

140.3 NR Prescriptive Envelope

SECTION 140.3 – PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

A building complies with this section by being designed with and having constructed and installed either (1) envelope components that comply with each of the requirements in Subsection (a) for each individual component and the requirements of Subsection (c) where they apply, or (2) an envelope that complies with the overall requirements in Subsection (b) and the requirements of Subsection (c) where they apply. When making calculations under Subsection (a) or (b), all of the rules listed in Section 140.1(c)1, 4, and 5 shall apply.

(a) Envelope Component Approach.

1. Exterior roofs and ceilings. Exterior roofs and ceilings shall:

A. ~~Roofs. All r~~Roofing ~~P~~products, ~~s~~ Shall meet the requirements of Section 110.8 and the applicable requirements of Subsections i through iii:

i. Nonresidential buildings:

~~a. with~~ Low-sloped roofs in climate zones 21-15 through 16 shall have a minimum 3-year-aged solar reflectance of 0.55-67 and a minimum thermal emittance of 0.7585, or a minimum aged-SRI of 6480.

~~EXCEPTION 1 TO SECTION 140.3(a)1Ai: Wood framed roofs in climate zones 3 and 5 are exempt from the minimum requirements for solar reflectance and thermal emittance or SRI if the roof assembly has a U factor of 0.039 or lower.~~

~~EXCEPTION 2 TO SECTION 140.3(a)1Ai: Metal building roofs in climate zones 3 and 5 are exempt from the minimum requirements for solar reflectance and thermal emittance or SRI if the roof assembly has a U factor of 0.048 or lower.~~

~~EXCEPTION 3 TO SECTION 140.3(a)1Ai: Roof area covered by building integrated photovoltaic panels and building integrated solar thermal panels are not required to meet the minimum requirements for solar reflectance and thermal emittance or SRI.~~

~~EXCEPTION 4 TO SECTION 140.3(a)1Ai: Roof constructions that have thermal mass over the roof membrane with a weight of at least 25 lb/ft².~~

~~ii. b. Nonresidential. S~~steep-sloped roofs ~~with roofing products that have a roof weight of less than 5 pounds per square foot~~ in climate zones ~~21 through~~ 16 shall have a minimum 3-year-aged solar reflectance of 0.20 and a minimum thermal emittance of 0.7585, or a minimum SRI of 16. ~~Steep-sloped roofing products that have a roof weight of 5 pounds per square foot or more in climate zones 1 through 16 shall have a minimum 3-year aged reflectance of 0.15 and a minimum emittance of 0.75, or a minimum SRI of 10.~~

iii. High-rise residential buildings and hotels and motels:

~~a. L~~with low-sloped roofs in climate zones ~~10, 11, 13, 14, and 2 through~~ 15 shall have a minimum 3-year-aged solar reflectance of 0.55-67 and a minimum thermal emittance of 0.7585, or a minimum SRI of 6480.

~~b. Steep-sloped roofs climate zones 2 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.85, or a minimum SRI of 16.~~

~~EXCEPTION 1 TO SECTION 140.3(a)1Ai and ii: Roof area covered by building integrated photovoltaic panels and building integrated solar thermal panels are not required to meet the minimum requirements for solar reflectance, thermal emittance, or SRI.~~

EXCEPTION 2 TO SECTION 140.3(a)1Aia and iia: Roof constructions that have thermal mass over the roof membrane with a weight of at least 25 lb/ft².

- B. **Have Roof Insulation**, ~~n~~ placed in direct contact with a continuous roof or drywall ceiling where required by Section 110.8(e); and

~~Shall C.~~ ~~h~~ Have an overall assembly U-factor no greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C, and shall be placed in direct contact with a continuous roof or drywall ceiling where required by Section 110.8(e).

2. **Exterior walls** ~~Walls. Exterior walls shall~~ Shall have an overall assembly U-factor no greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C.
3. **Demising walls** ~~Walls. Demising walls s~~ Shall meet the requirements of Section 110.8(f).
4. **External Exterior Floors and Soffits**. ~~External floors and soffits s~~ Shall have an overall assembly U-factor no greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C.
5. **Windows**. Windows shall:

- A. Have (1) a west-facing area no greater than 40 percent of the gross west-facing exterior wall area, or 6 feet times the west-facing display perimeter, whichever is greater; and (2) a total area no greater than 40 percent of the gross exterior wall area, or 6 feet times the display perimeter, whichever is greater; and

EXCEPTION to Section 140.3(a)5A: Window area in demising walls is not counted as part of the window area for this requirement. Demising wall area is not counted as part of the gross exterior wall area or display perimeter.

