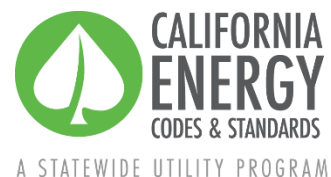


# Proposal Submeasure Summary



## 2022 California Energy Code (Title 24, Part 6)

### Nonresidential High Performance Envelope – Opaque Envelope

Updated: April 14, 2020

Prepared by: Kiri Coakley, Energy Solutions

#### 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 April 23rd, 2020. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. Please share comments by email to [info@title24stakeholders.com](mailto:info@title24stakeholders.com).

#### Measure Description

Opaque envelope is a prescriptive measure that would require changes to compliance software but would not require new field verification tests. This proposal looks at modifying Table 140.3-B, 140.3-C of Title 24, Part 6. This measure re-evaluates existing assembly U-factor requirements for the 2022 code cycle using the latest cost parameters. This re-evaluation includes all components of the opaque envelope, including walls, roofs, floors, and opaque doors, using nonresidential building prototypes to determine if cost-effective reductions in U-factor are justified in all climate zones.

#### Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 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.

We are not proposing to remove any multifamily Title 24, Part 6 requirements at this time. The Multifamily Restructuring CASE Team has not decided whether they will create a table in their section or reference nonresidential tables in multifamily sections. One potential issue is that if the multifamily codes are scattered in multiple places, it is going to create confusion to the design community and the enforcement team.

#### SECTION 140.3 – PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

A building complies with this section by being designed with and having constructed to meet all prescriptive requirements in Subsection (a) and the requirements of Subsection (c) and (d) where they apply.



**(a) Envelope Component Requirements.**

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

A. **Roofing Products.** Shall meet the requirements of Section 110.8 and the applicable requirements of Subsections i through ii:

i. Nonresidential buildings:

a. Low-sloped roofs in Climate Zones 1 through 16 shall have:

1. A minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75; or
2. A minimum Solar Reflectance Index (SRI) of 75.

**EXCEPTION 1 to Section 140.3(a)1Aia:** Wood-framed roofs in Climate Zones 3 and 5 are exempt from the requirements of Section 140.3(a)1Aia if the roof assembly has a U-factor of 0.034 or lower.

**EXCEPTION 2 to Section 140.3(a)1Aia:** Roof constructions with a weight of at least 25 lb/ft<sup>2</sup> over the roof membrane are exempt from the requirements of Section 140.3(a)1Aia.

**EXCEPTION 3 to SECTION 140.3(a)1Aia:** An aged solar reflectance less than 0.63 is allowed provided the maximum roof/ceiling U-factor in TABLE 140.3 is not exceeded.

b. Steep-sloped roofs in Climate Zones 1 through 16 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

ii. **High-rise residential buildings and Hotels and motels:**

a. Low-sloped roofs in Climate Zones 9, 10, 11, 13, 14 and 15 shall have a minimum aged solar reflectance of 0.55 and a minimum thermal emittance of 0.75, or a minimum SRI of 64.

**EXCEPTION to Section 140.3(a)1Aia:** Roof constructions with a weight of at least 25 lb/ft<sup>2</sup> over the roof membrane.

b. Steep-sloped roofs in Climate Zones 2 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

*TABLE 140.3-A MATERIALS DEEMED TO COMPLY WITH SECTION 140.3(a)9A*

	<b>MATERIALS AND THICKNESS</b>		<b>MATERIALS AND THICKNESS</b>
1	Plywood – min. 3/8 inches thickness	9	Built up roofing membrane
2	Oriented strand board – min. 3/8 inches thickness	10	Modified bituminous roof membrane
3	Extruded polystyrene insulation board – min. ½ inches thickness	11	Fully adhered single-ply roof membrane

4	Foil-back polyisocyanurate insulation board – min. ½ inches thickness	12	A Portland cement or Portland sand parge, or a gypsum plaster, each with min. 5/8 inches thickness
5	Closed cell spray foam with a minimum density of 2.0 pcf and a min. 2.0 inches thickness	13	Cast-in-place concrete, or precast concrete
6	Open cell spray foam with a density no less than 0.4 pcf and no greater than 1.5 pcf, and a min. 5½ inches thickness	14	Fully grouted concrete block masonry
7	Exterior or interior gypsum board min. 1/2 inches thickness	15	Sheet steel or sheet aluminum
8	Cement board – min. 1/2 inches thickness	---	-----

- A. Assemblies of materials and components that have an average air leakage not exceeding 0.04 cfm/ft<sup>2</sup>, under a pressure differential of 0.3 in. of water (1.57 psf) (0.2 L/m<sup>2</sup> at 75 pa), when tested in accordance with ASTM E2357, ASTM E1677, ASTM E1680, or ASTM E283; or

**EXCEPTION to Section 140.3(a)9B:** The following materials shall be deemed to comply with Section 140.3(a)9B if all joints are sealed and all of the materials are installed as air barriers in accordance with the manufacturer's instructions:

- i. Concrete masonry walls that have at least two coatings of paint or at least two coatings of sealer coating.
  - ii. Concrete masonry walls with integral rigid board insulation.
  - iii. Structurally Insulated Panels.
  - iv. Portland cement or Portland sand parge, or stucco, or a gypsum plaster, each with min. 1/2 inches thickness
- B. The entire building has an air leakage rate not exceeding 0.40 cfm/ft<sup>2</sup> at a pressure differential of 0.3 in of water (1.57 psf) (2.0 L/ m<sup>2</sup> at 75 pa), when the entire building is tested, after completion of construction, in accordance with ASTM E779 or another test method approved by the Commission.

**EXCEPTION to Section 140.3(a)9:** Relocatable Public School Buildings.

**TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING **HIGH RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS**)**

				Climate Zone																
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Envelope	Maximum U-factor	Roofs/ Ceilings	Metal Building	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	0.041	
			Wood Framed and Other	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.049 0.042	0.049 0.042	0.049 0.042	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030	0.034 0.030
		Walls	<b>Metal Building</b>	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061
			Metal-framed	0.069 0.060	0.062 0.055	0.082 0.071	0.062 0.055	0.062 0.055	0.069 0.060	0.069 0.060	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055	0.062 0.055
			Mass Light <sup>1</sup>	0.196	0.170	0.278	0.227	0.440	0.440	0.440	0.440	0.440	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
			Mass Heavy <sup>1</sup>	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.184	0.160
			Wood-framed and Other	0.095	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.045	0.059	0.059	0.059	0.059	0.042	0.059
		Floors/ Soffits	Raised Mass	0.092	0.092	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.092	0.092	0.092	0.092	0.092	0.092	0.058	
			Other	0.048	0.039	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.039	0.071	0.071	0.039	0.039	0.039	0.039	
		Roofing Products	Low-sloped	Aged Solar Reflectance	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
	Thermal Emittance			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	0.75	0.75	0.75	
	Steep-Sloped		Aged Solar Reflectance	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
			Thermal Emittance	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	0.75	0.75	0.75	
	<b>Air Barrier</b>				NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	
	Exterior Doors, Maximum U-factor			Non-Swinging	0.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.50	
				Swinging	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70