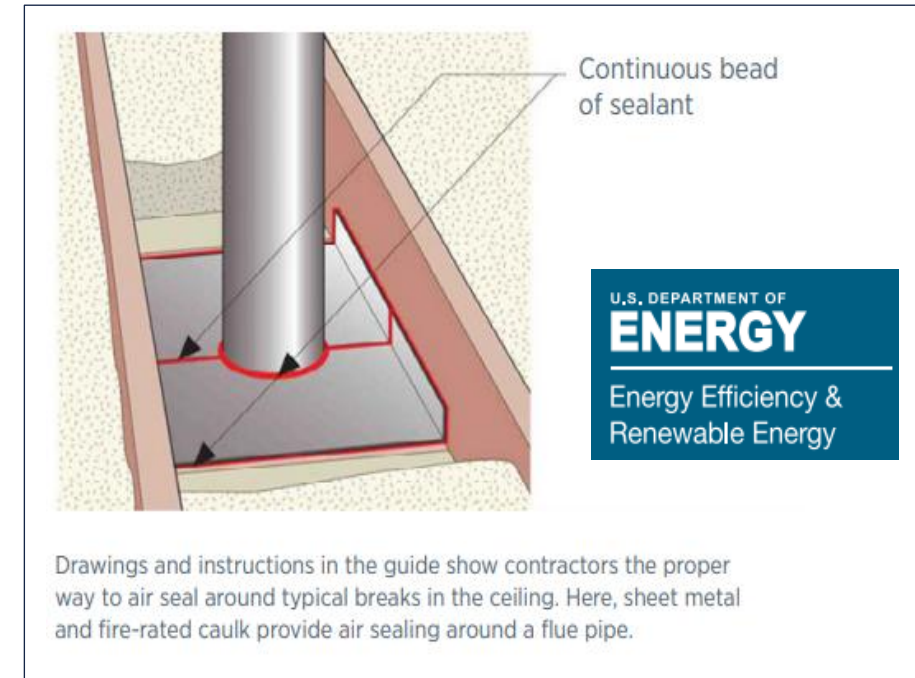
Alterations –Ceilings of Vented Attics

Altered ceilings must be air sealed in CZ 2, 4, 8-16

- Exception for existing R-19 insulation
- Except where combustion appliances are within the air boundary

Attic ventilation shall comply with the California Building Code requirements. Exception where

- existing R-38 existing insulation, asbestos, and knob and tube wiring
- the accessible spaces in the attic that are not large enough
- the attic space is shared with other dwellings that are not part of the alteration



Alterations –Ceilings of Vented Attics

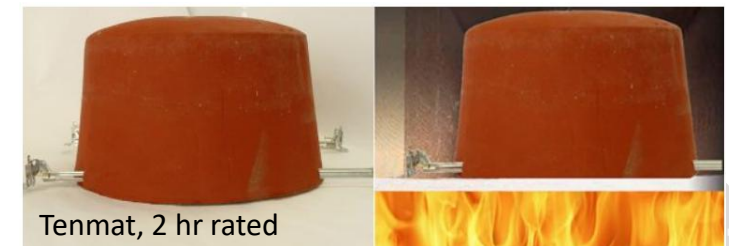
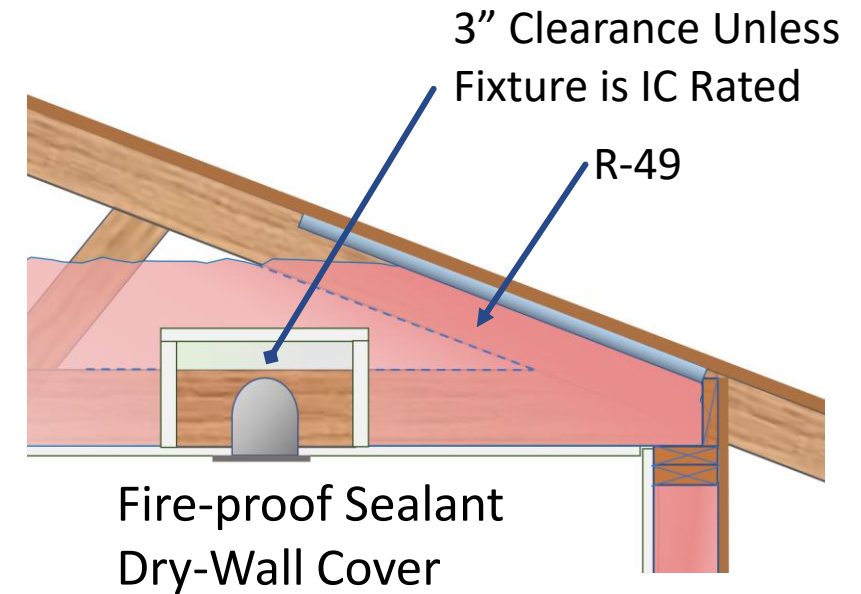
CZ 1-4, 6, 8-16 altered ceilings shall be insulated to R-49 in or weighted U-factor of 0.020.

- Except for CZ 1, 3, and 6 with existing R-19 insulation

In CZ 1-4 and 8-16 recessed downlights in the ceiling shall be covered with insulation to the same depth as the rest of the ceiling.

Downlights not rated for insulation contact must be replaced or retrofitted with a fire-proof cover that allows for insulation to be installed directly over the cover

- Except CZ 1 -4 and 8 -10, existing R-19 insulation *[not CZ 11-16]*



Manufactured Cover

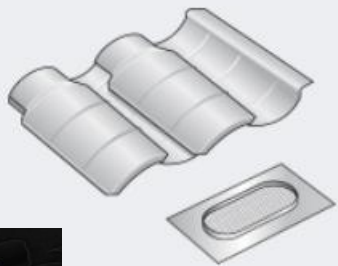


Better Ways to Vent Attics

Baffled and Protected Screened Openings

Screen Openings –min 1/8” dia

Wire Mesh –1/16” min wire thickness



When wildfires come near and reach critical temperature, the intumescent coating on the matrix structure expands, creating a "firewall."



Use Fire-Rated
Manufacture's
Recommended
Sealant and
Adhesives



Wall and Alterations and Upgrades

Assessment / Ques to Ask?

- Are the existing walls insulated?
- Will the remodel include exterior wall alterations?
- What is the condition of the siding? And structure?
- Will the siding be removed?

Goals and Opportunities

- Insulation –Type and Location
- Air-Sealing –Energy Saving and Fire Hardening
- Siding Replacement –Non-combustible, Rain Screens, Exterior Insulation