- B. Have Area-Weighted Performance Rating a-U-factor no greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C; and
- C. Have an Area-Weighted Performance Rating relative solar heat gain ~~coefficient~~, excluding the effects of interior shading, no greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C. The relative solar heat gain of windows is:
 - i. The solar heat gain coefficient of the windows; or
 - ii. Relative solar heat gain as calculated by ~~EQUATION 140.3-A~~ EQUATION 140.3-A, if an overhang extends beyond both sides of the window jamb a distance equal to the overhang projection. For fins, the fin projection is at least equal to the overhang projection, the fin offset is at least equal to the overhang offset and the fin extends from at least the sill to the head of the window.

EXCEPTION to Section 140.3(a)5C: ~~The applicable "north" value for A~~ relative solar heat gain ~~of in~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C or 0.56, ~~whichever is greater, or less~~ shall be used for windows:

- a. That are in the first story of exterior walls that form a display perimeter; and
- b. For which codes restrict the use of overhangs to shade the windows.

EQUATION 140.3-A RELATIVE SOLAR HEAT GAIN

$$RSHG = SHGC_{win} \times \left[1 + \frac{aH}{V} + b \left(\frac{H}{V} \right)^2 \right]$$

WHERE:

RSHG = Relative solar heat gain.

SHGC_{win} = Solar heat gain coefficient of the window.

- H* = Horizontal projection of the overhang from the surface of the window in feet, but no greater than *V*.
- V* = Vertical distance from the window sill to the bottom of the overhang in feet.
- a* = -0.41 for north-facing windows, -1.22 for south-facing windows, and -0.92 for east and west-facing windows.
- b* = 0.20 for north-facing windows, 0.66 for south-facing windows, and 0.35 for east and west-facing windows.

D. Have an Area-Weighted Performance Rating VT no less than the applicable value in TABLE 143-A or TABLE 143-B. The sill height of vertical fenestration with higher VTs shall be greater than or equal to the head height of vertical fenestration with lower VTs.

E. Area-Weighted Performance Ratings shall be calculated according to Equation 140.3-B for TABLE 140.3-A or TABLE 140.3-B.

F. If the Total Visible Transmittance performance value is not available it shall be calculated by using the manufacturers center of glass alone performance value in EQUATION 140.3-C.

EQUATION 140.3-B – AREA WEIGHTED PERFORMANCE RATING CALCULATION

$$\text{Area-Weighted Performance Rating} = \frac{\sum \text{Fenestration Area} \times \text{Fenestration Performance Rating}}{\text{Total Fenestration Area}}$$

Where:

Area Weighted Performance Rating = the area weighted U-factor, SHGC or VT of the fenestration on an exterior surface at a single orientation

Fenestration Area = Is the rough opening of fenestration in ft²

Fenestration Performance Rating = Is the U-factor, SHGC or VT of the fenestration

Total Fenestration Area = Is the gross area of the rough opening of all fenestration on the façade in ft².

EQUATION 140.3-C – VISIBLE TRANSMITTANCE CALCULATION

$$VT_T = 0.53 \times VT_{Ce}$$

Where:

VT_T = Is the total performance of the fenestration including glass and frame

VT_C = Is the performance value for the center of glass alone.

6. **Skylights.** Skylights shall:

- A. Have an area no greater than 5 percent of the gross exterior roof area; and

EXCEPTION to Section 140.3(a)6A: Atria over 55 feet high shall have a skylight area no greater than 10 percent of the gross exterior roof area.

- B. Have an Area-Weighted Performance Rating U-factor no greater than the applicable value in TABLE 140.3-A, TABLE 140.3-B, TABLE 140.3-C, or TABLE 143-C; and

- C. Have an Area-Weighted Performance Rating solar heat gain coefficient no greater than the applicable value in TABLE 140.3-A, TABLE 140.3-B, or TABLE 140.3-C; and:

D. Have an Area-Weighted Performance Rating VT no less than the applicable value in TABLE 140.3-A, or TABLE 140.3-B.

E. Have a glazing material or diffuser that has a measured haze value greater than 90 percent, tested according to ASTM D1003 (notwithstanding its scope) or other test method approved by the Commission.

