

Proposal Summary



Multifamily Envelope

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Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on May 17, 2023. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by May 31, 2023.

Measure Description

This CASE Report will focus on three measures that are grouped into the 'Envelope' category of building systems.

Cool Roof Improvements

This measure would increase aged solar reflectance (ASR), thermal emittance (TE) and solar reflectance index (SRI) value requirements and expand cool roof requirements to more climate zones. Cool roofs reduce the heat absorption into the roof materials, reducing the cooling loads in the building. The proposed code changes intend to align more closely with the 2022 Title 24 nonresidential or single family residential cool roof requirements.

For steep-sloped roofs, Option B, the proposed changes would increase the requirement for Climate Zones 10,11,13 and 15 from an ASR of 0.20 to 0.25 and a TE of 0.75 to 0.8.

For low-sloped roofs, Option D, the current prescriptive code for roof requires multifamily low-sloped roofs have a minimum ASR of 0.63, a TE of 0.75, and an SRI of 75 in Climate Zones 9 through 11 and 13 through 15. Proposed code changes would expand these requirements to other Climate Zones 2, 4, 6 through 8, and 12.

Improved Wall Performance

This measure would increase the mandatory U-factor of wood-framed wall insulation from 0.102 to 0.095 in 2x4 construction and 0.071 to 0.069 in 2x6 construction, establishing a new backstop for buildings using the performance compliance pathway. The code language is built on wall assembly U-factor, a potential pathway for the

proposed code change corresponds to increasing wall cavity insulation from R-13 to R-15 for 2x4 and R-20 to R-21 for 2x6 framing. For metal-framed wall insulation, the mandatory U-factor is proposed to improve from 0.151 to 0.148. Higher wall insulation reduces heat transfer in the solid portions of the walls in a building. Because wall insulation also has a prescriptive aspect that exceeds this minimum level (but is tradeable with other building systems in the performance compliance pathway), there will be no energy savings associated with this change to the mandatory portion of the code. This measure will be coordinated with changes to the residential wall insulation requirements.

High Performance Windows

High performance window measure will save energy by reducing the amount of heating or cooling needed to keep the indoor air temperature in the desired comfort range. This measure would improve prescriptive U-factor and solar heat gain coefficient (SHGC) for all categories of multifamily fenestration, including curtainwall, architectural windows, and punched windows. The Team proposes reduction of prescriptive U-factor requirement for All Other window category from 0.3 to 0.28 in climate zones 1,3-5, 11 and 13-16 and modifying prescriptive minimum RSHGC requirements of multifamily buildings with four or more habitable stories to be “NR”, no RSHGC requirement, in heating dominated climate zones 1,3,5 and 16 across all window type categories. The standard design will assume 0.35 RSHGC in performance approach.

This measure is aligned with changes to the single-family residential requirements. The proposed changes in prescriptive requirements are extended to additions and alterations scenarios as well.

Data Needs/Stakeholder Information Requests

The data needs for each measure are provided below.

Cool Roof Improvements

- **Technical Feasibility** – Information from manufacturers and specifiers on the following topics.
 1. Specifiers – Does available (stocked) product selection drive specifications? Are higher SRI and emissivity products available through special order and is that path chosen as a tradeoff in the performance method?
 2. Manufacturers – Are there limitations to the range of SRI than can be introduced while still maintaining the range of esthetic options desired for architectural purposes? What are the most specified roof colors and are there higher SRI versions that may be considered visually equivalent for architectural purposes?

- **Market Readiness** – Information from manufacturers on product availability and any barriers to increasing the SRI requirements for cool roofs.
 1. Manufacturers – Availability of cool roof products in the California market that exceed the current code for SRI and thermal emissivity. Are there any barriers to introducing higher performance cool roof products into the CA market? Do municipalities limit the SRI to address glare in a manner that will cause conflict between the Code and local ordinance?
- **Costs** – Information from manufacturers on the cost of cool roof products.
 1. Manufacturers – What are the cost implications of increasing the SRI of roofing products? Is there a premium to specifying a cool roof with asphalt shingles compared to a non-CR rated product? Does this cost difference increase as the SRI increases?

Improved Wall Performance

- **Technical Feasibility** – Information from manufacturers and specifiers on the following topics.
 1. Specifiers – Are higher (above code minimum of R-13 and R-20) R-value insulation products used in wall cross-sections as a tradeoff in the performance method? What do most projects have for insulation in typical wall cross-sections.
 2. Manufacturers – Are there limitations to the range of R-value than can be accommodated in 2x4 and 2x6 wall cross-sections? What is the practical limit for R-value in these walls based on space available or other limitations?
- **Market Readiness** – Information from manufacturers on product availability and any barriers to increasing the minimum R-value requirements for walls.
 1. Manufacturers – Are R-value 15 and 21 insulation products readily available in the market for specification?
- **Costs** – Information from manufacturers on the cost of insulation products.
 1. Manufacturers – What are the cost implications of increasing the minimum R-value from 13 to 15 in 2x4 walls, and from 20 to 21 in 2x6 walls?