Wall Extension –Where a (N) Wall *aligns* with an (E) Wall

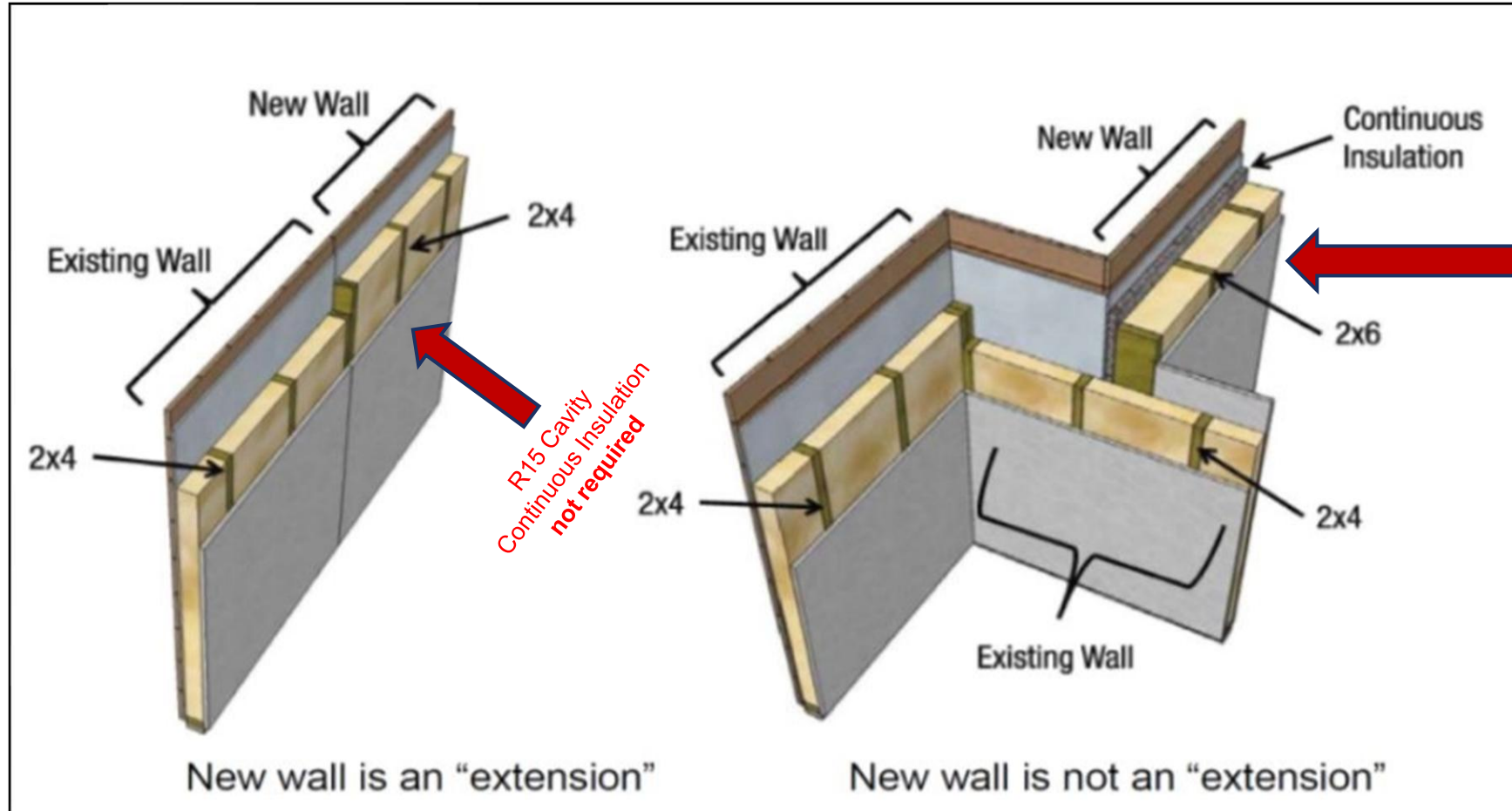
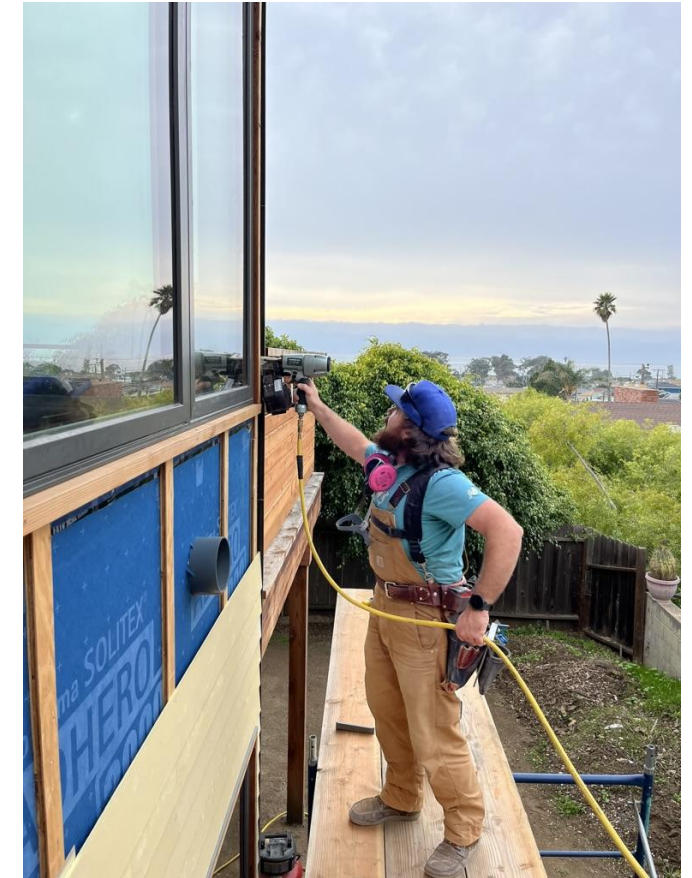
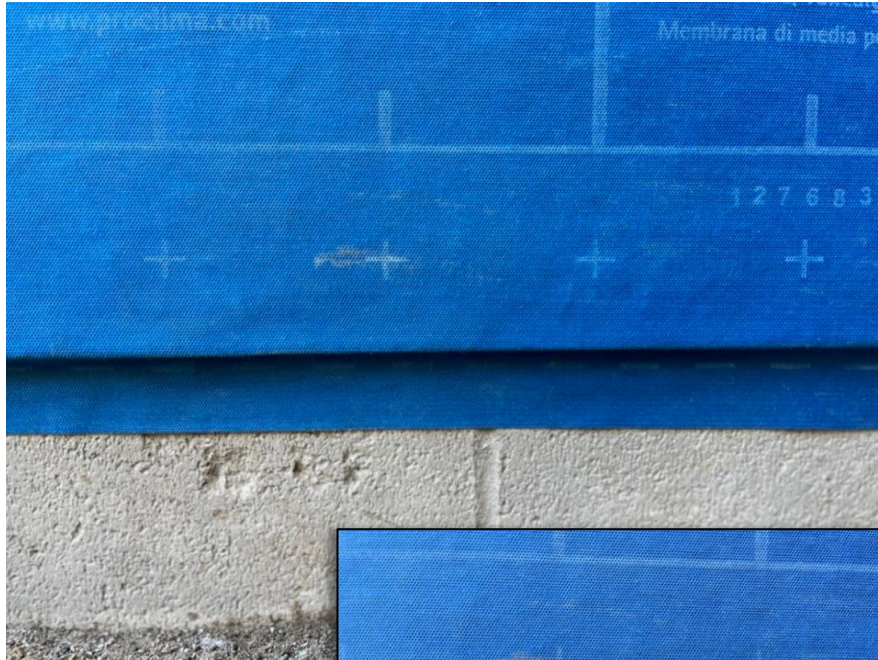


Image from CEC's BluePrint

Also Applies to Wall Alterations: R-15 for 2x4 walls and R-21 for 2x6 walls



'Ideal World' – Air-Barrier from the Exterior



Remodel –Air Barrier from the Interior



1



2



3



Adding Exterior Insulation to Existing CMU



Reduce Air Leakage – Additional Opportunities

Assessment:

- ECC (formerly HERS)
- Existing Conditions
- Infrared Camera
- Blower Door Testing

Solutions:

- Caulk Sill Plates
- Seal around windows while trim is off
- Attention at junctions



Window Replacements

Assessment / Ques to Ask?

- All new windows? Or matching existing remaining?
- Increasing or Adding window area?
- Too much glare? And/or overheating?

Goals and Opportunities

- Better Windows –Energy Saving
- Fire Hardening –WUI
- Operability and Ventilation
- Cost Comparison



Existing Windows –Metal Framed and/or High SHGC

(E) Windows – Non-thermally broken metal frames

Note:
Interior frame temperature is an indication of exterior surface temperature.



