

ANSI/ASHRAE Addenda as and at to
ANSI/ASHRAE Standard 90.1-2004



ASHRAE STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

This addendum updates the building envelope criteria for opaque assemblies only.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum as to 90.1-2004

Revise Tables 5.5-1 to 5.5-8 as follows (I-P tables are listed first, followed by SI tables):

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A, B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-1.282	NR
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-1.280	NR
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.614	NR
					<u>U-0.081</u>	<u>R-13.0</u>
<i>Walls, Above Grade</i>						
Mass	U-0.580	NR	U-0.151 ^a	R-5.7 ci ^a	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-1.180	NR
Steel Framed	U-0.124	R-13.0	U-0.124	R-13.0	U-0.352	NR
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.292	NR
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.322	NR	U-0.322	NR	U-0.322	NR
Steel Joist	U-0.350	NR	U-0.350	NR	U-0.350	NR
Wood Framed and Other	U-0.282	NR	U-0.282	NR	U-0.282	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-1.450		U-1.450	

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A, B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0%–10.0%	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
10.1%–20.0%	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
20.1%–30.0%	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
30.1%–40.0%	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.44}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.44}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
40.1%–50.0%	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{fixed}}^{-1.22}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{fixed}}^{-0.98}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.33}$	$U_{\text{oper}}^{-1.27}$	$\text{SHGC}_{\text{north}}^{-0.33}$	$U_{\text{oper}}^{-1.02}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
<i>Skylight with Curb, Glass, % of Roof</i>						
0%–2.0%	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-0.36}$	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1%–5.0%	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-0.16}$	$U_{\text{all}}^{-1.98}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
<i>Skylight with Curb, Plastic, % of Roof</i>						
0%–2.0%	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-0.34}$	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1%–5.0%	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-1.90}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
<i>Skylight without Curb, All, % of Roof</i>						
0%–2.0%	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-0.36}$	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1%–5.0%	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-1.36}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$

^a Exception to A3.1.3.1 applies.

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A, B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063 <u>U-0.048</u>	R-15.0 ei <u>R-20.0 ci</u>	U-0.063 <u>U-0.048</u>	R-15.0 ei <u>R-20.0 ci</u>	U-0.218	R-3.8 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.167	R-6.0
Attic and Other	U-0.034 <u>U-0.027</u>	R-30.0 <u>R-38.0</u>	U-0.027	R-38.0	U-0.081	R-13.0
<i>Walls, Above Grade</i>						
Mass	U-0.580 <u>U-0.151^a</u>	NR <u>R-5.7 ci^a</u>	U-0.151^a <u>U-0.123</u>	R-5.7 ei^a <u>R-7.6 ci</u>	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.184	R-6.0
Steel Framed	U-0.124	R-13.0	U-0.124 <u>U-0.064</u>	R-13.0 <u>R-13.0 + R-7.5 ci</u>	U-0.352 <u>U-0.124</u>	NR <u>R-13.0</u>
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.292 <u>U-0.089</u>	NR <u>R-13.0</u>

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A, B) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.137 U-0.107	R-4.2 ci R-6.3 ci	U-0.107 U-0.087	R-6.3 ci R-8.3 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.052	R-19.0	U-0.350 U-0.069	NR R-13.0
Wood Framed and Other	U-0.051	R-19.0	U-0.051 U-0.033	R-19.0 R-30.0	U-0.282 U-0.066	NR R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-1.450 U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0%–10.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{NR}
10.1%–20.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{NR}
20.1%–30.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{NR}
30.1%–40.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.61}	U _{oper} ^{-1.27}	SHGC _{north} ^{NR}
40.1%–50.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.17}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.17}	U _{fixed} ^{-0.98}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.44}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.43}	U _{oper} ^{-1.02}	SHGC _{north} ^{NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0%–2.0%	U _{all} ^{-1.98}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.98}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
2.1%–5.0%	U _{all} ^{-1.98}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0%–2.0%	U _{all} ^{-1.90}	SHGC _{all} ^{-0.39}	U _{all} ^{-1.90}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
2.1%–5.0%	U _{all} ^{-1.90}	SHGC _{all} ^{-0.34}	U _{all} ^{-1.90}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0%–2.0%	U _{all} ^{-1.36}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.36}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}
2.1%–5.0%	U _{all} ^{-1.36}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.36}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}

^a Exception to A3.1.3.1 applies.

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A, B, C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ei	U-0.063	R-15.0 ei	U-0.218	R-3.8 ei
Metal Building	U-0.048	R-20.0 ci	U-0.048	R-20.0 ci	U-0.173	R-5.0 ci
Attic and Other	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
	U-0.034	R-30.0	U-0.027	R-38.0	U-0.081	R-13.0
	<u>U-0.027</u>	<u>R-38.0</u>			<u>U-0.053</u>	<u>R-19.0</u>
<i>Walls, Above Grade</i>						
Mass	U-0.151^{a,b}	R-5.7 ei^{a,b}	U-0.123	R-7.6 ei	U-0.580	NR
	<u>U-0.123</u>	<u>R-7.6 ci</u>	<u>U-0.104</u>	<u>R-9.5 ci</u>		
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.184	R-6.0
Steel Framed	U-0.124	R-13.0	U-0.084	R-13.0 + R-3.8 ei	U-0.352	NR
	<u>U-0.084</u>	<u>R-13.0 + R-3.8 ci</u>	<u>U-0.064</u>	<u>R-13.0 + R-7.5 ci</u>	<u>U-0.124</u>	<u>R-13.0</u>
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.107	R-6.3 ci	U-0.087	R-8.3 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.052	R-19.0	U-0.069	R-13.0
Wood Framed and Other	U-0.051	R-19.0	U-0.033	R-30.0	U-0.282	NR
					<u>U-0.066</u>	<u>R-13.0</u>
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
	<u>F-0.900</u>	<u>R-10.0 for 24 in.</u>	<u>F-0.900</u>	<u>R-10.0 for 24 in.</u>		
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-0.500		U-1.450	
Fenestration (for Zones 3A and 3B; see next page for Zone 3C)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.39}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.39}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.39}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.39}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.19}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.19}	U _{fixed} ^{-0.98}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.26}	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.26}	U _{oper} ^{-1.02}	SHGC _{north} ^{-NR}

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A, B, C) (Continued)

Fenestration (for Zones 3A and 3B; see next page for Zone 3C)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} -1.17	SHGC _{all} -0.39	U _{all} -1.17	SHGC _{all} -0.36	U _{all} -1.98	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.17	SHGC _{all} -0.19	U _{all} -1.17	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} -1.30	SHGC _{all} -0.65	U _{all} -1.30	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.30	SHGC _{all} -0.34	U _{all} -1.30	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NR
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	U _{all} -0.69	SHGC _{all} -0.39	U _{all} -0.69	SHGC _{all} -0.36	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -0.69	SHGC _{all} -0.19	U _{all} -0.69	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^b Insulation is not required for non-residential mass walls in Climate Zone 3A located below the “Warm-Humid” line, and in Zone 3B.

TABLE 5.5-3 Building Fenestration Requirements For Climate Zone 3C

Fenestration (for Zone 3C)	Nonresidential		Residential		Semiheated	
	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing,% of Wall</i>						
0-10.0%	U _{fixed} -1.22	SHGC _{all} -0.61	U _{fixed} -1.22	SHGC _{all} -0.61	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.82	U _{oper} -1.27	SHGC _{north} -0.82	U _{oper} -1.27	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -0.61	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -1.22	SHGC _{all} -0.34	U _{fixed} -1.22	SHGC _{all} -0.34	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -0.61	U _{oper} -1.27	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -1.22	SHGC _{all} -0.20	U _{fixed} -0.73	SHGC _{all} -0.25	U _{fixed} -0.98	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.30	U _{oper} -0.81	SHGC _{north} -0.61	U _{oper} -1.02	SHGC _{north} -NR
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} -1.98	SHGC _{all} -0.61	U _{all} -1.98	SHGC _{all} -0.39	U _{all} -1.98	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.98	SHGC _{all} -0.39	U _{all} -1.98	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} -1.90	SHGC _{all} -0.65	U _{all} -1.90	SHGC _{all} -0.65	U _{all} -1.90	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.90	SHGC _{all} -0.39	U _{all} -1.90	SHGC _{all} -0.34	U _{all} -1.90	SHGC _{all} -NR
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	U _{all} -1.36	SHGC _{all} -0.61	U _{all} -1.36	SHGC _{all} -0.39	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.36	SHGC _{all} -0.39	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^b Insulation is not required for non-residential mass walls in Climate Zone 3A located below the “Warm-Humid” line, and in Zone 3B.

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A, B, C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063 U-0.048	R-15.0 ei R-20.0 ci	U-0.063 U-0.048	R-15.0 ei R-20.0 ci	U-0.218 U-0.173	R-3.8 ei R-5.0 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034 U-0.027	R-30.0 R-38.0	U-0.027	R-38.0	U-0.081 U-0.053	R-13.0 R-19.0
<i>Walls, Above Grade</i>						
Mass	U-0.151^a U-0.104	R-5.7 ei^a R-9.5 ci	U-0.104 U-0.090	R-9.5 ei R-11.4 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.134	R-10.0
Steel Framed	U-0.124 U-0.064	R-13.0 R-13.0 + R-7.5 ci	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.089 U-0.064	R-13.0 R-13.0 + R-3.8 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140 C-0.119	NR R-7.5 ci	C-1.140	NR
<i>Floors</i>						
Mass	U-0.107 U-0.087	R-6.3 ei R-8.3 ci	U-0.087 U-0.074	R-8.3 ei R-10.4 ci	U-0.322 U-0.137	NR R-4.2 ci
Steel Joist	U-0.052 U-0.038	R-19.0 R-30.0	U-0.038	R-30.0	U-0.069	R-13.0
Wood Framed and Other	U-0.051 U-0.033	R-19.0 R-30.0	U-0.033	R-30.0	U-0.066	R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730 F-0.540	NR R-10 for 24 in.	F-0.730	NR
Heated	F-0.950 F-0.860	R-7.5 for 24 in. R-15 for 24 in.	F-0.840 F-0.860	R-10 for 36 in. R-15 for 24 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450 U-0.500		U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A, B, C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
30.1-40.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{NR}
40.1-50.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.98}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.36}	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.36}	U _{oper} ^{-1.02}	SHGC _{north} ^{NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.49}	U _{all} ^{-0.98}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.39}	U _{all} ^{-0.98}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.65}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.62}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.34}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.49}	U _{all} ^{-0.58}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.39}	U _{all} ^{-0.58}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}

^a Exception to A3.1.3.1 applies.