7. **Exterior doors.** All exterior doors for conditioned spaces shall have a U-factor not greater than the applicable value in ~~TABLE 140.3-A~~ TABLE 140.3-A, ~~TABLE 140.3-B~~ TABLE 140.3-B, or ~~TABLE 140.3-C~~ TABLE 140.3-C.
8. **Relocatable Public School Buildings.** In complying with Sections 140.3(a)1 to 7, relocatable public school buildings shall comply either with ~~TABLE 140.3-A~~ TABLE 140.3-A, including the non-north window RSHG and skylight SHGC requirements, when the manufacturer/builder certifies that the relocatable building is manufactured only for use in a specific climate zone(s) and that the relocatable building cannot be lawfully used in other climate zones or with ~~TABLE 140.3-C~~ TABLE 140.3-C when the manufacturer/builder certifies that the relocatable building is manufactured for use in any climate zone. When the relocatable building complies with ~~TABLE 140.3-C~~ TABLE 140.3-C for use in more than one climate zone, the relocatable building shall meet the most stringent requirements for each building component in all of the climate zones for which the relocatable building is certified.

The manufacturer/builder shall place 2 metal identification labels on each relocatable building module, one mechanically fastened and visible from the exterior and the other mechanically fastened to the interior frame above the ceiling, at the end of the module. In addition to information required by the Division of the State Architect (DSA), the labels shall state either "Complies with Title 24, Part 6 for all Climate Zones" or "Complies with Title 24, Part 6 for Climate Zones" and then list all of the climate zones for which the manufacturer has manufactured the relocatable building to comply. The location of the identification labels shall be shown on the building plans.

9. **Air Barrier.** A continuous air barrier meeting the requirements of Section 110.7(a) and (b) shall be installed to the building envelope in Climate Zones 10-16 of TABLE 140.3-A.

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

TABLE 140.3-A – 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
E N V E L O P E	I N S U L A T I O N	Roofs/ Ceilings ³	Metal Building	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	
			Wood Framed and Other	0.049	0.039	0.039	0.039	0.049	0.075	0.067	0.067	0.039	0.039	0.039	0.039	0.039	0.039	0.039	
		Roofing Products	Low-sloped	Aged Reflectance	NR0.67	0.550.67	NR0.67												
				Emittance	NR0.85	0.750.85													
			Steep Sloped <i>(less than 5 lb/ft²)</i>	Aged Reflectance	NR0.20	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
				Emittance	NR0.85	0.750.85													
		Walls ³	Metal Building	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	0.057	0.061
			Metal-framed	0.098	0.062	0.082	0.062	0.062	0.098	0.098	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
			Mass Light	0.196	0.170	0.278	0.227	0.44	0.44	0.44	0.44	0.44	0.170	0.170	0.170	0.170	0.170	0.170	0.170
			Mass Heavy	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	0.160
			Wood-framed and Other	0.102	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.059	0.059	0.059	0.059	0.042	0.059
		Floors/ Soffits ³	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
		Air Barrier⁴Air Leakage		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

E	F		<u>All Climate Zones</u>
----------	----------	--	--------------------------

N V E L O P E	E N E S T R A T I O N	<u>Windows</u>		<u>Operable</u>	<u>Fixed</u>	<u>Operable</u>	<u>Curtainwall/ Storefront</u>	<u>Glazed Doors</u>		
			<u>Area-Weighted Performance Rating</u>	<u>Max U-factor</u>	<u>0.36</u>	<u>0.47</u>	<u>0.41</u>	<u>0.45</u>		
				<u>Max RSHG</u>	<u>0.25</u>	<u>0.22</u>	<u>0.26</u>	<u>0.23</u>		
			<u>Area-Weighted Performance Rating</u>	<u>Min VT</u>	<u>0.42</u>	<u>0.32</u>	<u>0.46</u>	<u>0.17</u>		
		<u>Max WWR%</u>	<u>40%</u>							
		<u>Skylights</u>		<u>Operable</u>	<u>Glass, Curb Mounted</u>	<u>Glass, Deck Mounted</u>	<u>Plastic, Curb Mounted</u>			
			<u>Area-Weighted Performance Rating</u>	<u>Max U-factor</u>	<u>0.58</u>	<u>0.46</u>	<u>0.88</u>			
				<u>Max RSHG</u>	<u>0.25</u>	<u>0.25</u>	<u>NR</u>			
			<u>Area-Weighted Performance Rating</u>	<u>Min VT</u>	<u>0.49</u>	<u>0.49</u>	<u>0.64</u>			
		<u>Max SRR%</u>	<u>5%</u>							

