



TITLE 24, PART 6

2025 CODE CYCLE

Multifamily Restructuring Topic

Codes and Standards Enhancement (CASE) Proposal
Multifamily | Restructuring

Lucy Albin
February 14, 2023

Multifamily Restructuring Topic Context

2022 Achievements

- Reorganized multifamily requirements into standalone chapters within Title 24 Part 6 with 2022 update
- Increased uniformity across multifamily buildings with three or fewer habitable stories and buildings with four or more habitable stories

2025 Measures

- Align requirements across multifamily buildings of all heights
- Expand application of compliance options
- Reorganize and clean up additions, alterations, and repairs chapter for clarity and ease of use

Multifamily Restructuring Measures

February 14, 2023 Stakeholder Meeting

- Snapshot Quality Insulation Installation (QII)

February 21, 2023 Stakeholder Meeting

- Slab Perimeter Insulation
- Visual Transmittance
- Skylight Properties (Additions and Alterations)
- Central Ventilation Shaft Sealing
- Verification (HERS/ATT) Clean-Up
- Additions and Alterations Clean-Up



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Snapshot QII

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Background

- Code Change Proposal
- 2022 Code Requirements
- Context and History

Current Code Requirements

- QII is prescriptively required for all multifamily buildings up to three habitable stories, except those in Climate Zone 7
- Two-part procedures for verifying the quality of insulation installation and air leakage control through envelope cavities:
 - Rough install stage: Verifies features associated with envelope cavity air-barriers before insulation is installed.
 - Insulation install stage: Verifies insulation is installed properly before interior finishes are applied (e.g. dry-wall)



Proposed Code Change

- Extend quality insulation installation (QII) requirements to all multifamily, with new protocols for larger buildings as deemed practical and cost effective
 - Full QII as required for 2022 low-rise multifamily is not proposed to be changed
- Confirm staged construction threshold – proposed 4 stories or greater
- Introduce:
 - Snapshot QII as a prescriptive requirement for 4+ stories
 - Full QII for additional compliance credit for 4+ stories
 - Snapshot QII for partial credit for buildings up to 3 stories

Draft code language for this measure is available in Handouts.



Proposed Code Change

Verification visit(s) timed at specific construction milestones – designed to be possible in two visits

- The verification is of **all available surfaces** at the time of inspection
- Minimum percentage of total wall area coverage back-stop. Additional visits required if unfulfilled in the first.
 - 20% for cavity air sealing inspection at framing stage;
 - Another 20% at the after insulation & before drywall installation stage;
 - 100% of first habitable story inspected
- Failure mitigation proposal:
 - Failure on 1st floor should be corrected, and would not count towards 20% minimum
 - Failure on subsequent floors would trigger full QII verification of 100% of remaining building envelope



Context and History

- Concern about insulation installation quality led to adoption of QII for residential buildings in the 2013 code cycle. The same concerns exist for taller buildings.
- Slow uptake in full QII requirement in multifamily buildings due to difficulty inspecting 100% of the envelope in phased construction
- Significant energy savings
- Allows more options for compliance with performance pathway



<https://www.aeropaca.org/editv2.php>



Market Overview

- Current Market Conditions
- Market Trends
- Potential Market Barriers and Solutions

Market Overview and Analysis

Current Market

- No experience with QII for multifamily buildings with 4+ stories
- QII is prescriptively required for multifamily buildings ≤ 3 stories

Market Trends

- Multifamily buildings are pursuing QII because there would be a large credit to make up without it
- QII in multifamily buildings for LEED and Green Point Rated certification

**Do you agree with
this description?
What else should we
know?**

Market Barriers

- QII new to the multifamily high-rise construction industry
 - *Leverage cross-over knowledge from low-rise QII experience*
- QII perceived as more challenging in multifamily construction
 - *Snapshot QII reduces the biggest challenges of timely access*
- QII requires better coordination among designers and trades
 - *This was true for residential QII, and was overcome with market support*
- Prohibitive to recover compliance in the case of a failed QII verification
 - *Failed Snapshot QII mitigation option built into proposed protocol and rules*