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A, B, C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063 <u>U-0.048</u>	R-15.0 ei <u>R-20.0 ci</u>	U-0.063 <u>U-0.048</u>	R-15.0 ei <u>R-20.0 ci</u>	U-0.173 <u>U-0.119</u>	R-5.0 ei <u>R-7.6 ci</u>
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034 <u>U-0.027</u>	R-30.0 <u>R-38.0</u>	U-0.027	R-38.0	U-0.053	R-19.0
<i>Walls, Above Grade</i>						
Mass	U-0.123 <u>U-0.090</u>	R-7.6 ei <u>R-11.4 ci</u>	U-0.090 <u>U-0.080</u>	R-11.4 ei <u>R-13.3 ci</u>	U-0.580 <u>U-0.151^a</u>	NR <u>R-5.7 ci^a</u>
Metal Building	U-0.113	R-13.0	U-0.057	R-13.0 + R-13.0	U-0.123	R-11.0
Steel Framed	U-0.084 <u>U-0.064</u>	R-13.0 + R-3.8 ei <u>R-13.0 + R-7.5 ci</u>	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089 <u>U-0.064</u>	R-13.0 <u>R-13.0 + R-3.8 ci</u>	U-0.089 <u>U-0.051</u>	R-13.0 <u>R-13.0 + R-7.5 ci</u>	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140 <u>C-0.119</u>	NR <u>R-7.5 ci</u>	C-1.140 <u>C-0.119</u>	NR <u>R-7.5 ci</u>	C-1.140	NR
<i>Floors</i>						
Mass	U-0.087 <u>U-0.074</u>	R-8.3 ei <u>R-10.4 ci</u>	U-0.074 <u>U-0.064</u>	R-10.4 ei <u>R-12.5 ci</u>	U-0.322 <u>U-0.137</u>	NR <u>R-4.2 ci</u>

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A, B, C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Steel Joist	U-0.052 U-0.038	R-19.0 R-30.0	U-0.038	R-30.0	U-0.069 U-0.052	R-13.0 R-19.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066 U-0.051	R-13.0 R-19.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730 F-0.540	NR R-10 for 24 in.	F-0.730	NR
Heated	F-0.840 F-0.860	R-10 for 36 in. R-15 for 24 in.	F-0.840 F-0.860	R-10 for 36 in. R-15 for 24 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700 U-0.500		U-0.700	
Non-Swinging	U-1.450 U-0.500		U-0.500		U-1.450	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.26}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.26}	U _{fixed} ^{-0.98}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.36}	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.02}	SHGC _{north} ^{-NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.49}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.49}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.39}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.39}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-1.10}	SHGC _{all} ^{-0.77}	U _{all} ^{-1.10}	SHGC _{all} ^{-0.77}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.10}	SHGC _{all} ^{-0.62}	U _{all} ^{-1.10}	SHGC _{all} ^{-0.62}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.49}	U _{all} ^{-0.69}	SHGC _{all} ^{-0.49}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.39}	U _{all} ^{-0.69}	SHGC _{all} ^{-0.39}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A, B, C) (Continued)

^a-Exception to A3.1.3.1 applies.

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A, B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063 <u>U-0.048</u>	R-15.0 ci <u>R-20.0 ci</u>	U-0.063 <u>U-0.048</u>	R-15.0 ci <u>R-20.0 ci</u>	U-0.173 <u>U-0.093</u>	R-5.0 ci <u>R-10.0 ci</u>
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.053 <u>U-0.034</u>	R-19.0 <u>R-30.0</u>
<i>Walls, Above Grade</i>						
Mass	U-0.104 <u>U-0.080</u>	R-9.5 ci <u>R-13.3 ci</u>	U-0.090 <u>U-0.071</u>	R-11.4 ci <u>R-15.2 ci</u>	U-0.580 <u>U-0.151^a</u>	NR <u>R-5.7 ci^a</u>
Metal Building	U-0.113	R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.084 <u>U-0.064</u>	R-13.0 + R-3.8 ci <u>R-13.0 + R-7.5 ci</u>	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089 <u>U-0.051</u>	R-13.0 <u>R-13.0 + R-7.5 ci</u>	U-0.064 <u>U-0.051</u>	R-13.0 + R-3.8 ci <u>R-13.0 + R-7.5 ci</u>	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140 <u>C-0.119</u>	NR <u>R-7.5 ci</u>	C-0.119	R-7.5 ci	C-1.140	NR
<i>Floors</i>						
Mass	U-0.087 <u>U-0.064</u>	R-8.3 ci <u>R-12.5 ci</u>	U-0.064 <u>U-0.057</u>	R-12.5 ci <u>R-14.6 ci</u>	U-0.322 <u>U-0.137</u>	NR <u>R-4.2 ci</u>
Steel Joist	U-0.038	R-30.0	U-0.038 <u>U-0.032</u>	R-30.0 <u>R-38.0</u>	U-0.069 <u>U-0.052</u>	R-13.0 <u>R-19.0</u>
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066 <u>U-0.051</u>	R-13.0 <u>R-19.0</u>
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730 <u>F-0.540</u>	NR <u>R-10 for 24 in.</u>	F-0.730 <u>F-0.520</u>	NR <u>R-15 for 24 in.</u>	F-0.730	NR
Heated	F-0.840 <u>F-0.860</u>	R-10 for 36 in. <u>R-15 for 24 in.</u>	F-0.780 <u>F-0.688</u>	R-10 for 48 in. <u>R-20 for 48 in.</u>	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A, B) (Continued)

20.1-30.0%	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{NR}$
30.1-40.0%	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{NR}$
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
40.1-50.0%	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
	$U_{fixed}^{-0.46}$	$SHGC_{all}^{-0.26}$	$U_{fixed}^{-0.46}$	$SHGC_{all}^{-0.26}$	$U_{fixed}^{-0.98}$	$SHGC_{all}^{NR}$
	$U_{oper}^{-0.47}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.47}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.02}$	$SHGC_{north}^{NR}$
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-0.98}$	$SHGC_{all}^{-0.46}$	$U_{all}^{-1.98}$	$SHGC_{all}^{NR}$
2.1-5.0%	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-0.98}$	$SHGC_{all}^{-0.36}$	$U_{all}^{-1.98}$	$SHGC_{all}^{NR}$
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	$U_{all}^{-0.87}$	$SHGC_{all}^{-0.71}$	$U_{all}^{-0.74}$	$SHGC_{all}^{-0.65}$	$U_{all}^{-1.90}$	$SHGC_{all}^{NR}$
2.1-5.0%	$U_{all}^{-0.87}$	$SHGC_{all}^{-0.58}$	$U_{all}^{-0.74}$	$SHGC_{all}^{-0.55}$	$U_{all}^{-1.90}$	$SHGC_{all}^{NR}$
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-0.58}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-1.36}$	$SHGC_{all}^{NR}$
2.1-5.0%	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-0.58}$	$SHGC_{all}^{-0.39}$	$U_{all}^{-1.36}$	$SHGC_{all}^{NR}$

^a-Exception to A3.1.3.1 applies.

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063 <u>U-0.048</u>	R-15.0 ci <u>R-20.0 ci</u>	U-0.063 <u>U-0.048</u>	R-15.0 ci <u>R-20.0 ci</u>	U-0.173 <u>U-0.093</u>	R-5.0 ci <u>R-10.0 ci</u>
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.053 <u>U-0.034</u>	R-19.0 <u>R-30.0</u>
<i>Walls, Above Grade</i>						
Mass	U-0.090 <u>U-0.071</u>	R-11.4 ci <u>R-15.2 ci</u>	U-0.080 <u>U-0.071</u>	R-13.3 ci <u>R-15.2 ci</u>	U-0.580 <u>U-0.123</u>	NR <u>R-7.6 ci</u>
Metal Building	U-0.057	R-13.0 + R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.064	R-13.0 + R-7.5 ci	U-0.064 <u>U-0.042</u>	R-13.0 + R-7.5 ci <u>R-13.0 + R-15.6 ci</u>	U-0.124	R-13.0
Wood Framed and Other	U-0.089 <u>U-0.051</u>	R-13.0 <u>R-13.0 + R-7.5 ci</u>	U-0.051	R-13.0 + R-7.5 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.119	R-7.5 ci	C-0.119 <u>C-0.092</u>	R-7.5 ci <u>R-10.0 ci</u>	C-1.140	NR
<i>Floors</i>						