	<u>RSHG North</u>	<u>-0 to <= 10% WWR</u>	<u>0.72</u>	<u>0.61</u>	<u>0.72</u>															
		<u>10 to <= 20% WWR</u>	<u>0.49</u>	<u>0.51</u>	<u>0.61</u>	<u>0.51</u>	<u>0.49</u>													
		<u>20 to <= 30% WWR</u>	<u>0.47</u>	<u>0.47</u>	<u>0.61</u>	<u>0.47</u>														
		<u>30-40% WWR</u>	<u>0.47</u>	<u>0.47</u>	<u>0.61</u>	<u>0.47</u>	<u>0.47</u>	<u>0.47</u>	<u>0.47</u>	<u>0.40</u>	<u>0.40</u>	<u>0.40</u>	<u>0.47</u>	<u>0.47</u>						

	RSHG Non-North	0 to < 10% WWR	0.49	0.47	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.47	0.47	0.47	0.47	0.46	0.46	0.49		
		10 to < 20% WWR	0.43	0.36	0.55	0.55	0.55	0.61	0.61	0.61	0.61	0.61	0.61	0.36	0.36	0.36	0.36	0.36	0.36	0.43	
		20 to < 30% WWR	0.43	0.36	0.41	0.41	0.41	0.39	0.39	0.39	0.39	0.39	0.39	0.36	0.36	0.36	0.36	0.36	0.36	0.43	
		30-40% WWR	0.43	0.31	0.41	0.41	0.41	0.34	0.34	0.34	0.34	0.34	0.34	0.31	0.31	0.31	0.31	0.31	0.31	0.43	
Doors, 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	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	0.70	0.70	0.70
Skylight	U-factor	Glass, eurb	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	
		Glass, no eurb	0.68	0.68	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
		Plastic	1.04	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.04
	SHGC	Glass, 0 to < 2%	NR	0.46	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.46	0.46	0.46	0.46	0.46	0.46	0.46	NR	
		Glass, 2.1-5%	NR	0.36	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.36	0.36	0.36	0.36	0.36	0.36	NR	
		Plastic, 0 to < 2%	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
		Plastic, 2.1-5%	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57

Notes:

1. Mass, Light walls are defined as having a heat capacity greater than or equal to 7.0 Btu/h-ft² and less than 15.0 Btu/h-ft². Heavy mass walls are defined as having a heat capacity greater than or equal to 15.0 Btu/h-ft².

2. ~~No skylight SHGC requirements are defined for climate zones 1 and 16.~~ A climate zone without a requirement is designated as "NR".

3. Closed-cell polyurethane foam insulation shall meet the procedure specified in Reference Residential Appendices, RA3.5

4. Relocatable Public School Buildings are not subject to the requirements of Section 140.3(a)9.

TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR 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			
E N V E L O P E	I N S U L A T I O N	Roofs/ Ceilings ²	Metal Building	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065			
			Wood Framed and Other	0.034	0.028	0.039	0.028	0.039	0.039	0.039	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028		
		Roofing Products	Low- sloped	Aged Reflect ance	NR	NR <u>.67</u>	NR															
				Emittan ce	NR	NR <u>.85</u>	NR															
			Steep Sloped	Aged Reflect ance	NR	<u>.20</u>	<u>.20</u>	NR														
				Emittan ce	NR	<u>.85</u>	<u>.85</u>	NR														
		Walls ²	Metal Building	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.057	0.057	0.057	0.057	0.057		
			Metal-framed	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105		
			Mass Light	0.170	0.170	0.170	0.170	0.170	0.227	0.227	0.227	0.196	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170		
			Mass Heavy	0.160	0.160	0.160	0.184	0.211	0.690	0.690	0.690	0.690	0.690	0.184	0.253	0.211	0.184	0.184	0.184	0.160		
			Wood-framed and Other	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.042	0.059	0.059	0.042	0.042	0.042		
		Floors/ Soffits ²	Mass	0.045	0.045	0.058	0.058	0.058	0.069	0.092	0.092	0.092	0.069	0.058	0.058	0.058	0.045	0.058	0.037			
			Other	0.034	0.034	0.039	0.039	0.039	0.039	0.071	0.039	0.039	0.039	0.039	0.039	0.039	0.034	0.039	0.034			