High Performance Windows

- **Technical Feasibility** – Information from manufacturers and specifiers on the following topics related to high performance windows.
 1. Specifiers – Preferences for window specifications; are higher performance windows used in performance method compliance approaches? What product types are used when specifying higher performance? Do triple pane or thin triples get specified? Are there any

practical reasons (other than cost) that higher performance windows aren't chosen at times?

2. Manufacturers – are there any reliability or other limitations to window units that make high performance windows less reliable or have lower life expectations?
- **Market Readiness** – Information from manufacturers on product availability and any barriers to introduction for high performance windows.
 1. Manufacturers – Availability of window products in the California market that exceed the current code for U-factor. Are triple pane or thin triple window units available? Are there any barriers to introducing higher performance windows into the CA market? Are higher performing products available in traditional double pane configurations that can compete with triple or thin triples?
 - **Costs** – Information from manufacturers and distributors on the cost of high performing windows.
 1. Manufacturers – Are better than code windows sold at a rate (currently) to support standard production lines and distribution? What are the cost implications of improving a window unit from the current code performance level up by a U-factor of 0.02? Does this increase extend linearly for each 0.02 beyond code?
 2. Distributors – Are specifiers driving the selection of window performance by requesting (specifying) improved performance, or do specifiers allow product availability and/or cost determine specifications?

Data may be provided anonymously. To participate or provide information, please email Avani Goyal, agoyal@trccompanies.com directly and cc info@title24stakeholders.com.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2022 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow.

Cool Roof Improvements Proposed Code Language

The following changes are proposed for Section 160.1(b):

Section 170.2 (a)

1. Exterior roofs and ceilings.

Exterior roofs and ceilings shall comply with each of the applicable requirements in this subsection:

- A. A. Roofing Products. All roofing products shall meet the requirements of Section 110.8 and the applicable minimum aged solar reflectance and thermal emittance requirements of TABLE 170.2-A.

EXCEPTION 1 to Section 170.2(a)1A: Roof area covered with ~~B~~building integrated photovoltaic panels and building integrated solar thermal panels are exempt from the minimum requirements for solar reflectance and thermal emittance or SRI.

Table 170.2-A

TABLE 170.2-A ENVELOPE COMPONENT PACKAGE – Multifamily Standard Building Design																		
Multifamily			Climate Zone															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Roof/Ceiling	Option B (meets §170.2(a)1Bii)	Below Roof Deck Insulation ^{1,2} (With Air Space)		NR	NR	NR	R19	NR	NR	NR	R19	R19	R13	R19	R19	R19	R19	R13
		Ceiling Insulation		R 38	R 38	R 30	R 38	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38
		Radiant Barrier		NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR
		Low-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75
			Solar Reflectance Index (SRI)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	75	NR	75
		Steep-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	<u>0.2 0.25</u>	<u>0.2 0.25</u>	NR	<u>0.2 0.25</u>	<u>0.2 0.25</u>	NR
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	<u>0.75 0.8</u>	<u>0.75 0.8</u>	NR	<u>0.75 0.8</u>	<u>0.75 0.8</u>	NR
			Solar Reflectance Index (SRI)	NR	NR	NR	NR	NR	NR	NR	NR	NR	<u>16 23</u>	<u>16 23</u>	NR	<u>16 23</u>	<u>16 23</u>	NR
	Option C (meets §170.2(a)1Biii)	Ceiling Insulation		R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38
		Radiant Barrier		NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
		Low-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75
			Solar Reflectance Index (SRI)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	75	NR	75
		Steep-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.2	0.2	0.2	0.2	0.2	NR
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	NR
			Solar Reflectance Index (SRI)	NR	NR	NR	NR	NR	NR	NR	NR	NR	16	16	16	16	16	NR
	Option D (Non Attic Roof)	Metal Building U-factor		0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
		Wood Framed and Other U-factor		0.028	0.028	0.034	0.028	0.034	0.034	0.039	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
		Low-sloped	Aged Solar Reflectance	NR	<u>NR 0.63</u>	NR	<u>NR 0.63</u>	NR	<u>NR 0.63</u>	<u>NR 0.63</u>	<u>NR 0.63</u>	0.63	0.63	0.63	<u>NR 0.63</u>	0.63	0.63	NR
			Thermal Emittance	NR	<u>NR 0.75</u>	NR	<u>NR 0.75</u>	NR	<u>NR 0.75</u>	<u>NR 0.75</u>	<u>NR 0.75</u>	0.75	0.75	0.75	<u>NR 0.75</u>	0.75	0.75	NR
			Solar Reflectance Index (SRI)	NR	<u>NR 75</u>	NR	<u>NR 75</u>	NR	<u>NR 75</u>	<u>NR 75</u>	<u>NR 75</u>	75	75	75	<u>NR 75</u>	75	75	NR
		Steep-sloped	Aged Solar Reflectance	NR	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	NR
			Thermal Emittance	NR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	NR
			Solar Reflectance Index (SRI)	NR	16	16	16	16	16	16	16	16	16	16	16	16	16	NR

Improved Wall Performance Proposed Code Language

The following changes are proposed for Section 160.1(b):

Section 160.1(b) Wall Insulation.