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Mass	U-0.087 <u>U-0.064</u>	R-8.3 ci <u>R-12.5 ci</u>	U-0.064 <u>U-0.051</u>	R-12.5 ci <u>R-16.7 ci</u>	U-0.137 <u>U-0.107</u>	R-4.2 ci <u>R-6.3 ci</u>
Steel Joist	U-0.038	R-30.0	U-0.038 <u>U-0.032</u>	R-30.0 <u>R-38.0</u>	U-0.052	R-19.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066 <u>U-0.051</u>	R-13.0 <u>R-19.0</u>
	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
Opaque Elements	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730 <u>F-0.520</u>	NR <u>R-15 for 24 in.</u>	F-0.540 <u>F-0.520</u>	R-10 for 24 in. <u>R-15 for 24 in.</u>	F-0.730	NR
Heated	F-0.840 <u>F-0.843</u>	R-10 for 36 in. <u>R-20 for 24 in.</u>	F-0.780 <u>F-0.688</u>	R-10 for 48 in. <u>R-20 for 48 in.</u>	F-1.020 <u>F-0.900</u>	R-7.5 for 12 in. <u>R-10 for 24 in.</u>
<i>Opaque Doors</i>						
Swinging	U-0.700 <u>U-0.500</u>		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450	
	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
Fenestration	Max. U	SHGC (All	Max. U	SHGC (All	Max. U	SHGC (All
	(Fixed/	Orientations/	(Fixed/	Orientations/	(Fixed/	Orientations/
	Operable)	North-Oriented)	Operable)	North-Oriented)	Operable)	North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-1.22}$	$SHGC_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-1.27}$	$SHGC_{\text{north}}^{-\text{NR}}$
10.1-20.0%	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-1.22}$	$SHGC_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-1.27}$	$SHGC_{\text{north}}^{-\text{NR}}$
20.1-30.0%	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-1.22}$	$SHGC_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-1.27}$	$SHGC_{\text{north}}^{-\text{NR}}$
30.1-40.0%	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-0.57}$	$SHGC_{\text{all}}^{-0.49}$	$U_{\text{fixed}}^{-1.22}$	$SHGC_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-0.67}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-1.27}$	$SHGC_{\text{north}}^{-\text{NR}}$
40.1-50.0%	$U_{\text{fixed}}^{-0.46}$	$SHGC_{\text{all}}^{-0.36}$	$U_{\text{fixed}}^{-0.46}$	$SHGC_{\text{all}}^{-0.36}$	$U_{\text{fixed}}^{-0.98}$	$SHGC_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-0.47}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-0.47}$	$SHGC_{\text{north}}^{-0.64}$	$U_{\text{oper}}^{-1.02}$	$SHGC_{\text{north}}^{-\text{NR}}$
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-1.17}$	$SHGC_{\text{all}}^{-0.68}$	$U_{\text{all}}^{-1.17}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-1.98}$	$SHGC_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-1.17}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-1.17}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-1.98}$	$SHGC_{\text{all}}^{-\text{NR}}$
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-0.87}$	$SHGC_{\text{all}}^{-0.77}$	$U_{\text{all}}^{-0.61}$	$SHGC_{\text{all}}^{-0.77}$	$U_{\text{all}}^{-1.90}$	$SHGC_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-0.87}$	$SHGC_{\text{all}}^{-0.71}$	$U_{\text{all}}^{-0.61}$	$SHGC_{\text{all}}^{-0.77}$	$U_{\text{all}}^{-1.90}$	$SHGC_{\text{all}}^{-\text{NR}}$
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-0.69}$	$SHGC_{\text{all}}^{-0.68}$	$U_{\text{all}}^{-0.69}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-1.36}$	$SHGC_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-0.69}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-0.69}$	$SHGC_{\text{all}}^{-0.64}$	$U_{\text{all}}^{-1.36}$	$SHGC_{\text{all}}^{-\text{NR}}$

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.048	R-20.0 ci	U-0.048	R-20.0 ci	U-0.093 U-0.063	R-10.0 ci R-15.0 ci
Metal Building	U-0.049	R-13.0 + R-19.0	U-0.049	R-13.0 + R-19.0	U-0.072	R-16.0
Attic and Other	U-0.027 U-0.021	R-38.0 R-49.0	U-0.027 U-0.021	R-38.0 R-49.0	U-0.034	R-30.0
<i>Walls, Above Grade</i>						
Mass	U-0.080 U-0.071	R-13.3 ci R-15.2 ci	U-0.071 U-0.052	R-15.2 ci R-25.0 ci	U-0.151 ^a U-0.104	R-5.7 ci^a R-9.5 ci
Metal Building	U-0.057	R-13.0 + R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.064	R-13.0 + R-7.5 ci	U-0.055 U-0.037	R-13.0 + R-10.0 ci R-13.0 + R-18.8 ci	U-0.124 U-0.084	R-13.0 R-13.0 + R-3.8 ci
Wood Framed and Other	U-0.051 U-0.036	R-13.0 + R-7.5 ci R-13.0 + R-15.6 ci	U-0.051 U-0.036	R-13.0 + R-7.5 ci R-13.0 + R-15.6 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.119	R-7.5 ci	C-0.119 C-0.075	R-7.5 ci R-12.5 ci	C-1.140	NR
<i>Floors</i>						
Mass	U-0.064 U-0.057	R-12.5 ci R-14.6 ci	U-0.057 U-0.051	R-14.6 ci R-16.7 ci	U-0.137 U-0.087	R-4.2 ci R-8.3 ci
Steel Joist	U-0.038 U-0.032	R-30.0 R-38.0	U-0.032	R-38.0	U-0.052	R-19.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.051 U-0.033	R-19.0 R-30.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.540 F-0.520	R-10 for 24 in. R-15 for 24 in.	F-0.520 F-0.510	R-15 for 24 in. R-20 for 24 in.	F-0.730	NR
Heated	F-0.780 F-0.688	R-10 for 48 in. R-20 for 48 in.	F-0.780 F-0.688	R-10 for 48 in. R-20 for 48 in.	F-0.950 F-0.900	R-7.5 for 24 in. R-10.0 for 24 in.
<i>Opaque Doors</i>						
Swinging	U-0.500		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450 U-0.500	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8 (Continued)

Fenestration	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
30.1-40.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-NR}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-0.47}	SHGC _{north} ^{-NR}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-0.35}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.35}	SHGC _{all} ^{-NR}	U _{fixed} ^{-0.98}	SHGC _{all} ^{-NR}
	U _{oper} ^{-0.39}	SHGC _{north} ^{-NR}	U _{oper} ^{-0.39}	SHGC _{north} ^{-NR}	U _{oper} ^{-1.02}	SHGC _{north} ^{-NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-0.98}	SHGC _{all} ^{-NR}	U _{all} ^{-0.98}	SHGC _{all} ^{-NR}	U _{all} ^{-1.30}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.98}	SHGC _{all} ^{-NR}	U _{all} ^{-0.98}	SHGC _{all} ^{-NR}	U _{all} ^{-1.30}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-0.61}	SHGC _{all} ^{-NR}	U _{all} ^{-0.61}	SHGC _{all} ^{-NR}	U _{all} ^{-1.10}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.61}	SHGC _{all} ^{-NR}	U _{all} ^{-0.61}	SHGC _{all} ^{-NR}	U _{all} ^{-1.10}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} ^{-0.58}	SHGC _{all} ^{-NR}	U _{all} ^{-0.58}	SHGC _{all} ^{-NR}	U _{all} ^{-0.81}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.58}	SHGC _{all} ^{-NR}	U _{all} ^{-0.58}	SHGC _{all} ^{-NR}	U _{all} ^{-0.81}	SHGC _{all} ^{-NR}

^a Exception to A3.1.3.1 applies.

Make the following revisions to the SI edition.

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
	<i>Roofs</i>					
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-7.280	NR
Metal Building	U-0.369	R-3.3	U-0.273	R-3.5 ci	U-1.240	R-0.7 ci
Attic and Other	U-0.192	R-5.3	U-0.369	R-3.3	U-7.268	NR
			U-0.153	R-6.7	U-3.483	NR
					U-0.459	R-2.3
<i>Walls, Above Grade</i>						
Mass	U-3.293	NR	U-0.857 ^a	R-1.0 ci ^a	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-6.700	NR
Steel Framed	U-0.705	R-2.3	U-0.705	R-2.3	U-1.998	NR
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-1.660	NR
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-1.825	NR	U-1.825	NR	U-1.825	NR
Steel Joist	U-1.986	NR	U-1.986	NR	U-1.986	NR
Wood Framed and Other	U-1.599	NR	U-1.599	NR	U-1.599	NR

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-8.233		U-8.233	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
10.1-20.0%	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
20.1-30.0%	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
30.1-40.0%	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.44}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.44}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
40.1-50.0%	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{fixed}}^{-6.93}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{fixed}}^{-5.54}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.33}$	$U_{\text{oper}}^{-7.21}$	$\text{SHGC}_{\text{north}}^{-0.33}$	$U_{\text{oper}}^{-5.77}$	$\text{SHGC}_{\text{north}}^{-\text{NR}}$
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-0.36}$	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-0.16}$	$U_{\text{all}}^{-11.24}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-0.34}$	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-0.27}$	$U_{\text{all}}^{-10.79}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-0.36}$	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$
2.1-5.0%	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-7.72}$	$\text{SHGC}_{\text{all}}^{-\text{NR}}$

^a Exception to A3.1.3.1 applies.