E	F			<u>All Climate Zones</u>
----------	----------	--	--	--------------------------

<u>N</u> <u>V</u> <u>E</u> <u>L</u> <u>O</u> <u>P</u> <u>E</u>	<u>E</u> <u>N</u> <u>E</u> <u>S</u> <u>T</u> <u>R</u> <u>A</u> <u>T</u> <u>I</u> <u>O</u> <u>N</u>	<u>Windows</u>		<u>Operable</u>	<u>Fixed</u>	<u>Operable</u>	<u>Curtainwall/ Storefront</u>	<u>Glazed Doors</u>	
			<u>Area-Weighted Performance Rating</u>	<u>Max U-factor</u>	<u>0.36</u>	<u>0.45</u>	<u>0.40</u>	<u>0.45</u>	
				<u>Max RSHG</u>	<u>0.25</u>	<u>0.22</u>	<u>0.26</u>	<u>0.23</u>	
			<u>Area-Weighted Performance Rating</u>	<u>Min VT</u>	<u>0.49</u>	<u>0.44</u>	<u>0.53</u>	<u>0.19</u>	
			<u>Max WWR%</u>	<u>40%</u>					
		<u>Skylights</u>		<u>Operable</u>	<u>Glass, Curb Mounted</u>	<u>Glass, Deck Mounted</u>	<u>Plastic, Curb Mounted</u>		
			<u>Area-Weighted Performance Rating</u>	<u>Max U-factor</u>	<u>0.58</u>	<u>0.46</u>	<u>0.88</u>		
				<u>Max RSHG</u>	<u>0.25</u>	<u>0.25</u>	<u>0.34</u>		
			<u>Area-Weighted Performance Rating</u>	<u>Min VT</u>	<u>0.49</u>	<u>0.49</u>	<u>NR</u>		
			<u>Max SRR%</u>	<u>5%</u>					

Doors, 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	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	0.70
Skylight	U factor	Glass, curb	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
		Glass, no curb	0.68	0.68	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.68	0.68	0.68	0.68	0.68	0.68
		Plastic	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
SHGC	Glass, 0 to <2%	0.46	0.46	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.46	0.46	0.46	0.46	0.46	0.46	
	Glass, 2.1-5%	0.36	0.32	0.32	0.32	0.32	0.40	0.40	0.40	0.40	0.32	0.32	0.32	0.32	0.34	0.34	0.36	
	Plastic, 0 to <2%	0.69	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	
	Plastic, 2.1-5%	0.55	0.34	0.39	0.39	0.39	0.57	0.57	0.57	0.57	0.34	0.34	0.34	0.34	0.27	0.27	0.55	

Notes:

1. Mass, Light walls are defined as having a heat capacity greater than or equal to 7.0 Btu/h-ft² and less than 15.0 Btu/h-ft². Heavy mass walls are defined as having a heat capacity greater than or equal to 15.0 Btu/h-ft².

2. Closed-cell polyurethane foam insulation shall meet the procedure specified in Reference Residential Appendices, RA3.5

TABLE 140.3-C PRESCRIPTIVE ENVELOPE CRITERIA FOR RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE IN ALL CLIMATE ZONES

		ALL CLIMATE ZONES
Roof Ceiling U-factor¹		
Metal Building		0.048
Wood-framed and other		0.039
Roofing Products – Aged Reflectance/Emittance		
Low-Sloped		0.67 55 /0.875
Steep-Sloped — Less than 5lb/ft²		0.20/0.875
————— 5lb/ft² or more		0.15/0.75
Wall U-factor¹		
Wood frame		0.059
Metal frame		0.062
Metal building		0.057
Mass/7.0 ≤ HC		0.170
Other		0.059
Floor/Soffit U-factor¹		
Wood-Framed and Other		0.048
Windows		
U-factor		0.47
Relative solar heat gain		
0-10% WWR		0.36
11-20% WWR		0.31
21-30% WWR		0.26
31-40% WWR		0.26
Doors, U-factor		
Non-Swinging		0.50
Swing		0.70
Skylights		
U-factor	Glass w/Curb	0.99
	Glass wo/Curb	0.57
	Plastic w/Curb	0.87
SHGC Glass	0-2%	0.46
	2.1-5%	0.36
SHGC Plastic	0-2%	0.69
	2.1-5%	0.57