104.5 deg. F
at the frame



66 deg. F
at the wall

Managing Client Expectations

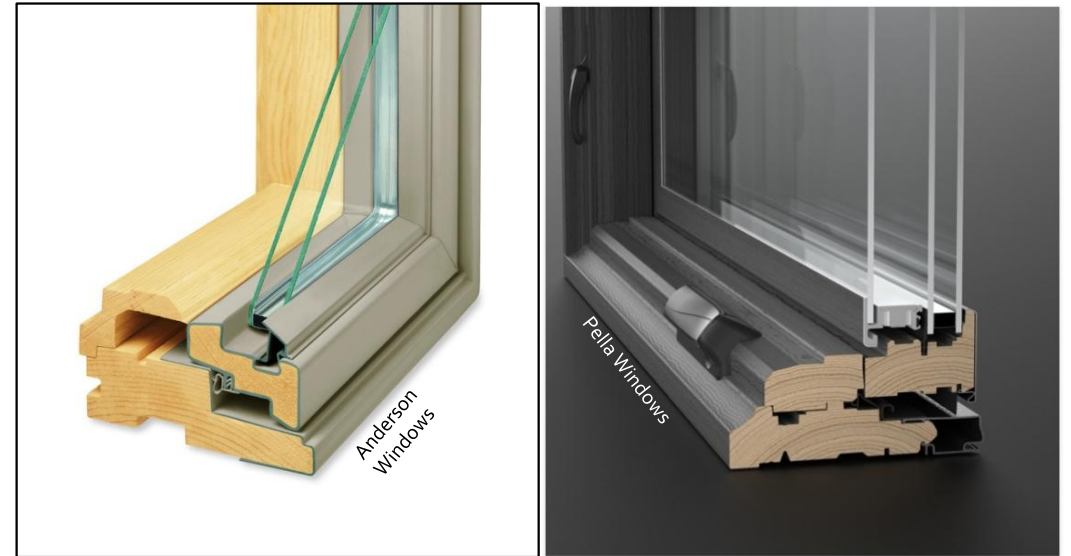
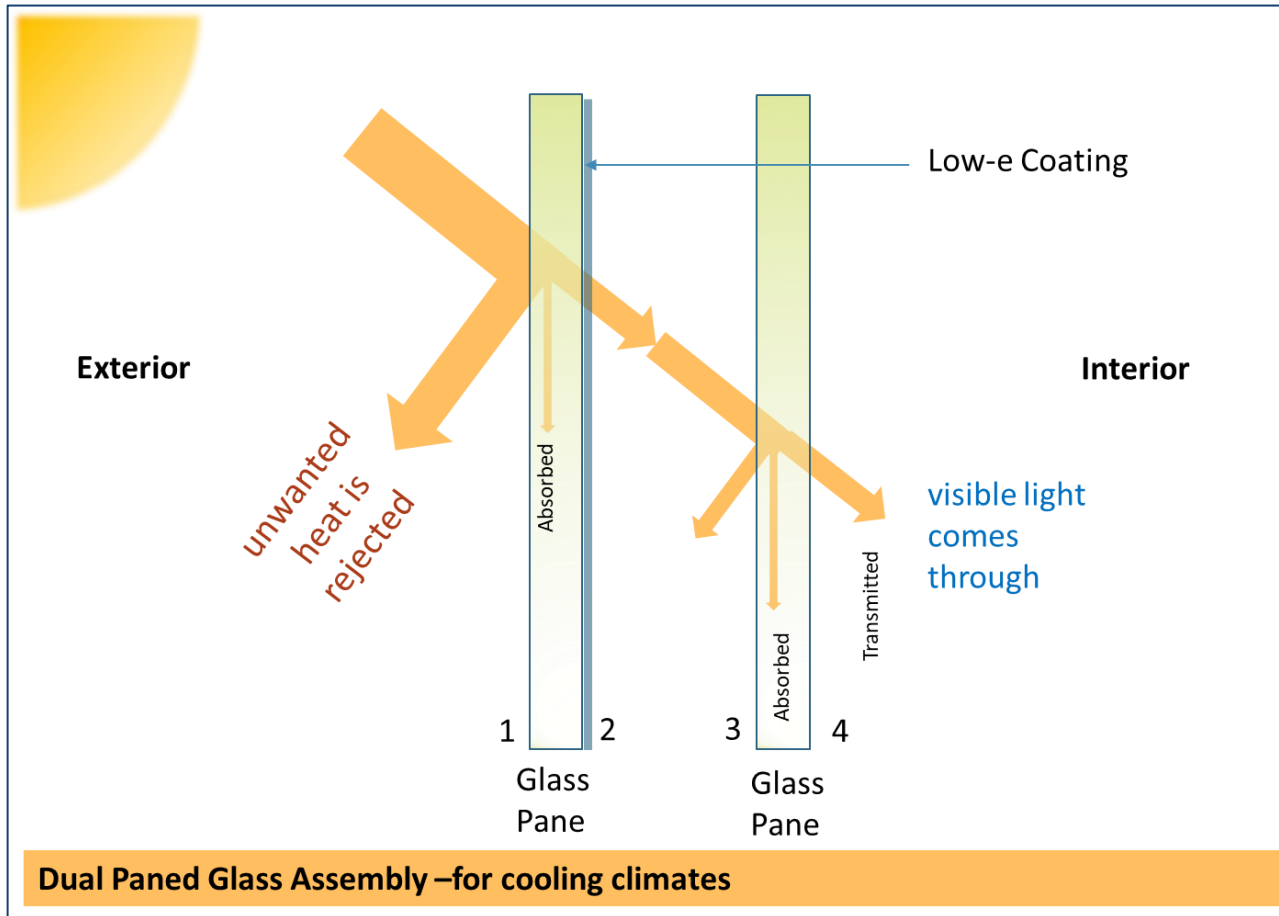
Note:
Older (E) windows may have higher solar heat gain coefficient (SHGC) glass and 'accept' more solar heat/warmth as compared to (N) windows with low SHGC glazing.



107 deg F at the floor. Nice and Warm!?



Windows



Just about all brands of windows offer dual and triple paned options meeting the U-0.27 requirement

U-Factors – Measure of heat transfer through an assembly

SHGC – Solar Heat Gain Coefficient is the fraction of solar radiation admitted through a window

Tvis – Ratio of visible light that can pass through the glass



Window Requirements – Based on Climate Zone (CZ)

Mandatory Measure:

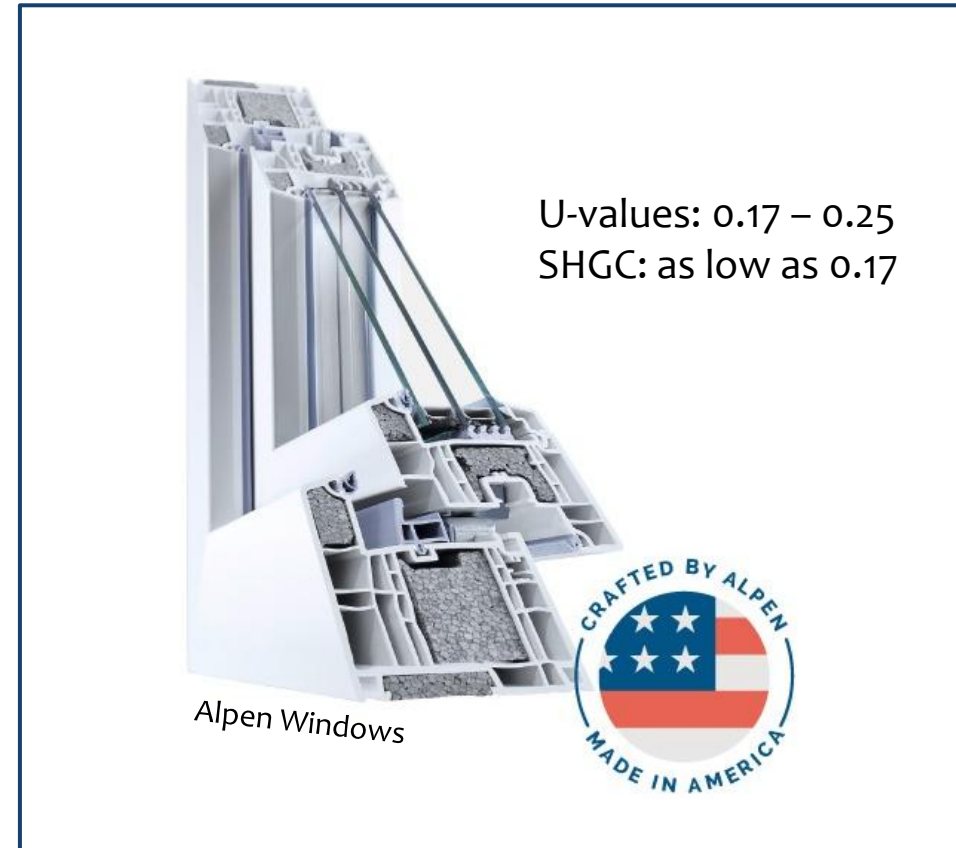
- **U-0.40** maximum U-factor all CZ

Prescriptive:

- **U-0.30** for CZ 6-10 and 15
- **U-0.27** for CZ 1-5, 11-14, and 16

Exception: New dwelling units with a conditioned floor area of **500 sf** or less in **CZ 5** may comply with a max **U-0.30**.