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A, B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-1.240	R-0.7 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.948	R-1.1
Attic and Other	U-0.192 U-0.153	R-5.3 R-6.7	U-0.153	R-6.7	U-0.459	R-2.3
<i>Walls, Above Grade</i>						
Mass	U-3.293 U-0.857 ^a	NR R-1.0 ci ^a	U-0.857^a U-0.701	R-1.0 ei^a R-1.3 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-1.045	R-1.1
Steel Framed	U-0.705	R-2.3	U-0.705 U-0.365	R-2.3 R-2.3 + R-1.3 ci	U-1.998 U-0.705	NR R-2.3
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-1.660 U-0.504	NR R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.780 U-0.606	R-0.7 ei R-1.1 ci	U-0.606 U-0.496	R-1.1 ei R-1.5 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.296	R-3.3	U-1.986 U-0.390	NR R-2.3
Wood Framed and Other	U-0.288	R-3.3	U-0.288 U-0.188	R-3.3 R-5.3	U-1.599 U-0.376	NR R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-8.233 U-2.839		U-8.233	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-0.61}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A, B) (Continued)

Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
40.1-50.0%	U _{fixed} -6.93 U _{oper} -7.21	SHGC _{all} -0.17 SHGC _{north} -0.44	U _{fixed} -6.93 U _{oper} -7.21	SHGC _{all} -0.17 SHGC _{north} -0.43	U _{fixed} -5.54 U _{oper} -5.77	SHGC _{all} -NR SHGC _{north} -NR
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} -11.24	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} -10.79	SHGC _{all} -0.39	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -10.79	SHGC _{all} -0.34	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	U _{all} -7.72	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^aException to A3.1.3.1 applies.

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-1.240 U-0.982	R-0.7 ei R-0.9 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.192 U-0.153	R-5.3 R-6.7	U-0.153	R-6.7	U-0.459 U-0.300	R-2.3 R-3.3
<i>Walls, Above Grade</i>						
Mass	U-0.857^{a,b} U-0.701	R-1.0 ei^{a,b} R-1.3 ci	U-0.701 U-0.592	R-1.3 ei R-1.7 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-1.045	R-1.1
Steel Framed	U-0.705 U-0.479	R-2.3 R-2.3 + R-0.7 ci	U-0.479 U-0.365	R-2.3 + R-0.7 ei R-2.3 + R-1.3 ci	U-1.998 U-0.705	NR R-2.3
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.606	R-1.1 ci	U-0.496	R-1.5 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.296	R-3.3	U-0.390	R-2.3
Wood Framed and Other	U-0.288	R-3.3	U-0.188	R-5.3	U-1.599 U-0.376	NR R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Heated	F-1.766 F-1.558	R-1.3 for 300 mm R-1.8 for 600 mm	F-1.766 F-1.558	R-1.3 for 300 mm R-1.8 for 600 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-2.839		U-8.233	
Fenestration (for Zones 3A and 3B; see next page for Zone 3C)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.25	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.25	U _{fixed} -3.24	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.39	U _{oper} -3.80	SHGC _{north} -0.39	U _{oper} -7.21	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.25	U _{fixed} -3.24	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.39	U _{oper} -3.80	SHGC _{north} -0.39	U _{oper} -7.21	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.61	SHGC _{all} -0.19	U _{fixed} -2.61	SHGC _{all} -0.19	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.26	U _{oper} -2.67	SHGC _{north} -0.26	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -6.64	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.19	U _{all} -6.64	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -7.38	SHGC _{all} -0.65	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.38	SHGC _{all} -0.34	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.92	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.19	U _{all} -3.92	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^b Insulation is not required for non-residential mass walls in Climate Zone 3A located below the "Warm Humid" line, and in Zone 3B.

TABLE 5.5-3 Building Fenestration Requirements For Climate Zone 3C

Fenestration (for Zone 3C)	Nonresidential		Residential		Semiheated	
	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing,% of Wall</i>						
0-10.0%	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.61}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.61}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-NR}$
	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.82}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.82}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-NR}$
10.1-20.0%	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.61}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-NR}$
	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-NR}$
20.1-30.0%	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-NR}$
	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-NR}$
30.1-40.0%	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.34}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.34}$	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-NR}$
	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-NR}$
40.1-50.0%	$U_{\text{fixed}}^{-6.93}$	$SHGC_{\text{all}}^{-0.20}$	$U_{\text{fixed}}^{-4.14}$	$SHGC_{\text{all}}^{-0.25}$	$U_{\text{fixed}}^{-5.54}$	$SHGC_{\text{all}}^{-NR}$
	$U_{\text{oper}}^{-7.21}$	$SHGC_{\text{north}}^{-0.30}$	$U_{\text{oper}}^{-4.60}$	$SHGC_{\text{north}}^{-0.61}$	$U_{\text{oper}}^{-5.77}$	$SHGC_{\text{north}}^{-NR}$
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-0.61}$	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-NR}$
2.1-5.0%	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-11.24}$	$SHGC_{\text{all}}^{-NR}$
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-0.65}$	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-0.65}$	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-NR}$
2.1-5.0%	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-0.34}$	$U_{\text{all}}^{-10.79}$	$SHGC_{\text{all}}^{-NR}$
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-0.61}$	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-NR}$
2.1-5.0%	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-0.39}$	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-0.19}$	$U_{\text{all}}^{-7.72}$	$SHGC_{\text{all}}^{-NR}$

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	$U-0.360$	$R-2.6 \text{ ei}$	$U-0.360$	$R-2.6 \text{ ei}$	$U-1.240$	$R-0.7 \text{ ei}$
Metal Building	$U-0.369$	$R-3.3$	$U-0.369$	$R-3.3$	$U-0.551$	$R-1.8$
Attic and Other	$U-0.192$	$R-5.3$	$U-0.153$	$R-6.7$	$U-0.459$	$R-2.3$
	$U-0.153$	$R-6.7$			$U-0.300$	$R-3.3$
<i>Walls, Above Grade</i>						
Mass	$U-0.857^a$	$R-1.0 \text{ ei}^a$	$U-0.592$	$R-1.7 \text{ ei}$	$U-3.293$	NR
	$U-0.592$	$R-1.7 \text{ ci}$	$U-0.513$	$R-2.0 \text{ ci}$		
Metal Building	$U-0.642$	$R-2.3$	$U-0.642$	$R-2.3$	$U-0.761$	$R-1.8$
Steel Framed	$U-0.705$	$R-2.3$	$U-0.365$	$R-2.3 + R-1.3 \text{ ci}$	$U-0.705$	$R-2.3$
	$U-0.365$	$R-2.3 + R-1.3 \text{ ci}$				

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Wood Framed and Other	U-0.504	R-2.3	U-0.504 U-0.365	R-2.3 R-2.3 + R-0.7 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473 C-0.678	NR R-1.3 ci	C-6.473	NR
<i>Floors</i>						
Mass	U-0.606 U-0.496	R-1.1 ci R-1.5 ci	U-0.496 U-0.420	R-1.5 ci R-1.8 ci	U-1.825 U-0.780	NR R-0.7 ci
Steel Joist	U-0.296 U-0.214	R-3.3 R-5.3	U-0.214	R-5.3	U-0.390	R-2.3
Wood Framed and Other	U-0.288 U-0.188	R-3.3 R-5.3	U-0.188	R-5.3	U-0.376	R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264 F-0.935	NR R-1.8 for 600 mm	F-1.264	NR
Heated	F-1.644 F-1.489	R-1.3 for 600 mm R-2.6 for 600 mm	F-1.454 F-1.489	R-1.8 for 900 mm R-2.6 for 600 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233 U-2.839		U-2.839		U-8.233	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.61	SHGC _{all} -0.25	U _{fixed} -2.61	SHGC _{all} -0.25	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -5.56	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -7.38	SHGC _{all} -0.65	U _{all} -7.38	SHGC _{all} -0.62	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.38	SHGC _{all} -0.34	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.29	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^aException to A3.1.3.1 applies.

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.982 U-0.677	R-0.9 ei R-1.3 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.192 U-0.153	R-5.3 R-6.7	U-0.153	R-6.7	U-0.300	R-3.3
<i>Walls, Above Grade</i>						
Mass	U-0.701 U-0.513	R-1.3 ei R-2.0 ci	U-0.513 U-0.453	R-2.0 ei R-2.3 ci	U-3.293 U-0.857 ^a	NR R-1.0 ci ^a
Metal Building	U-0.642	R-2.3	U-0.324	R-2.3 + R-2.3	U-0.698	R-1.9
Steel Framed	U-0.479 U-0.365	R-2.3 + R-0.7 ei R-2.3 + R-1.3 ci	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
⁷ Wood Framed and Other	U-0.504 U-0.365	R-2.3 R-2.3 + R-0.7 ci	U-0.504 U-0.291	R-2.3 R-2.3 + R-1.3 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473 C-0.678	NR R-1.3 ci	C-6.473 C-0.678	NR R-1.3 ci	C-6.473	NR
<i>Floors</i>						
Mass	U-0.496 U-0.420	R-1.5 ei R-1.8 ci	U-0.420 U-0.363	R-1.8 ei R-2.2 ci	U-1.825 U-0.780	NR R-0.7 ci
Steel Joist	U-0.296 U-0.214	R-3.3 R-5.3	U-0.214	R-5.3	U-0.390 U-0.296	R-2.3 R-3.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376 U-0.288	R-2.3 R-3.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264 F-0.935	NR R-1.8 for 600 mm	F-1.264	NR
Heated	F-1.454 F-1.489	R-1.8 for 900 mm R-2.6 for 600 mm	F-1.454 F-1.489	R-1.8 for 900 mm R-2.6 for 600 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975 U-2.839		U-3.975	
Non-Swinging	U-8.233 U-2.839		U-2.839		U-8.233	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.49}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-3.24}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-3.80}	SHGC _{north} ^{-0.49}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.61	SHGC _{all} -0.26	U _{fixed} -2.61	SHGC _{all} -0.26	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -6.25	SHGC _{all} -0.77	U _{all} -6.25	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.25	SHGC _{all} -0.62	U _{all} -6.25	SHGC _{all} -0.62	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -NR

^a-Exception to A3.1.3.1 applies.