Note: Construction assembly U-factors shall be calculated in accordance with Reference Joint Appendix JA4.

1. Closed-cell polyurethane foam insulation shall meet the procedure specified in Reference Residential Appendices, RA3.5

(b) **Overall Envelope TDV Energy Approach.** ~~The total TDV Energy of the overall envelope of the proposed building, TDV_{prop} , shall be no greater than the total TDV Energy of the overall envelope of a standard building, TDV_{std} , as calculated in Reference Nonresidential Appendix NA5 "Envelope Tradeoff Procedure". In making the calculations, it shall be assumed that the orientation and area of each envelope component of the standard building are the same as in the proposed building. If the proposed building has Window Wall Ratio greater than 40 percent or Skylight Roof Ratio greater than 5 percent, the area of walls and windows or roofs and skylights will be adjusted accordingly in the standard building to cap the WWR at 40 percent and SRR at 5 percent.~~

RESERVED

(c) **Minimum Skylight Area Daylighting Requirement for Large Enclosed Spaces in Buildings with Three or Fewer Stories.** In climate zones 2 through 15, low rise conditioned or unconditioned enclosed spaces that are greater than 85,000 ft² directly under a roof with ceiling heights greater than 15 feet shall meet ~~Sections 143(e)1-4 below~~ the following requirements.

- ~~1. **Daylit Area.** At least one half of the floor area shall be in the skylit daylight area, the primary sidelit daylight area, or a combination of the skylit and primary sidelit daylight areas. The skylit and primary sidelit daylight areas shall be shown on the building plans. Skylit and primary sidelit daylight areas are defined in Section 131(e)1.~~
- ~~2. **Minimum Skylight Area or Effective Aperture.** Areas that are skylit shall have a minimum skylight area to skylit area ratio of at least 3.3 percent or minimum skylight effective aperture of at least 1.1 percent. Skylight effective aperture shall be determined as specified in EQUATION 146-C. If primary sidelit area is used to comply with Section 143(e)1, the primary sidelit daylight areas shall have an effective aperture greater than 10 percent. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E.~~
1. At least 75% of the floor area will be within a horizontal distance of one head height from windows or within 0.7 time average ceiling height from the edge of rough opening of skylights
2. All Skylit Daylit Zones and the Primary Sidelit Daylit Zones shall be shown on plan
3. General lighting in daylit zones shall be controlled in accordance with Section 130.1(d).
- 36. Skylight Characteristics.** Skylights shall:
 - A. Have a glazing material or diffuser that has a measured haze value greater than 90 percent, tested according to ASTM D1003 (notwithstanding its scope) or other test method approved by the Commission; and
 - B. If the space is conditioned, meet the requirements in Section 140.3(a)6 or 140.3(b).
- ~~4. **Controls.** Electric lighting in the daylit area shall be controlled as described in Section 131(e)2.~~

EXCEPTION 1 to Section 140.3(c): Auditoriums, churches, movie theaters, museums, and refrigerated warehouses.

EXCEPTION 2 to Section 140.3(c): In buildings with unfinished interiors, future enclosed spaces where it is planned to have less than or equal to 85,000 square feet of floor area, or ceiling heights less than or equal to 15 feet, based on proposed future interior wall and ceiling locations as delineated in the plans. This exception shall not apply to these future enclosed spaces when interior walls and ceilings are installed for the first time, the enclosed space floor area is greater than 85,000 square feet, and the ceiling height is greater than 15 feet (see Section 140.9(b)1M). This exception shall not be used for S-1 or S-2 (storage), or for F-1 or F-2 (factory) occupancies.

EXCEPTION 3 to Section 140.3(c): Enclosed spaces having a designed general lighting system with a lighting power density less than 0.5 watts per square foot.