- **SHGC** – Not Required for CZ 1, 3, and 5
- **SHGC-0.23** for CZ 2, 4, 6-14, and 16
- **SHGC-0.20** for CZ 15



WUI Exemption to the Mandatory Max U-factor

CALIFORNIA DEPARTMENT OF FORESTRY
and FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL



STATE FIRE MARSHAL LISTED WILDLAND-
URBAN INTERFACE (WUI) PRODUCTS
HANDBOOK

Published by CAL FIRE
FIRE ENGINEERING AND INVESTIGATIONS DIVISION
BUILDING MATERIALS LISTING PROGRAM
September 2, 2025

*Thermally Broken Steel Frame
for Residential Construction*



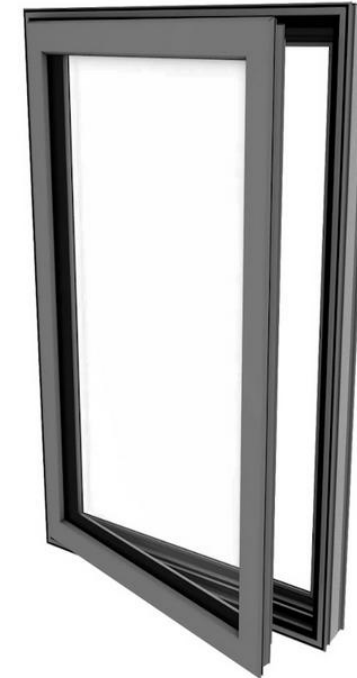
This product line is based in
Ventura and meets the Residential
Prescriptive U-factor and the WUI
Fire Code requirements.

<https://osfm.fire.ca.gov/what-we-do/fire-engineering-and-investigations/building-materials-listing>



Fenestration Alterations –i.e. added and replaced windows and skylights

CZ 1, 3, 5, 16		2025 Code	
Fenestration (Windows and Skylights)	U-factor	SHGC	
Window Replacement 75 sq ft or less	0.40	NR	
Skylight Replacement	0.40	0.30	
Window Replacement > 75 sq ft or New Additional Fenestration	0.27	NR	
Total Glazing as a % of Floor Area	20%		
West Facing Glazing	NR		



Models with U-factors as low as U-0.12 are available



EXCEPTION:

Alterations that add up to **16 square feet of new fenestration or skylight** shall not be required to meet the total fenestration area and west-facing fenestration area requirements.



Fenestration Alterations –i.e. added and replaced windows and skylights

CZ 6-10, 15		2025 Code	
Fenestration (Windows and Skylights)	U-factor	SHGC	
		CZ 6-10	CZ 15
Window Replacement 75 sq ft or less	0.40	0.35	0.23
Skylight Replacement	0.40	0.30	0.30
Window Replacement > 75 sq ft or New Additional Fenestration	0.30	0.23	0.23
Total Glazing as a % of Floor Area	20%		
West Facing Glazing	5%		

CZ 2, 4, 11-14		2025 Code	
Fenestration (Windows and Skylights)	U-factor	SHGC	
Window Replacement 75 sq ft or less	0.40	0.35	
Skylight Replacement	0.40	0.30	
Window Replacement > 75 sq ft or New Additional Fenestration	0.27	0.23	
Total Glazing as a % of Floor Area	20%		
West Facing Glazing	5%		



EXCEPTION:

Alterations that add up to **16 square feet of new fenestration or skylight** shall not be required to meet the total fenestration area and west-facing fenestration area requirements.




Example –High Performance Window



energystar.gov/windows
Certified

DO NOT REMOVE UNTIL FINAL INSPECTION


Universal Series (D)
Tilt and Turn Window
CASCADIA Windows & Doors
 Fiberglass frame, Triple glazed, Low E Coating
 (e=.002(2), 0.068(5)) Argon Filled, Endur Spacer
 CPD# CWL-K-23-00066-00001
 #101 - 5350B 2/5 St. Langley, BC, Canada V4W 0C1
 info@cascadiawindows.com www.cascadiawindows.com

ENERGY PERFORMANCE RATINGS


U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.15	0.17

ADDITIONAL PERFORMANCE RATINGS

Visible Transmittance	Condensation Resistance	Air Leakage (U.S./I-P)
0.39	77	≤ 0.3

Manufacturer stipulates that these ratings conform to applicable NFRCC procedures for determining whole product performance. NFRCC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRCC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrcc.org

PHYSICAL PERFORMANCE RATINGS

 **Class LC-PG45-DAW**



Window Cost Comparison

	Panes	U-Factor	Delivered Cost
Alpen			
	Double	0.15	\$75,878.51
	Double	0.16	\$85,311.14
Andersen			
A-Series	Triple	0.23	\$135,873.69
Loewen			
Alum Clad	Double	0.25	\$152,826.18
Marvin			
Essential & Ultimate Drs	Double	0.29	\$118,620.61
SeemRay			
	Double	0.21	\$64,000.00
SmartWin			
	Double	?	\$128,469.00
WeatherShield			
	Double	0.24	\$99,873.00
Wythe			
	Triple	0.14	\$91,702.00
Zola			
Classic-Clad	Double	0.25	\$114,189.00
Cascadia			
	Triple	0.14	\$70,557.00



Adding or Replacing a Water Heater

Assessment / Cues to Ask?

- What exists now?
 - Gas Tank or Tankless
 - Electric Resistance Tank
- How much space is available?
- Hot water pipes exposed, insulated, accessible?
- Plumbing lines have long runs? Recirculation pump?
- Occupant needs and use patterns?

Goals and Opportunities

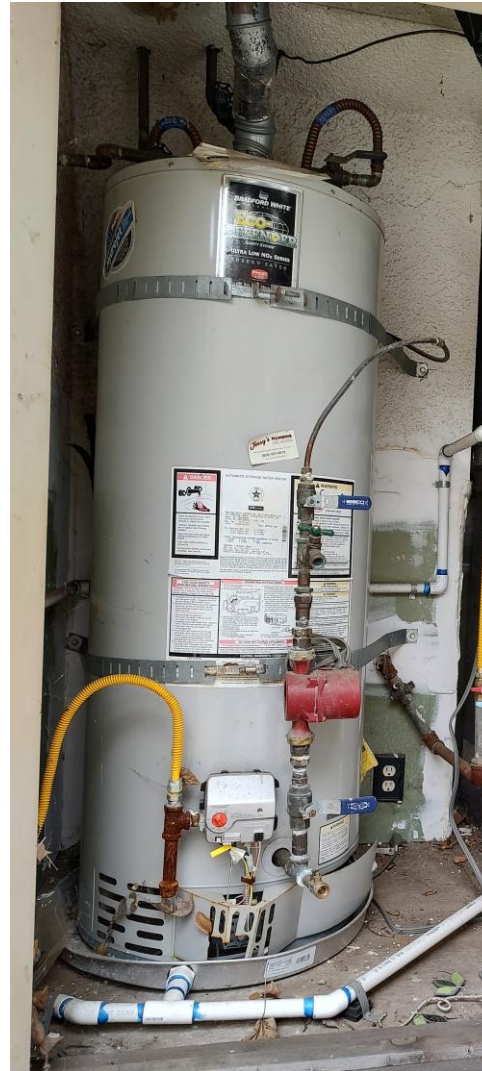
- Upgrade or Replace Before its an Emergency.
- HPWH can:
 - Utilize on-site Solar
 - Reduce Carbon Footprint
 - Eliminate Burning Fossil Fuel in the Home



Existing Water Heaters – Opportunity or leave as is?