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ei	U-0.360	R-2.6 ei	U-0.982	R-0.9 ei
Metal Building	U-0.273	R-3.5 ci	U-0.273	R-3.5 ci	U-0.527	R-1.8 ci
Attic and Other	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
	U-0.153	R-6.7	U-0.153	R-6.7	U-0.300	R-3.3
					U-0.192	R-5.3
<i>Walls, Above Grade</i>						
Mass	U-0.592	R-1.7 ei	U-0.513	R-2.0 ei	U-3.293	NR
	U-0.453	R-2.3 ci	U-0.404	R-2.7 ci	U-0.857 ^a	R-1.0 ci ^a
Metal Building	U-0.642	R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.479	R-2.3 + R-0.7 ei	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
	U-0.365	R-2.3 + R-1.3 ci				
Wood Framed and Other	U-0.504	R-2.3	U-0.365	R-2.3 + R-0.7 ei	U-0.504	R-2.3
	U-0.291	R-2.3 + R-1.3 ci	U-0.291	R-2.3 + R-1.3 ci		
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-0.678	R-1.3 ci	C-6.473	NR
	C-0.678	R-1.3 ci				
<i>Floors</i>						
Mass	U-0.496	R-1.5 ei	U-0.363	R-2.2 ei	U-1.825	NR
	U-0.363	R-2.2 ci	U-0.321	R-2.6 ci	U-0.780	R-0.7 ci

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Steel Joist	U-0.214	R-5.3	U-0.214 U-0.183	R-5.3 R-6.7	U-0.390 U-0.296	R-2.3 R-3.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376 U-0.288	R-2.3 R-3.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264 F-0.935	NR R-1.8 for 600 mm	F-1.264 F-0.900	NR R-2.6 for 600 mm	F-1.264	NR
Heated	F-1.454 F-1.489	R-1.8 for 900 mm R-2.6 for 600 mm	F-1.350 F-1.191	R-1.8 for 1200 mm R-3.5 for 1200 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.21	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.21	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.61	SHGC _{all} -0.26	U _{fixed} -2.61	SHGC _{all} -0.26	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.46	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -4.94	SHGC _{all} -0.71	U _{all} -4.20	SHGC _{all} -0.65	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -4.94	SHGC _{all} -0.58	U _{all} -4.20	SHGC _{all} -0.55	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.49	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -NR

^aException to A3.1.3.1 applies.

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.360 U-0.273	R-2.6 ei R-3.5 ci	U-0.982 U-0.527	R-0.9 ei R-1.8 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.153	R-6.7	U-0.153	R-6.7	U-0.300 U-0.192	R-3.3 R-5.3
<i>Walls, Above Grade</i>						
Mass	U-0.513 U-0.404	R-2.0 ei R-2.7 ci	U-0.453 U-0.404	R-2.3 ei R-2.7 ci	U-3.293 U-0.701	NR R-1.3 ci
Metal Building	U-0.324	R-2.3 + R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.365	R-2.3 + R-1.3 ci	U-0.365 U-0.240	R-2.3 + R-1.3 ei R-2.3 + R-2.7 ci	U-0.705	R-2.3
Wood Framed and Other	U-0.504 U-0.291	R-2.3 R-2.3 + R-1.3 ci	U-0.291	R-2.3 + R-1.3 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.678	R-1.3 ci	C-0.678 C-0.522	R-1.3 ei R-1.8 ci	C-6.473	NR
<i>Floors</i>						
Mass	U-0.496 U-0.363	R-1.5 ei R-2.2 ci	U-0.363 U-0.287	R-2.2 ei R-2.9 ci	U-0.780 U-0.606	R-0.7 ei R-1.1 ci
Steel Joist	U-0.214	R-5.3	U-0.214 U-0.183	R-5.3 R-6.7	U-0.296	R-3.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376 U-0.288	R-2.3 R-3.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264 F-0.900	NR R-2.6 for 600 mm	F-0.935 F-0.900	R-1.8 for 600 mm R-2.6 for 600 mm	F-1.264	NR
Heated	F-1.454 F-1.459	R-1.8 for 900 mm R-3.5 for 600 mm	F-1.350 F-1.191	R-1.8 for 1200 mm R-3.5 for 1200 mm	F-1.766 F-1.558	R-1.3 for 300 mm R-1.8 for 600 mm
<i>Opaque Doors</i>						
Swinging	U-3.975 U-2.839		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.21	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.21	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.21	SHGC _{north} -NR

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.21	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.61	SHGC _{all} -0.36	U _{fixed} -2.61	SHGC _{all} -0.36	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.64	U _{oper} -2.67	SHGC _{north} -0.64	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.68	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -4.94	SHGC _{all} -0.77	U _{all} -3.46	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -4.94	SHGC _{all} -0.71	U _{all} -3.46	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.68	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -7.72	SHGC _{all} -NR

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.273	R-3.5 ci	U-0.273	R-3.5 ci	U-0.527 <u>U-0.360</u>	R-1.8 ci <u>R-2.6 ci</u>
Metal Building	U-0.278	R-2.3 + R-3.3	U-0.278	R-2.3 + R-3.3	U-0.409	R-2.8
Attic and Other	U-0.153 <u>U-0.119</u>	R-6.7 <u>R-8.6</u>	U-0.153 <u>U-0.119</u>	R-6.7 <u>R-8.6</u>	U-0.192	R-5.3
<i>Walls, Above Grade</i>						
Mass	U-0.453 <u>U-0.404</u>	R-2.3 ei <u>R-2.7 ci</u>	U-0.404 <u>U-0.295</u>	R-2.7 ei <u>R-4.4 ci</u>	U-0.857^a <u>U-0.592</u>	R-1.0 ei^a <u>R-1.7 ci</u>
Metal Building	U-0.324	R-2.3 + R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.365	R-2.3 + R-1.3 ci	U-0.315 <u>U-0.212</u>	R-2.3 + R-1.8 ei <u>R-2.3 + R-3.3 ci</u>	U-0.705 <u>U-0.479</u>	R-2.3 <u>R-2.3 + R-0.7 ci</u>
Wood Framed and Other	U-0.291 <u>U-0.203</u>	R-2.3 + R-1.3 ei <u>R-2.3 + R-2.7 ci</u>	U-0.291 <u>U-0.203</u>	R-2.3 + R-1.3 ei <u>R-2.3 + R-2.7 ci</u>	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.678	R-1.3 ci	C-0.678 <u>C-0.425</u>	R-1.3 ei <u>R-2.2 ci</u>	C-6.473	NR
<i>Floors</i>						
Mass	U-0.363 <u>U-0.321</u>	R-2.2 ei <u>R-2.6 ci</u>	U-0.321 <u>U-0.287</u>	R-2.6 ei <u>R-2.9 ci</u>	U-0.780 <u>U-0.496</u>	R-0.7 ei <u>R-1.5 ci</u>
Steel Joist	U-0.214 <u>U-0.183</u>	R-5.3 <u>R-6.7</u>	U-0.183	R-6.7	U-0.296	R-3.3

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8 (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.288 U-0.188	R-3.3 R-5.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.935 F-0.900	R-1.8 for 600 mm R-2.6 for 600 mm	F-0.900 F-0.883	R-2.6 for 600 mm R-3.5 for 600 mm	F-1.264	NR
Heated	F-1.350 F-1.191	R-1.8 for 1200 mm R-3.5 for 1200 mm	F-1.350 F-1.191	R-1.8 for 1200 mm R-3.5 for 1200 mm	F-1.644 F-1.558	R-1.3 for 600 mm R-1.8 for 600 mm
<i>Opaque Doors</i>						
Swinging	U-2.839		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233 U-2.839	
Fenestration	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-2.61}	SHGC _{all} ^{-NR}	U _{fixed} ^{-6.93}	SHGC _{all} ^{-NR}
	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-2.67}	SHGC _{north} ^{-NR}	U _{oper} ^{-7.21}	SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-1.99}	SHGC _{all} ^{-NR}	U _{fixed} ^{-1.99}	SHGC _{all} ^{-NR}	U _{fixed} ^{-5.54}	SHGC _{all} ^{-NR}
	U _{oper} ^{-2.21}	SHGC _{north} ^{-NR}	U _{oper} ^{-2.21}	SHGC _{north} ^{-NR}	U _{oper} ^{-5.77}	SHGC _{north} ^{-NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-5.56}	SHGC _{all} ^{-NR}	U _{all} ^{-5.56}	SHGC _{all} ^{-NR}	U _{all} ^{-7.38}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-5.56}	SHGC _{all} ^{-NR}	U _{all} ^{-5.56}	SHGC _{all} ^{-NR}	U _{all} ^{-7.38}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-3.46}	SHGC _{all} ^{-NR}	U _{all} ^{-3.46}	SHGC _{all} ^{-NR}	U _{all} ^{-6.25}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-3.46}	SHGC _{all} ^{-NR}	U _{all} ^{-3.46}	SHGC _{all} ^{-NR}	U _{all} ^{-6.25}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} ^{-3.29}	SHGC _{all} ^{-NR}	U _{all} ^{-3.29}	SHGC _{all} ^{-NR}	U _{all} ^{-4.60}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-3.29}	SHGC _{all} ^{-NR}	U _{all} ^{-3.29}	SHGC _{all} ^{-NR}	U _{all} ^{-4.60}	SHGC _{all} ^{-NR}

* Exception to A3.1.3.1 applies.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

This proposed addendum updates building envelope criteria for fenestration.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum at to 90.1-2004

Revise Tables 5.5-1 to 5.5-8 as follows (I-P tables are listed first, followed by SI tables):

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-1.282	NR
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-1.280	NR
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.614	NR
<i>Walls, Above Grade</i>						
Mass	U-0.580	NR	U-0.151 ^a	R-5.7 ci ^a	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-1.180	NR
Steel Framed	U-0.124	R-13.0	U-0.124	R-13.0	U-0.352	NR
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.292	NR
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.322	NR	U-0.322	NR	U-0.322	NR
Steel Joist	U-0.350	NR	U-0.350	NR	U-0.350	NR
Wood Framed and Other	U-0.282	NR	U-0.282	NR	U-0.282	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-1.450		U-1.450	