Technical Considerations

- Technical Considerations
- Potential Barriers and Solutions

Technical Considerations

Technical Considerations

- Updated QII protocols will consider technical, and logistical, feasibility challenges for cavity air-sealing and insulation installation quality for all construction types

Technical Barriers and Potential Solutions

- Physical access to insulation, especially exterior shell insulation
 - *Snapshot QII allows for high-floor exterior shell verification from the ground.*
- Scheduling and timing with staged construction
 - *Snapshot QII greatly reduces scheduling challenges*

**Do you agree with
this description?
What else should we
know?**

Energy and Cost Impacts Per Dwelling Unit

Methodology and Assumptions

- Energy Savings Methodology and Results
- Cost Impacts Methodology and Results
 - Incremental costs
 - Energy cost savings



Methodology for Energy Impacts Analysis

Methodology for per-dwelling unit energy and demand impacts:

- Prototypes analyzed:

Prototype	# Stories	# Dwelling Units	Floor Area (sq. ft.)
Mid-rise Mixed Use	5	88	113,100
High-rise Mixed Use	10	117	125,400

- Climate zones analyzed: All except zone 7



Standard Design

No QII verification: 30% derating applied to the cavity insulation (framed walls, ceilings/attics, exterior floors)



Proposed Design

Snapshot QII: Removal of half of the 30% cavity derating (15% total derating)

Preliminary Energy Savings Estimates Per Dwelling Unit

Key Assumptions:

- No QII baseline
- Snapshot QII proposed
- 30-year evaluation period

Energy and Energy Cost Impacts - New Construction & Additions – MidRiseMixedUse					
Climate Zone	First-Year Electricity Savings (kWh)	First-Year Peak Electrical Demand Reduction (kWh)	First-Year Natural Gas Savings (kBtu)	First-Year Source Energy Savings (kBtu)	First-Year LSC Savings (2026 PV\$)
CZ01	4.42	0.07	15.00	28.16	55.42
CZ02	11.27	1.39	-	26.75	81.54
CZ03	9.16	0.12	-	30.08	78.59
CZ04	20.23	2.28	-	45.57	150.91
CZ05	8.47	0.15	-	27.52	68.61
CZ06	5.90	3.22	-	12.54	44.16
CZ07	N/A	N/A	N/A	N/A	N/A
CZ08	11.99	5.46	-	18.56	79.23
CZ09	6.01	0.53	-	17.41	46.59
CZ10	7.91	1.07	-	19.20	58.50
CZ11	11.70	2.61	-	30.21	91.01
CZ12	16.01	3.61	-	32.64	119.94
CZ13	11.86	4.10	-	24.19	88.96
CZ14	14.24	3.12	-	37.38	107.65
CZ15	14.86	9.80	-	16.38	98.30
CZ16	12.80	3.40	84.20	104.19	197.63

Incremental Cost Information

- Verification cost of HERS rater – labor and travel
- Interviews with building designers, HERS Raters, insulation contractors, and framers
 - Costs from increased verification times, travel
 - No additional material costs or installation costs
- Estimates are conservative (surface area coverage, travel distance, verification time, labor rates)
- No additional replacement or annual maintenance costs



Incremental Per Dwelling Unit Cost

Over 30-Year Period of Analysis

Incremental First Cost	Mid-Rise Mixed Use	High-Rise Mixed Use
Labor	\$18.03	\$16.41
Travel	\$2.84	\$2.67
Other	\$0.00	\$0.00
Total	\$20.87	\$19.08

Cost data came from:

- HERS rater hourly rate
- Inspection time per wall area
- Wall area and number of visits
- Mileage rate

No equipment replacement or maintenance costs.