Electric
Resistance
Tank



Gas Tank



Gas Tankless

Prescriptive Alterations –Water Heater Replacement

Section 150.2(b)1H

i. **Pipe Insulation.** For newly installed and existing accessible piping, the insulation requirements of Section 150.0(j)1 shall be met.

ii. **Distribution System.** For recirculation distribution systems serving individual dwelling units, only Demand Recirculation Systems with manual on/off control as specified in the Reference Appendix RA4.4.9 shall be installed.

iii. **Water heating system.** The water heating system shall meet one of the following:

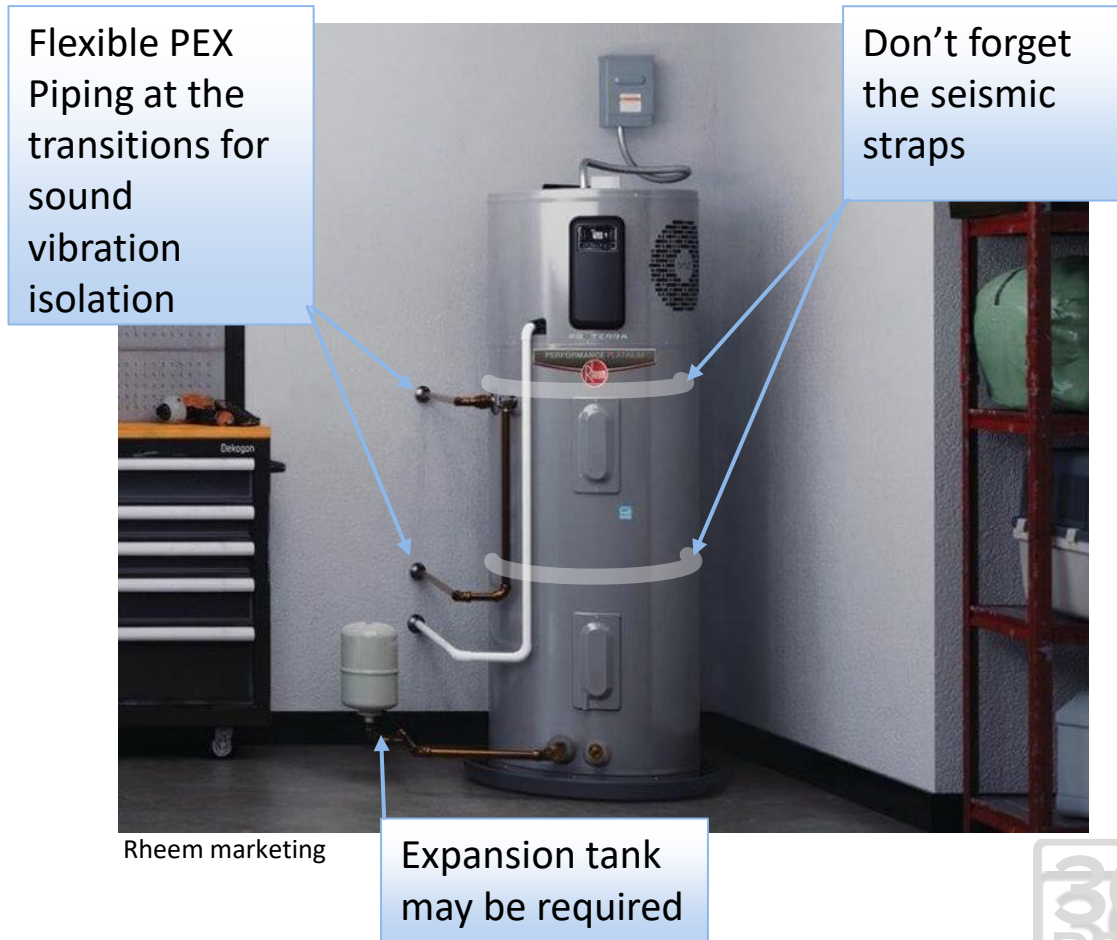
- a. A **natural gas or propane** water-heating system; or
- b. A **single heat pump water heater**. The storage tank shall not be located outdoors and be placed on an incompressible, rigid insulated surface with a minimum thermal resistance of R-10. The water heater shall be installed with a communication interface that meets either the requirements of Section 110.12(a) or has an ANSI/CTA-2045-B communication port; or
- c. A **single heat pump water heater** that meets the requirements of NEEA Advanced Water Heater Specification Tier 3 or higher; or
- d. If the existing water heater is an **electric resistance** water heater, a consumer electric water heater; or
- e. A water-heating system determined by the Executive Director to use no more energy than the one specified in Item a above; or if no natural gas is connected to the existing water heater location, a water-heating system determined by the executive director to use no more energy than the one specified in Item d above.

Note:

Section 150.2(b)1H did not change under the 2025 Code.

Design Considerations of Integrated Systems

- HPWH – larger diameter and taller
 - Good rule of thumb is 2'-6" x 2'-6" clr floor area and 7' clr height
- Space at the air exhaust port – 6" min, 12"-24" recommended
- Consider units with air exhaust and intake at the top of the tank
- Learn where the filter is located
- Insulate the water pipes
- Condensate drainage needs to be addressed
- Electrical 240V 30amp typical
- 120V 15amp available –hint: upsize the tank, i.e. 50gal to a 66gal



Integrated or Split-System? Ambient Air Temperature Matters

Integrated HPWH

Lower temp range:

- Most brands 40-45 deg F
- Some models 37 deg F

Upper temp range:

- Most brands 145 deg F



SanCO2 Hydronic Split System

Lower temp range:

- - 26 deg F

Upper temp range:

- 114 deg F




Heat pumps have an operational temperature range – outside of the range means electric resistance mode – which means more energy and more money to operate



New for 2025: Mandatory Measures for HPWH

Heat Pump Water Heaters –Integrated

- Require a Back-Up Heat Source. Can be internal or external to the HPWH
- Ventilation Requirements Including:
 - Volume of Space
 - Net Free Area – Permanent Openings
 - Ducted Systems – Permanent Openings
- Duct Requirements: Where ducts are installed, such as R-6 duct insulation and sealed penetrations



Sealed at Penetrations

R-6 Ducts



Heat Pump Compressor

Electric Elements

Net Free Area = 125 sq in + 25 sq in per kBtu/h of compressor capacity or manufacturer specifications, whichever is larger.



Garage and Exterior Closets



- Works well in most climates



- Can work well in mild/moderate winter climates
- Protected from weather
- Louvered door for air volume