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-1.20-	SHGC-0.25 all-	U-1.20-	SHGC-0.25 all-	U-1.20-	SHGC-NR all-
Metal fr: curtainwall/ storefront ^d	U-1.20		U-1.20		U-1.20	
Metal framing: entrance door ^d	U-1.20		U-1.20		U-1.20	
Metal framing: all other ^d	U-1.20		U-1.20		U-1.20	
0-10.0%	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -0.25	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.44	U _{oper} -1.27	SHGC _{north} -0.44	U _{oper} -1.27	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -1.22	SHGC _{all} -0.19	U _{fixed} -1.22	SHGC _{all} -0.19	U _{fixed} -0.98	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.33	U _{oper} -1.27	SHGC _{north} -0.33	U _{oper} -1.02	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -1.98	SHGC _{all} -0.36	U _{all} -1.98	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.98	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -0.16	U _{all} -1.98	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -1.90	SHGC _{all} -0.34	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -1.36	SHGC _{all} -0.36	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.218	R-3.8 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.167	R-6.0
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.081	R-13.0
<i>Walls, Above Grade</i>						
Mass	U-0.580	NR	U-0.151 ^a	R-5.7 ci ^a	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.184	R-6.0
Steel Framed	U-0.124	R-13.0	U-0.124	R-13.0	U-0.352	NR
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.292	NR
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.137	R-4.2 ci	U-0.107	R-6.3 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.052	R-19.0	U-0.350	NR
Wood Framed and Other	U-0.051	R-19.0	U-0.051	R-19.0	U-0.282	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-1.450		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)
	(Fixed/ Operable)		(Fixed/ Operable)		(Fixed/ Operable)	
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-0.75	SHGC-0.25 all	U-0.75	SHGC-0.25 all	U-1.20	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-0.70		U-0.70		U-1.20	
Metal framing: entrance door ^d	U-1.10		U-1.10		U-1.20	
Metal framing: all other ^d	U-0.75		U-0.75		U-1.20	
0-10.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.30}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-1.22}	SHGC _{all} ^{-NR}
	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-0.64}	U _{oper} ^{-1.27}	SHGC _{north} ^{-NR}

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations)	Max. U	SHGC (All Orientations)	Max. U	SHGC (All Orientations)
	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)
		North-Oriented)		North-Oriented)		North-Oriented)
30.1-40.0%	U _{fixed} ^a -1.22	SHGC _{all} ^a -0.25	U _{fixed} ^a -1.22	SHGC _{all} ^a -0.25	U _{fixed} ^a -1.22	SHGC _{all} -NR
	U _{oper} ^a -1.27	SHGC _{north} ^a -0.64	U _{oper} ^a -1.27	SHGC _{north} ^a -0.64	U _{oper} ^a -1.27	SHGC _{north} -NR
40.1-50.0%	U _{fixed} ^a -1.22	SHGC _{all} ^a -0.17	U _{fixed} ^a -1.22	SHGC _{all} ^a -0.17	U _{fixed} ^a -0.98	SHGC _{all} -NR
	U _{oper} ^a -1.27	SHGC _{north} ^a -0.44	U _{oper} ^a -1.27	SHGC _{north} ^a -0.43	U _{oper} ^a -1.02	SHGC _{north} -NR
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} ^a -1.98	SHGC _{all} ^a -0.36	U _{all} ^a -1.98	SHGC _{all} ^a -0.19	U _{all} ^a -1.98	SHGC _{all} -NR
2.1-5.0%	U _{all} ^a -1.98	SHGC _{all} ^a -0.19	U _{all} ^a -1.98	SHGC _{all} ^a -0.19	U _{all} ^a -1.98	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} ^a -1.90	SHGC _{all} ^a -0.39	U _{all} ^a -1.90	SHGC _{all} ^a -0.27	U _{all} ^a -1.90	SHGC _{all} -NR
2.1-5.0%	U _{all} ^a -1.90	SHGC _{all} ^a -0.34	U _{all} ^a -1.90	SHGC _{all} ^a -0.27	U _{all} ^a -1.90	SHGC _{all} -NR
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	U _{all} ^a -1.36	SHGC _{all} ^a -0.36	U _{all} ^a -1.36	SHGC _{all} ^a -0.19	U _{all} ^a -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} ^a -1.36	SHGC _{all} ^a -0.19	U _{all} ^a -1.36	SHGC _{all} ^a -0.19	U _{all} ^a -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^b Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.218	R-3.8 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.081	R-13.0
<i>Walls, Above Grade</i>						
Mass	U-0.151 ^{a, b}	R-5.7 ci ^{a, b}	U-0.123	R-7.6 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.184	R-6.0
Steel Framed	U-0.124	R-13.0	U-0.084	R-13.0 + R-3.8 ci	U-0.352	NR
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.107	R-6.3 ci	U-0.087	R-8.3 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.052	R-19.0	U-0.069	R-13.0

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
Wood Framed and Other	U-0.051	R-19.0	U-0.033	R-30.0	U-0.282 <u>U-0.066</u>	NR <u>R-13.0</u>
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-0.500		U-1.450	
Fenestration (for Zones 3A and 3B; see next page for Zone 3C)	Assembly Max. U	Assembly Max. SHGC (All Orientations/ North Oriented)	Assembly Max. U	Assembly Max. SHGC (All Orientations/ North Oriented)	Assembly Max. U	Assembly Max. SHGC (All Orientations/ North Oriented)
	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)	(Fixed/ Operable)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-0.65	SHGC-0.25 all	U-0.65	SHGC-0.25 all	U-1.20	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-0.60		U-0.60		U-1.20	
Metal framing: entrance door ^d	U-0.90		U-0.90		U-1.20	
Metal framing: all other ^d	U-0.65		U-0.65		U-1.20	
0-10.0%	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.39} SHGC _{north} ^{-0.49}	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.39} SHGC _{north} ^{-0.49}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.25} SHGC _{north} ^{-0.49}	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.39} SHGC _{north} ^{-0.49}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.25} SHGC _{north} ^{-0.39}	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.25} SHGC _{north} ^{-0.39}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.25} SHGC _{north} ^{-0.39}	U _{fixed} ^{-0.57} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.25} SHGC _{north} ^{-0.39}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-0.46} U _{oper} ^{-0.47}	SHGC _{all} ^{-0.19} SHGC _{north} ^{-0.26}	U _{fixed} ^{-0.46} U _{oper} ^{-0.47}	SHGC _{all} ^{-0.19} SHGC _{north} ^{-0.26}	U _{fixed} ^{-0.98} U _{oper} ^{-1.02}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.39}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.65}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.34}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.39}	U _{all} ^{-0.69}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.69}	SHGC _{all} ^{-0.19}	U _{all} ^{-0.69}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.36}	SHGC _{all} ^{-NR}

^a Exception to A3.1.3.1 applies.

^b Insulation is not required for non-residential mass walls in Climate Zone 3A located below the "Warm-Humid" line, and in Zone 3B.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-3 (continued) Building Fenestration Requirements For Climate Zone 3C

Fenestration (for Zone 3C)	Nonresidential		Residential		Semiheated	
	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max-U	SHGC (All Orientations/ North-Oriented)	Max-U	SHGC (All Orientations/ North-Oriented)	Max-U	SHGC (All Orientations/ North-Oriented)
	(Fixed/ Operable)		(Fixed/ Operable)		(Fixed/ Operable)	
<i>Vertical Glazing, % of Wall</i>						
0-10.0%	U _{fixed} -1.22	SHGC _{all} -0.64	U _{fixed} -1.22	SHGC _{all} -0.64	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.82	U _{oper} -1.27	SHGC _{north} -0.82	U _{oper} -1.27	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -0.64	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -1.22	SHGC _{all} -0.34	U _{fixed} -1.22	SHGC _{all} -0.34	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -0.64	U _{oper} -1.27	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -1.22	SHGC _{all} -0.29	U _{fixed} -0.73	SHGC _{all} -0.25	U _{fixed} -0.98	SHGC _{all} -NR
	U _{oper} -1.27	SHGC _{north} -0.39	U _{oper} -0.84	SHGC _{north} -0.64	U _{oper} -1.02	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -1.08	SHGC _{all} -0.64	U _{all} -1.08	SHGC _{all} -0.39	U _{all} -1.08	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.08	SHGC _{all} -0.39	U _{all} -1.08	SHGC _{all} -0.49	U _{all} -1.08	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -1.00	SHGC _{all} -0.65	U _{all} -1.00	SHGC _{all} -0.65	U _{all} -1.00	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.00	SHGC _{all} -0.39	U _{all} -1.00	SHGC _{all} -0.34	U _{all} -1.00	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -1.36	SHGC _{all} -0.64	U _{all} -1.36	SHGC _{all} -0.39	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.36	SHGC _{all} -0.39	U _{all} -1.36	SHGC _{all} -0.49	U _{all} -1.36	SHGC _{all} -NR

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.218	R-3.8 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.081	R-13.0
<i>Walls, Above Grade</i>						
Mass	U-0.151 ^a	R-5.7 ci ^a	U-0.104	R-9.5 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.113	R-13.0	U-0.134	R-10.0
Steel Framed	U-0.124	R-13.0	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.089	R-13.0