Cost Effectiveness – MidRiseMixedUse

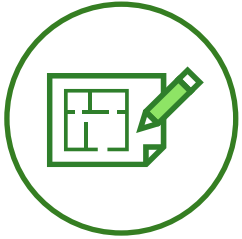
Climate Zone	Benefits <i>LSC Savings + Other PV Savings</i> (2026 PV\$/dwelling unit)	Costs <i>Total Incremental PV Costs</i> (2026 PV\$/dwelling unit)	Benefit-to-Cost Ratio
1	\$55.42	\$20.87	2.66
2	\$81.54	\$20.87	3.91
3	\$78.59	\$20.87	3.77
4	\$150.91	\$20.87	7.23
5	\$68.61	\$20.87	3.29
6	\$44.16	\$20.87	2.12
7	N/A	N/A	N/A
8	\$79.23	\$20.87	3.80
9	\$46.59	\$20.87	2.23
10	\$58.50	\$20.87	2.80
11	\$91.01	\$20.87	4.36
12	\$119.94	\$20.87	5.75
13	\$88.96	\$20.87	4.26
14	\$107.65	\$20.87	5.16
15	\$98.30	\$20.87	4.71
16	\$197.63	\$20.87	9.47



Compliance and Enforcement

- Design
- Permit Application
- Construction
- Inspection
- Revisions to Compliance Software

Compliance and Verification Process



- 1. Design Phase:** Requires an integrative design process
 - Consider inspection access and timing options when determining design
 - Engage with the HERS Rater during design phase
 - Communication with trades regarding quality expectations
 - The design team, including developer and architect, would specify wall construction type and provides necessary information to populate the Certificate of Compliance documents
 - Documents would include frame type, dimensions, cavity and continuous installation types and R-values, and the overall assembly U-factor



- 2. Permit Application Phase**
 - Newly trigger installation forms, inspection forms, and registry requirements for high-rise buildings
 - Design professional would complete and submit the Certificate of Compliance documents
 - Permitting package would include product specifications, schedules for framing, and insulation components

Compliance and Verification Process



3. Construction Phase:

- Requires careful planning and oversight during construction (timing of access, cost of failure and mitigation)
- General contractor and HERS Rater would coordinate field verification visit(s) such that the wall area is visually accessible at the right construction stages
- The general contractor would communicate, establish expectations, and orchestrate the coordination between framing, insulation, and drywall installers, and other trades as necessary



4. Inspection Phase:

- Third-party inspections need to be concurrent with construction for timing of inspections, and physical and visual access to air-sealing and insulation layers
- General contractor would ensure the insulation installer completes and signs the Certificate of Installation documents before or at verification visits(s)
- HERS Rater would perform verification and note any deficiencies and correction notes as needed
- HERS Rater would populate, sign, and submit the Certificate of Verification forms to the registry for building compliance purposes

Compliance and Verification

- Number and timing of visits to complete verification, additional coordination between HERS rater and contractors
- California's HERS Registries will need to house verification data related to all multifamily buildings
- Multifamily project teams will need to ramp up coordination between Title 24 consultants, the developer, installation trades, and HERS Raters.



Software Updates

- Full QII is already a modeling option in CBECC for buildings with 3 or fewer stories (Y/N dropdown)
- Extend full QII option to all multifamily buildings
- Introduce snapshot QII for partial credit to all multifamily buildings
- Apply all three QII derate mechanisms for buildings 4+ stories that do not take QII
 - 30% cavity derate
 - Attic floor insulation derate
 - Heat-flow between conditioned zone and attic zone
- Update standard design for buildings with 4+ stories (i.e. Snapshot QII taken) to include 15% cavity derating, and full credit back for any applied attic related derate mechanism



Review of Code Language Markup

- Draft Code Change Language



Draft Code Change Language

- Draft code language available for review in Handouts and downloadable.
- **Provide Feedback to CASE Author by February 28th.**
- Structure subject to change – considering separate RA section for full and snapshot procedures
- Change to prescriptive requirements:

Building type	Prescriptive requirement	Performance options
Buildings with three habitable stories or fewer	Full QII	No QII (less credit) Snapshot QII (less credit)
Buildings with four habitable stories or greater	Snapshot QII	No QII (less credit) Full QII (more credit)



Discussion and Next Steps

We want to hear from you!

- Provide **any last comments or feedback** on this presentation now verbally or over the chat
- More information on pre-rulemaking for the 2025 Energy Code at <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency>

Comments on this measure are due by February 28th. Please send comments to info@title24stakeholders.com and copy CASE Authors (see contact info on following slide).

Thank You

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