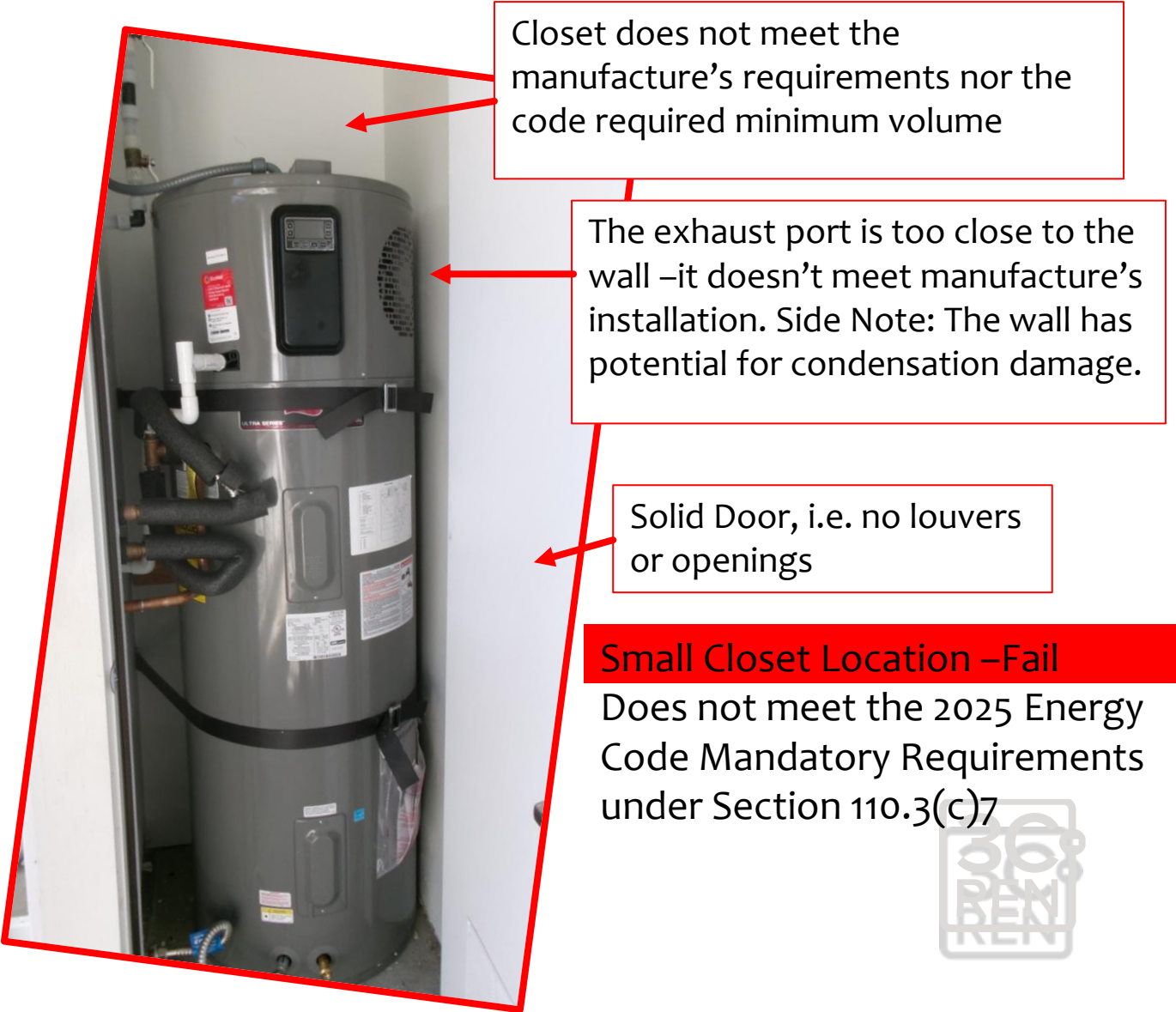


HPWH Need Surrounding Air –that’s where the heat comes from

Louvered door allows the HPWH to ‘communicate’ to the larger spaces of the house.



NFA = 125 sq in + 25 sq in per kBtu/h of compressor capacity or manufacturer specifications, whichever is larger



Closet does not meet the manufacture’s requirements nor the code required minimum volume

The exhaust port is too close to the wall –it doesn’t meet manufacture’s installation. Side Note: The wall has potential for condensation damage.

Solid Door, i.e. no louvers or openings

Small Closet Location –Fail
Does not meet the 2025 Energy Code Mandatory Requirements under Section 110.3(c)7

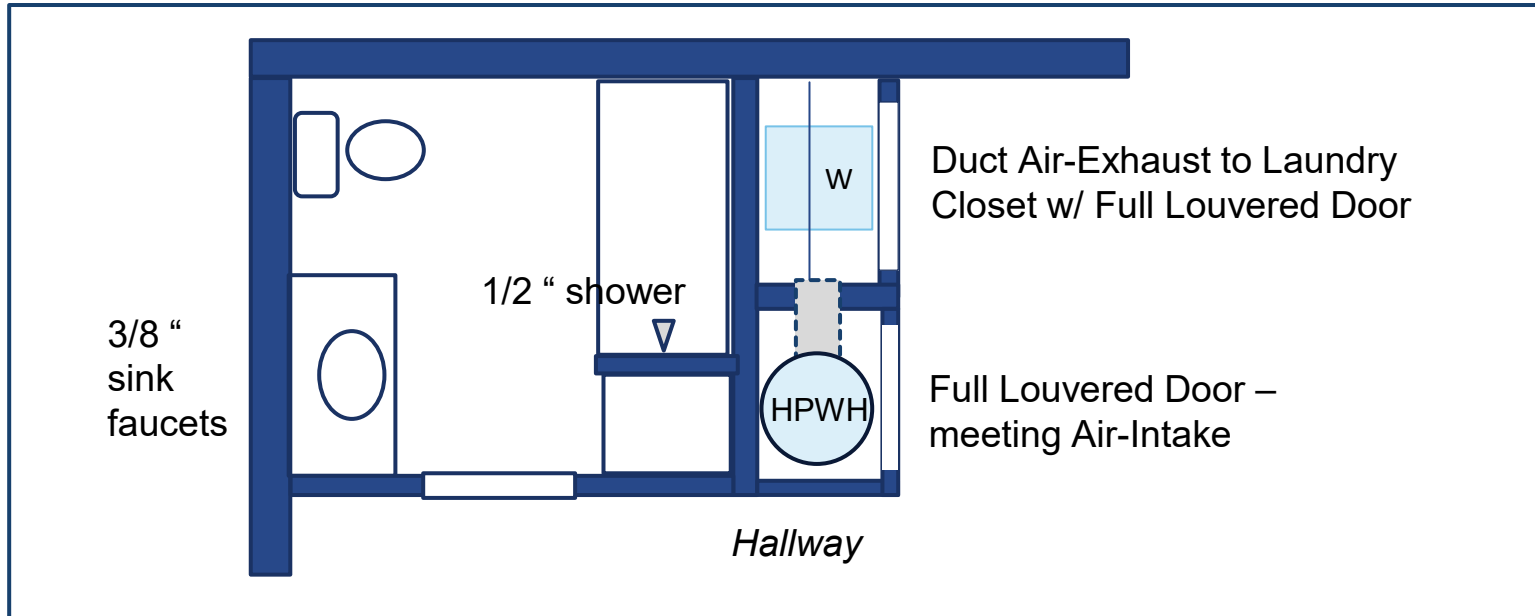


Existing Small Homes – Interior space or a garage may not be available



- Enclosure provides protection from the weather
- Appropriate for mild climates (HPWH units go into electric resistance mode around 40-45 deg F)
- Gaps between the siding boards allow for ventilation air
- Control panel is accessible
- Exhaust vent port is free from obstruction
- Condensate drainage is taken outdoors

Indoor Location – “Free Air-Conditioning” Can also help with WUI



HPWH Located Indoors, and with Air-Inlet Indoors and Air-Outlet Indoors

- Duct outlet air is transferred to a naturally warm area such as a laundry room or W/D closet; or kitchen refrigeration area and/or pantry
- Duct inlet air can come from the adjacent space or be transferred via duct from another warm space



Q&A with
Jennifer Rennick, In Balance
Green Consulting
Mike Horgan, Cairn
Collaborative Design-Build



What retrofit projects are you interested in learning more about?





Tatiana Soglin
In Balance Green Consulting



CALGreen & Electric Vehicle Charging in Alterations

Electric Vehicle Charging

- EV Charging Definitions
- What Alterations Trigger EV Charging
- Multi Family Requirements
- Non-Res Requirements
- Access Compliance

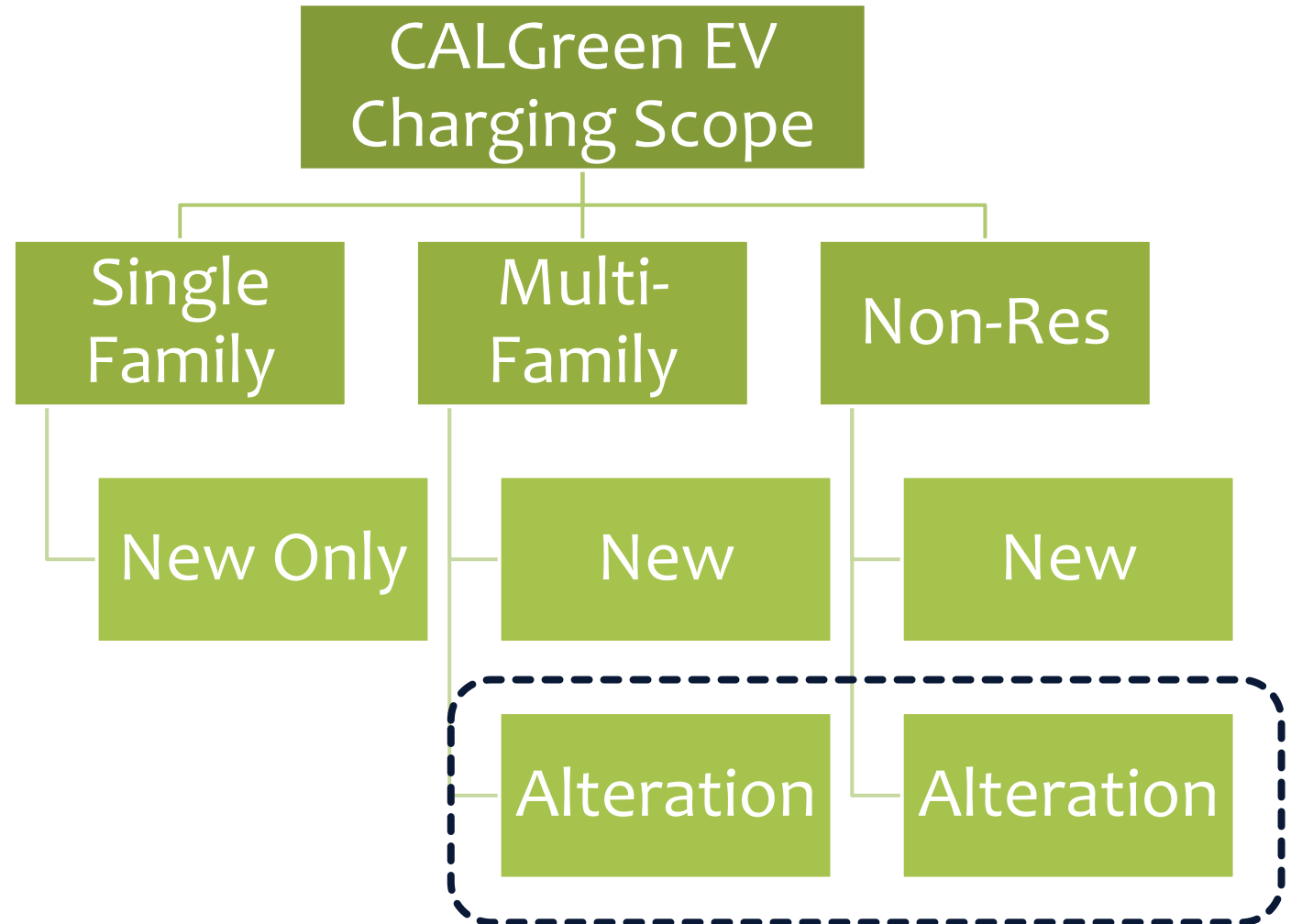
Big increase between 2022 Code and 2025!