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.107	R-6.3 ci	U-0.087	R-8.3 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.038	R-30.0	U-0.069	R-13.0
Wood Framed and Other	U-0.051	R-19.0	U-0.033	R-30.0	U-0.066	R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-0.950	R-7.5 for 24 in.	F-0.840	R-10 for 36 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All	Max. U	SHGC (All	Max. U	SHGC (All
	(Fixed/	Orientations/	(Fixed/	Orientations/	(Fixed/	Orientations/
	Operable)	North-Oriented)	Operable)	North-Oriented)	Operable)	North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-0.40-	SHGC-0.40 all	U-0.40-	SHGC-0.40 all	U-1.20-	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-0.50		U-0.50		U-1.20	
Metal framing: entrance door ^d	U-0.85		U-0.85		U-1.20	
Metal framing: all other ^d	U-0.55		U-0.55		U-1.20	
0-10.0%	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} -NR
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} -NR
10.1-20.0%	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.57}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} -NR
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} -NR
20.1-30.0%	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} -NR
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} -NR
30.1-40.0%	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-0.67}	SHGC _{all} ^{-0.39}	U _{fixed} ^{-1.22}	SHGC _{all} -NR
	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-0.67}	SHGC _{north} ^{-0.49}	U _{oper} ^{-1.27}	SHGC _{north} -NR
40.1-50.0%	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.46}	SHGC _{all} ^{-0.25}	U _{fixed} ^{-0.98}	SHGC _{all} -NR
	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.36}	U _{oper} ^{-0.47}	SHGC _{north} ^{-0.36}	U _{oper} ^{-1.02}	SHGC _{north} -NR
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.49}	U _{all} ^{-0.98}	SHGC _{all} ^{-0.36}	U _{all} ^{-1.98}	SHGC _{all} -NR
2.1-5.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.39}	U _{all} ^{-0.98}	SHGC _{all} ^{-0.19}	U _{all} ^{-1.98}	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.65}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.62}	U _{all} ^{-1.90}	SHGC _{all} -NR
2.1-5.0%	U _{all} ^{-1.30}	SHGC _{all} ^{-0.34}	U _{all} ^{-1.30}	SHGC _{all} ^{-0.27}	U _{all} ^{-1.90}	SHGC _{all} -NR

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -0.69	SHGC _{all} -0.49	U _{all} -0.58	SHGC _{all} -0.36	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -0.69	SHGC _{all} -0.39	U _{all} -0.58	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.173	R-5.0 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.053	R-19.0
<i>Walls, Above Grade</i>						
Mass	U-0.123	R-7.6 ci	U-0.090	R-11.4 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.057	R-13.0 + R-13.0	U-0.123	R-11.0
Steel Framed	U-0.08	R-13.0 + R-3.8 ci	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
<i>Floors</i>						
Mass	U-0.087	R-8.3 ci	U-0.074	R-10.4 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.038	R-30.0	U-0.069	R-13.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066	R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-0.840	R-10 for 36 in.	F-0.840	R-10 for 36 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-0.500		U-1.450	

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-0.35-</u>	<u>SHGC-0.40 all</u>	<u>U-0.35-</u>	<u>SHGC-0.40 all</u>	<u>U-1.20-</u>	<u>SHGC-NR all</u>
<u>Metal fr. curtainwall/ storefront^d</u>	<u>U-0.45</u>		<u>U-0.45</u>		<u>U-1.20</u>	
<u>Metal framing: entrance door^d</u>	<u>U-0.80</u>		<u>U-0.80</u>		<u>U-1.20</u>	
<u>Metal framing: all other^d</u>	<u>U-0.55-</u>		<u>U-0.55-</u>		<u>U-1.20-</u>	
0-10.0%	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.49</u>	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.49</u>	<u>U_{fixed}-1.22</u>	<u>SHGC_{all}-NR</u>
	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-1.27</u>	<u>SHGC_{north}-NR</u>
10.1-20.0%	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-1.22</u>	<u>SHGC_{all}-NR</u>
	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-1.27</u>	<u>SHGC_{north}-NR</u>
20.1-30.0%	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-1.22</u>	<u>SHGC_{all}-NR</u>
	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-1.27</u>	<u>SHGC_{north}-NR</u>
30.1-40.0%	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-0.67</u>	<u>SHGC_{all}-0.39</u>	<u>U_{fixed}-1.22</u>	<u>SHGC_{all}-NR</u>
	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-0.67</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-1.27</u>	<u>SHGC_{north}-NR</u>
40.1-50.0%	<u>U_{fixed}-0.46</u>	<u>SHGC_{all}-0.26</u>	<u>U_{fixed}-0.46</u>	<u>SHGC_{all}-0.26</u>	<u>U_{fixed}-0.98</u>	<u>SHGC_{all}-NR</u>
	<u>U_{oper}-0.47</u>	<u>SHGC_{north}-0.36</u>	<u>U_{oper}-0.47</u>	<u>SHGC_{north}-0.49</u>	<u>U_{oper}-1.02</u>	<u>SHGC_{north}-NR</u>
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	<u>U_{all}-1.17</u>	<u>SHGC_{all}-0.49</u>	<u>U_{all}-1.17</u>	<u>SHGC_{all}-0.49</u>	<u>U_{all}-1.98</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-1.17</u>	<u>SHGC_{all}-0.39</u>	<u>U_{all}-1.17</u>	<u>SHGC_{all}-0.39</u>	<u>U_{all}-1.98</u>	<u>SHGC_{all}-NR</u>
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	<u>U_{all}-1.10</u>	<u>SHGC_{all}-0.77</u>	<u>U_{all}-1.10</u>	<u>SHGC_{all}-0.77</u>	<u>U_{all}-1.90</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-1.10</u>	<u>SHGC_{all}-0.62</u>	<u>U_{all}-1.10</u>	<u>SHGC_{all}-0.62</u>	<u>U_{all}-1.90</u>	<u>SHGC_{all}-NR</u>
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	<u>U_{all}-0.69</u>	<u>SHGC_{all}-0.49</u>	<u>U_{all}-0.69</u>	<u>SHGC_{all}-0.49</u>	<u>U_{all}-1.36</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-0.69</u>	<u>SHGC_{all}-0.39</u>	<u>U_{all}-0.69</u>	<u>SHGC_{all}-0.39</u>	<u>U_{all}-1.36</u>	<u>SHGC_{all}-NR</u>

^a—Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.173	R-5.0 ci
Metal Building Attic and Other	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
	U-0.027	R-38.0	U-0.027	R-38.0	U-0.053	R-19.0
<i>Walls, Above Grade</i>						
Mass	U-0.104	R-9.5 ci	U-0.090	R-11.4 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.084	R-13.0 + R-3.8 ci	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.064	R-13.0 + R-3.8 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-1.140	NR	C-0.119	R-7.5 ci	C-1.140	NR
<i>Floors</i>						
Mass	U-0.087	R-8.3 ci	U-0.064	R-12.5 ci	U-0.322	NR
Steel Joist	U-0.038	R-30.0	U-0.038	R-30.0	U-0.069	R-13.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066	R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-0.840	R-10 for 36 in.	F-0.780	R-10 for 48 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)
	(Fixed/ Operable)		(Fixed/ Operable)		(Fixed/ Operable)	
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-0.35-</u>	<u>SHGC-0.40 all</u>	<u>U-0.35</u>	<u>SHGC-0.40 all</u>	<u>U-0.65</u>	<u>SHGC-NR all</u>
<u>Metal fr: curtainwall/ storefront^d</u>			<u>U-0.45</u>		<u>U-0.60</u>	
<u>Metal framing: entrance door^d</u>	<u>U-0.80-</u>		<u>U-0.80-</u>		<u>U-0.90-</u>	
<u>Metal framing: all other^d</u>	<u>U-0.55-</u>		<u>U-0.55-</u>		<u>U-0.65-</u>	
<u>0-10.0%</u>	<u>U_{fixed}^{-0.67}</u>	<u>SHGC_{all}^{-0.40}</u>	<u>U_{fixed}^{-0.67}</u>	<u>SHGC_{all}^{-0.40}</u>	<u>U_{fixed}^{-1.22}</u>	<u>SHGC_{all}^{-NR}</u>
	<u>U_{oper}^{-0.67}</u>	<u>SHGC_{north}^{-0.40}</u>	<u>U_{oper}^{-0.67}</u>	<u>SHGC_{north}^{-0.64}</u>	<u>U_{oper}^{-1.27}</u>	<u>SHGC_{north}^{-NR}</u>

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
10.1-20.0%	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -1.27	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -1.27	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -0.67	SHGC _{all} -0.39	U _{fixed} -1.22	SHGC _{all} -NR
	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -0.67	SHGC _{north} -0.49	U _{oper} -1.27	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -0.46	SHGC _{all} -0.26	U _{fixed} -0.46	SHGC _{all} -0.26	U _{fixed} -0.98	SHGC _{all} -NR
	U _{oper} -0.47	SHGC _{north} -0.49	U _{oper} -0.47	SHGC _{north} -0.49	U _{oper} -1.02	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -1.17	SHGC _{all} -0.49	U _{all} -0.98	SHGC _{all} -0.46	U _{all} -1.98	SHGC _{all} -NR
2.1-5.0%	U _{all} -1.17	SHGC _{all} -0.49	U _{all} -0.98	SHGC _{all} -0.36	U _{all} -1.98	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -0.87	SHGC _{all} -0.71	U _{all} -0.74	SHGC _{all} -0.65	U _{all} -1.90	SHGC _{all} -NR
2.1-5.0%	U _{all} -0.87	SHGC _{all} -0.58	U _{all} -0.74	SHGC _{all} -0.55	U _{all} -1.90	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -0.69	SHGC _{all} -0.49	U _{all} -0.58	SHGC _{all} -0.49	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -0.69	SHGC _{all} -0.49	U _{all} -0.58	SHGC _{all} -0.39	U _{all} -1.36	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.173	R-5.0 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.053	R-19.0
<i>Walls, Above Grade</i>						
Mass	U-0.090	R-11.4 ci	U-0.080	R-13.3 ci	U-0.580	NR
Metal Building	U-0.057	R-13.0 + R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.064	R-13.0 + R-7.5 ci	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.051	R-13.0 + R-7.5 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.119	R-7.5 ci	C-0.119	R-7.5 ci	C-1.140	NR