1. Metal Building- The area-weighted average U-factor of the wall assembly shall not exceed 0.113.
2. Metal Framed- The area-weighted average U-factor of the wall assembly shall not exceed ~~0.151~~ 0.148.
3. Wood Framed and Others-
 - A. Nominal 2x4 inch framing shall have an area-weighted average U-factor of the wall assembly not exceeding ~~0.102~~ 0.95.
 - B. Nominal 2x6 inch framing shall have an area-weighted average U-factor of the wall assembly not exceeding ~~0.071~~ 0.69.
 - C. Other wall assemblies shall have an area-weighted average U-factor of the wall assembly not exceeding 0.102.

High Performance Windows Proposed Code Language

There are no proposed changes to the code text. For Table 170.2-A, the following changes are proposed:

TABLE 170.2-A ENVELOPE COMPONENT PACKAGE – Multifamily Standard Building Design																	
Multifamily		Climate Zone															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Curtain Wall/ Storefront ⁵	Maximum U-factor	0.38	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.38
	Maximum RSHGC three or less habitable stories	NR	0.26	NR	0.26	NR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.26	NR
	Maximum RSHGC, four or more habitable stories	0.35	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.26	0.25
	Minimum VT, four or more habitable stories	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
NAFS 2017 Performance Class AW ^{5,6}	Maximum U-factor	0.38	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.38
	Maximum RSHGC three or less habitable stories	NR	0.24	NR	0.24	NR	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	NR
	Maximum RSHGC, four or more habitable stories	0.35	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	Minimum VT, four or more habitable stories	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
All Other Fenestration	Maximum U-factor	0.3 0.28	0.3	0.3 0.28	0.3 0.28	0.3 0.28	0.34	0.34	0.3	0.3	0.3	0.3 0.28	0.3	0.3 0.28	0.3 0.28	0.3 0.28	0.3 0.28
	Maximum RSHGC three or less habitable stories	NR	0.23	NR	0.23	NR	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	NR
	Maximum RSHGC, four or more habitable stories	0.35	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Maximum Window to Floor Ratio		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Maximum Window to Wall Ratio		40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Maximum Skylight Roof Ratio		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%

Footnotes to TABLE 170.2-A

5: Requirements apply to doors included in the Curtainwall/Storefront construction

6: Product must be certified to meet the North American Fenestration Standard/Specification for an Architectural Window (AW).

Section 180.2 1. TABLE 180.2-B:

Table 180.2-B Altered Fenestration Maximum U-Factor and Maximum RSHGC																	
Climate Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Curtainwall / Storefront / Window Wall and Glazed Doors ¹	U-factor	0.38	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.38
Curtainwall / Storefront / Window Wall and Glazed Doors ¹	RSHGC	0.35 NR	0.26	0.26 NR	0.26	0.26 NR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25 NR
Curtainwall / Storefront / Window Wall and Glazed Doors ¹	VT ²	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
NAFS 2017 Performance Class AW Window – Fixed ⁺	U-factor	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.41	0.41	0.38	0.38	0.38	0.38	0.38	0.38	0.38
NAFS 2017 Performance Class AW Window – Fixed ⁺	RSHGC	0.35 NR	0.25	0.25 NR	0.25	0.25 NR	0.31	0.31	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25 NR
NAFS 2017 Performance Class AW Window – Fixed ⁺	VT ²	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
NAFS 2017 Performance Class AW Window – Operable ⁺	U-factor	0.43	0.43	0.43	0.43	0.43	0.47	0.47	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
NAFS 2017 Performance Class AW Window – Operable ⁺	RSHGC	0.35 NR	0.24	0.24 NR	0.24	0.24 NR	0.31	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24 NR
NAFS 2017 Performance Class AW Window – Operable ⁺	VT ²	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
All Other Windows and Glazed Doors ⁺	U-factor	0.3 0.28	0.3	0.3 0.28	0.3 0.28	0.3 0.28	0.3	0.34	0.3	0.3	0.3	0.3 0.28	0.3	0.3 0.28	0.3 0.28	0.3 0.28	0.3 0.28
All Other Windows and Glazed Doors ⁺	RSHGC	0.35 NR	0.23	0.23 NR	0.23	0.23 NR	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23 NR
Skylights, 3 habitable stories and fewer	U-factor	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Skylights, 3 habitable stories and fewer	RSHGC	NA	0.23	NA	0.23	NA	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	NA
Skylights, 4 habitable stories and greater	U-factor	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Skylights, 4 habitable stories and greater	RSHGC	0.35	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Skylights, 4 habitable stories and greater	VT ²	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49

Footnotes to TABLE 180.2-B

~~1. For fenestration installed in buildings with three or fewer habitable stories, there is no SHGC requirement in Climate Zones 1, 3, 5, and 16.~~

~~1: Requirements apply to doors included in the Curtainwall/Storefront construction~~

2. Minimum VT requirements to not apply to multifamily buildings 3 habitable stories or less