CALGreen Scope

CALGreen Code Sections

- 4.106.4 Electric vehicle (EV) charging for new construction.
- **4.106.4.3 Electric vehicle charging for additions and alterations** of parking facilities serving existing multifamily buildings, hotels and motels.
- 5.106.5 Electric vehicle (EV) charging
 - **5.106.5.4 Additions or alterations to existing buildings or parking facilities**



EV Charging – 3 Types



EV CAPABLE

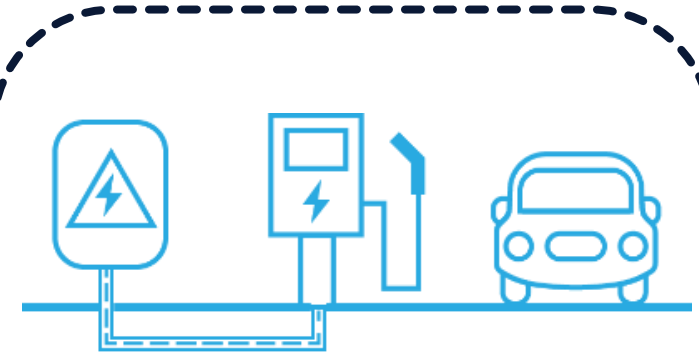
Provide electrical panel space, conduit (no wire), and a termination box for a future 208/240-volt, 40-amp circuit



EV READY

Provide a space that is fully wired for 208/240 volt and has a receptacle so it's "ready" for someone with their own plug-in cord

Only EVCS Trigger ADA



EV CHARGING STATION

Provide Level 2 EV Charging Stations (EVCS). These should be stand-alone chargers in common-use parking areas



Residential Parking Lot Alterations

Multifamily + Hotel/Motel

- **Trigger:** When existing parking facilities are altered or new parking spaces are added to existing parking facilities and the work requires a building permit
- **Requirement:** All new or altered spaces must be EV Ready or EVCS



Low Power Level 2

208/240-volt, **20-amp** receptacle, Used for EV Ready



Level 2

208/240-volt, 40-amp charge station, Used for EVCS



See code section for additional information and exceptions.

4.106.4.3

Nonresidential Parking Lot Alterations

- **Triggers:**
 - When parking area is added, or electrical work is done (i.e. increased power supply to electric service panel or new PV system)
- **Requirement with previously installed EV capable infrastructure:**
 - Upgrade all existing EV capable spaces with EVCS and include EV charging in compliance with relevant parking table
- **Requirement without previously installed EV capable infrastructure:**
 - Include EV charging in compliance with relevant parking table

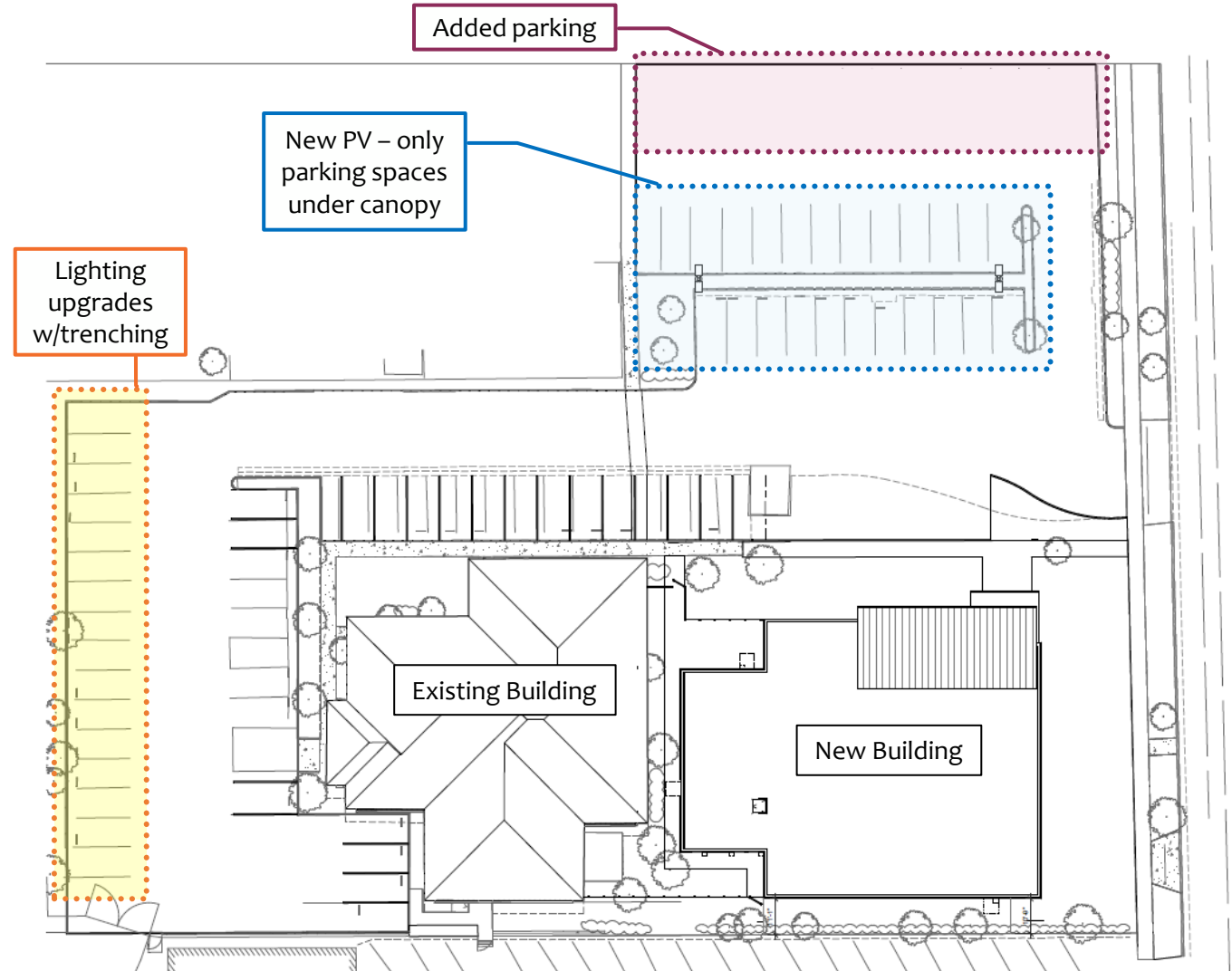
See code section for additional information and exceptions.



5.106.5.4

Triggers in Practice

- Alteration or addition
 - Dug up, not just restriping
- New lighting
 - That requires trenching
- PV Canopy
 - Intervening Code Cycle (in effect on 7/1/2027) clarifies language regarding new PVs and limited EVCS requirements



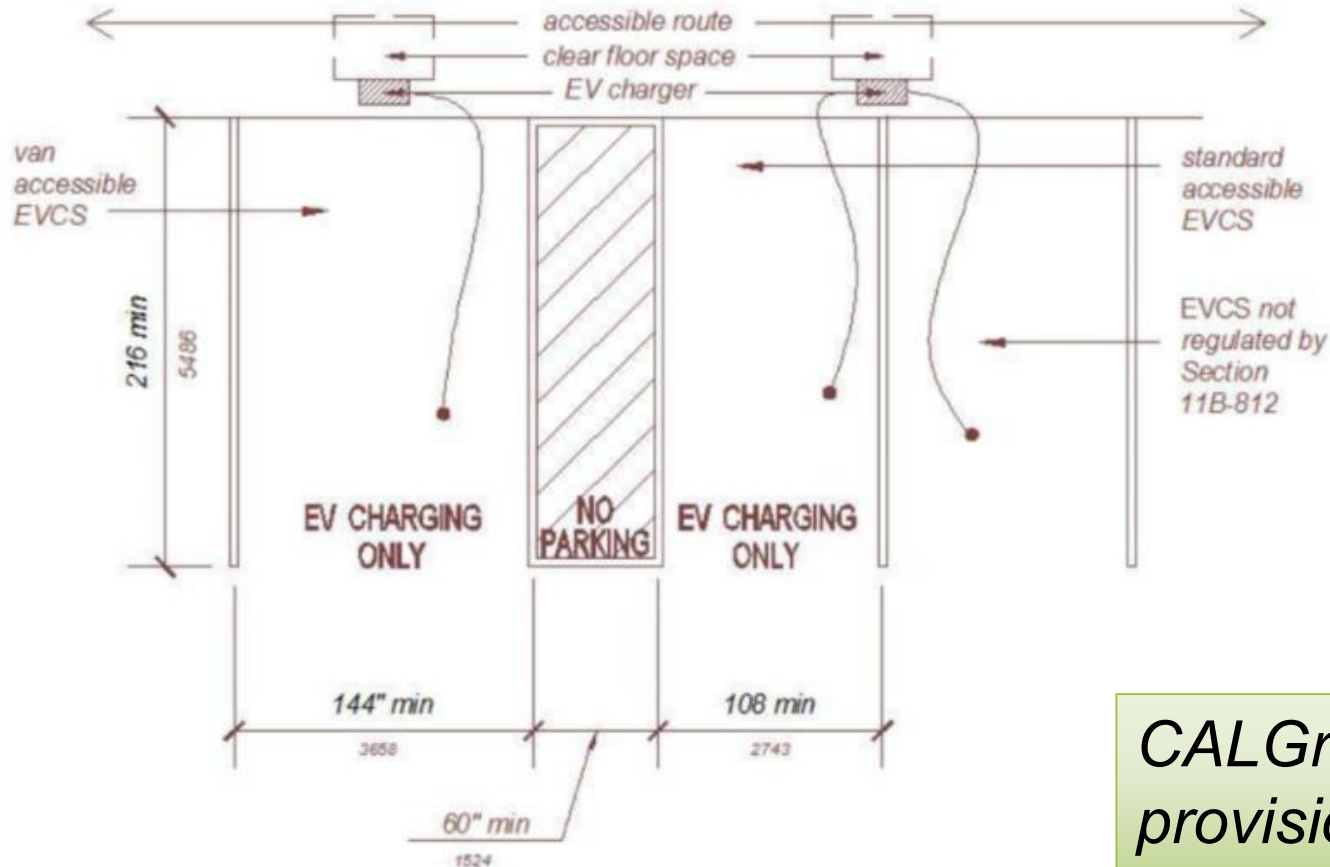
Electric Vehicle Charging - Non-Res

Total Spaces	2022 Code		2025 Code		
	EV Capable	EVCS	EV Capable	EVCS	EVCS Office/Retail
0-9	0	0	0	0	0
10-25	4	0	4	2	3
26-50	8	2	8	4	6
51-75	13	3	13	6	8
76-100	17	4	17	8	13
101-150	25	6	25	12	19
151-200	35	9	35	18	26
201+	20%	25% of EV Capable	50% of EV Capable	50% of EV Capable	75% of EV Capable



Note that the EVCS count towards the total number of EV Capable Spaces

Electric Vehicle Charging- Accessibility



All of the EVCS that are built for Non-residential uses, or hotels, motels and public housing, must comply with California Building Code, Chapter 11B-228.3.

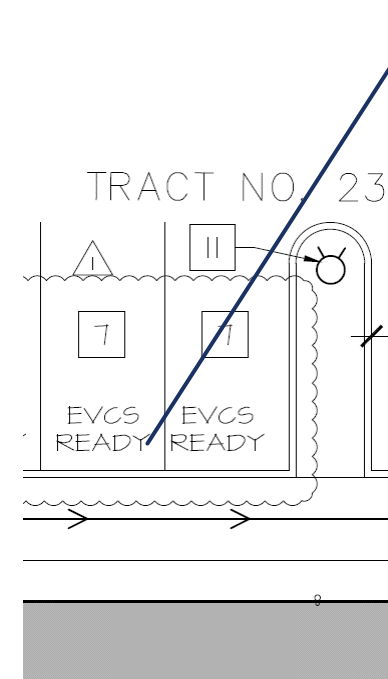
CALGreen now includes similar provisions for Multi-family, where Chapter 11 is silent.



Documentation for EV

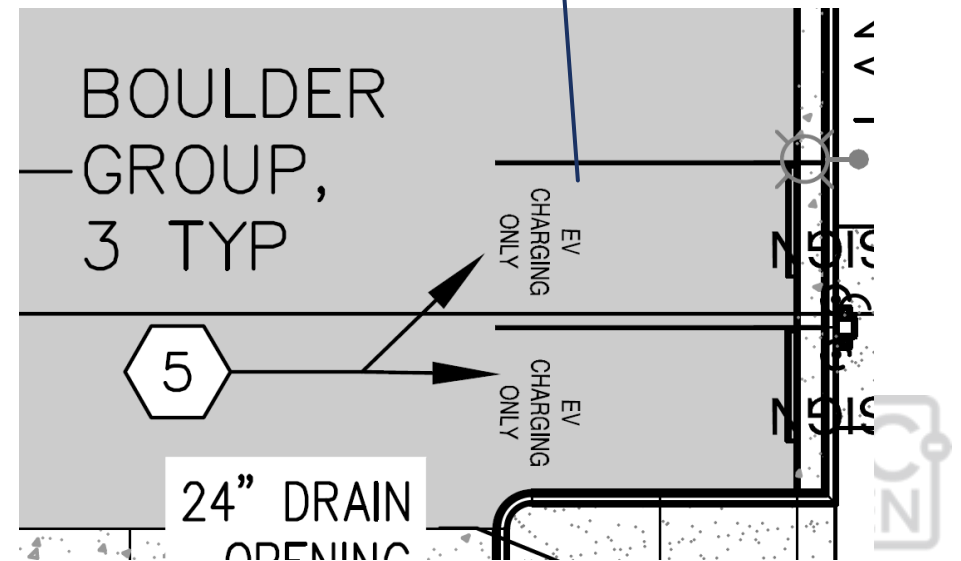
Documentation:

- Calculations on Cover Sheet for number and type of spaces
- Spaces labeled on Site Plans, with Details
- Sufficient capacity in panels on Electrical Sheets



Shows Builder (and plans examiner) location of EV ready spaces


Shows Builder striping for stall of EVCS space






**Have you thought about ADA
accessibility when retrofitting
projects?**





**Q&A with
Tatiana Soglin, In Balance
Green Consulting**





**POST-EVENT
SURVEY**



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.

Thanks for coming!



Continuing Education Units Available

- Contact dresurreccion@co.slo.ca.us with any questions.

Today's Slides and Recording are Coming to Your Inbox Soon!

Upcoming Courses:

- [5/13 2025 Energy Code in Practice: Multifamily Residential](#)
- [5/26 Builder's Perspective: Insulation and Air Sealing](#)
- [6/3 Energy Code in Practice: Nonresidential](#)
- [6/9 Reducing Carbon Emissions from MEP Systems](#)

Any phone numbers who joined? Please share your name!