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Floors</i>						
Mass	U-0.087	R-8.3 ci	U-0.064	R-12.5 ci	U-0.137	R-4.2 ci
Steel Joist	U-0.038	R-30.0	U-0.038	R-30.0	U-0.052	R-19.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066	R-13.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.730	NR	F-0.540	R-10 for 24 in.	F-0.730	NR
Heated	F-0.840	R-10 for 36 in.	F-0.780	R-10 for 48 in.	F-1.020	R-7.5 for 12 in.
<i>Opaque Doors</i>						
Swinging	U-0.700		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)
	(Fixed/ Operable)		(Fixed/ Operable)		(Fixed/ Operable)	
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-0.35-	SHGC-0.45 all	U-0.35	SHGC-NR all	U-0.65	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-0.40		U-0.40		U-0.60	
Metal framing: entrance door ^d	U-0.80		U-0.80		U-0.90	
Metal framing: all other ^d	U-0.45-		U-0.45-		U-0.65-	
0-10.0%	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
10.1-20.0%	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
20.1-30.0%	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
30.1-40.0%	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.67} U _{oper} ^{-0.67}	SHGC _{all} ^{-0.40} SHGC _{north} ^{-0.64}	U _{fixed} ^{-1.22} U _{oper} ^{-1.27}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
40.1-50.0%	U _{fixed} ^{-0.46} U _{oper} ^{-0.47}	SHGC _{all} ^{-0.36} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.46} U _{oper} ^{-0.47}	SHGC _{all} ^{-0.36} SHGC _{north} ^{-0.64}	U _{fixed} ^{-0.98} U _{oper} ^{-1.02}	SHGC _{all} ^{-NR} SHGC _{north} ^{-NR}
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.68}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.64}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-1.17}	SHGC _{all} ^{-0.64}	U _{all} ^{-1.17}	SHGC _{all} ^{-0.64}	U _{all} ^{-1.98}	SHGC _{all} ^{-NR}
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} ^{-0.87}	SHGC _{all} ^{-0.77}	U _{all} ^{-0.61}	SHGC _{all} ^{-0.77}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}
2.1-5.0%	U _{all} ^{-0.87}	SHGC _{all} ^{-0.71}	U _{all} ^{-0.61}	SHGC _{all} ^{-0.77}	U _{all} ^{-1.90}	SHGC _{all} ^{-NR}

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -0.69	SHGC _{all} -0.68	U _{all} -0.69	SHGC _{all} -0.64	U _{all} -1.36	SHGC _{all} -NR
2.1-5.0%	U _{all} -0.69	SHGC _{all} -0.64	U _{all} -0.69	SHGC _{all} -0.64	U _{all} -1.36	SHGC _{all} -NR

⊆ Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

⊆ Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.048	R-20.0 ci	U-0.048	R-20.0 ci	U-0.093	R-10.0 ci
Metal Building	U-0.049	R-13.0 + R-19.0	U-0.049	R-13.0 + R-19.0	U-0.072	R-16.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.034	R-30.0
<i>Walls, Above Grade</i>						
Mass	U-0.080	R-13.3 ci	U-0.071	R-15.2 ci	U-0.151 ^a	R-5.7 ci ^a
Metal Building	U-0.057	R-13.0 + R-13.0	U-0.057	R-13.0 + R-13.0	U-0.113	R-13.0
Steel Framed	U-0.064	R-13.0 + R-7.5 ci	U-0.055	R-13.0 + R-10.0 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.051	R-13.0 + R-7.5 ci	U-0.051	R-13.0 + R-7.5 ci	U-0.089	R-13.0
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.119	R-7.5 ci	C-0.119	R-7.5 ci	C-1.140	NR
<i>Floors</i>						
Mass	U-0.064	R-12.5 ci	U-0.057	R-14.6 ci	U-0.137	R-4.2 ci
Steel Joist	U-0.038	R-30.0	U-0.032	R-38.0	U-0.052	R-19.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.051	R-19.0
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.540	R-10 for 24 in.	F-0.520	R-15 for 24 in.	F-0.730	NR
Heated	F-0.780	R-10 for 48 in.	F-0.780	R-10 for 48 in.	F-0.950	R-7.5 for 24 in.
<i>Opaque Doors</i>						
Swinging	U-0.500		U-0.500		U-0.700	
Non-Swinging	U-0.500		U-0.500		U-1.450	

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8 (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-0.35</u>	<u>SHGC-0.45 all</u>	<u>U-0.35</u>	<u>SHGC-NR all</u>	<u>U-0.65</u>	<u>SHGC-NR all</u>
<u>Metal fr: curtainwall/ storefront^d</u>	<u>U-0.40-</u>		<u>U-0.40</u>		<u>U-0.60</u>	
<u>Metal framing: entrance door^d</u>	<u>U-0.80-</u>		<u>U-0.80-</u>		<u>U-0.90-</u>	
<u>Metal framing: all other^d</u>	<u>U-0.45-</u>		<u>U-0.45-</u>		<u>U-0.65-</u>	
0-10.0%	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-1.22</u> <u>U_{oper}-1.27</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>
10.1-20.0%	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-1.22</u> <u>U_{oper}-1.27</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>
20.1-30.0%	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-1.22</u> <u>U_{oper}-1.27</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>
30.1-40.0%	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.46</u> <u>U_{oper}-0.47</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-1.22</u> <u>U_{oper}-1.27</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>
40.1-50.0%	<u>U_{fixed}-0.36</u> <u>U_{oper}-0.39</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.36</u> <u>U_{oper}-0.39</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>	<u>U_{fixed}-0.98</u> <u>U_{oper}-1.02</u>	<u>SHGC_{all}-NR</u> <u>SHGC_{north}-NR</u>
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	<u>U_{all}-0.98</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.98</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-1.30</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-0.98</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.98</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-1.30</u>	<u>SHGC_{all}-NR</u>
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	<u>U_{all}-0.61</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.61</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-1.10</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-0.61</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.61</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-1.10</u>	<u>SHGC_{all}-NR</u>
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	<u>U_{all}-0.58</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.58</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.81</u>	<u>SHGC_{all}-NR</u>
2.1-5.0%	<u>U_{all}-0.58</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.58</u>	<u>SHGC_{all}-NR</u>	<u>U_{all}-0.81</u>	<u>SHGC_{all}-NR</u>

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

Revise Tables 5.5-1 to 5.5-8 as follows (SI version).

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-7.280	NR
Metal Building Attic and Other	U-0.369	R-3.3	U-0.369	R-3.3	U-7.268	NR
	U-0.192	R-5.3	U-0.153	R-6.7	U-3.483	NR
<i>Walls, Above Grade</i>						
Mass	U-3.293	NR	U-0.857 ^a	R-1.0 ci ^a	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-6.700	NR
Steel Framed	U-0.705	R-2.3	U-0.705	R-2.3	U-1.998	NR
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-1.660	NR
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-1.825	NR	U-1.825	NR	U-1.825	NR
Steel Joist	U-1.986	NR	U-1.986	NR	U-1.986	NR
Wood Framed and Other	U-1.599	NR	U-1.599	NR	U-1.599	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-8.233		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations)	Max. U	SHGC (All Orientations)	Max. U	SHGC (All Orientations)
	(Fixed/Operable)	(Fixed/Operable)	(Fixed/Operable)	(Fixed/Operable)	(Fixed/Operable)	(Fixed/Operable)
		North-Oriented)	North-Oriented)	North-Oriented)	North-Oriented)	North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-6.81</u>	<u>SHGC-0.25 all</u>	<u>U-6.81</u>	<u>SHGC-0.25 all</u>	<u>U-6.81</u>	<u>SHGC-NR all</u>
<u>Metal fr: curtainwall/ storefront^d</u>	<u>U-6.81</u>		<u>U-6.81</u>		<u>U-6.81</u>	
<u>Metal framing: entrance door^d</u>	<u>U-6.81</u>		<u>U-6.81</u>		<u>U-6.81</u>	
<u>Metal framing: all other^d</u>	<u>U-6.81</u>		<u>U-6.81</u>		<u>U-6.81</u>	

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
0-10.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.44	U _{oper} -7.24	SHGC _{north} -0.44	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -6.93	SHGC _{all} -0.19	U _{fixed} -6.93	SHGC _{all} -0.19	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.33	U _{oper} -7.24	SHGC _{north} -0.33	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -11.24	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -0.16	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -10.79	SHGC _{all} -0.34	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -7.72	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-1.240	R-0.7 ci
Metal Building Attic and Other	U-0.369	R-3.3	U-0.369	R-3.3	U-0.948	R-1.1
	U-0.192	R-5.3	U-0.153	R-6.7	U-0.459	R-2.3
<i>Walls, Above Grade</i>						
Mass	U-3.293	NR	U-0.857 ^a	R-1.0 ci ^a	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-1.045	R-1.1
Steel Framed	U-0.705	R-2.3	U-0.705	R-2.3	U-1.998	NR
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-1.660	NR

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A,B) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.780	R-0.7 ci	U-0.606	R-1.1 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.296	R-3.3	U-1.986	NR
Wood Framed and Other	U-0.288	R-3.3	U-0.288	R-3.3	U-1.599	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-8.233		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-4.26	SHGC-0.25 all	U-4.26	SHGC-0.25 all	U-6.81	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-3.97		U-3.97		U-6.81	
Metal framing: entrance door ^d	U-6.25		U-6.25		U-6.81	
Metal framing: all other ^d	U-4.26		U-4.26		U-6.81	
0-10.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.30	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -0.25	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -6.93	SHGC _{all} -0.17	U _{fixed} -6.93	SHGC _{all} -0.17	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.44	U _{oper} -7.24	SHGC _{north} -0.43	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -11.24	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR

TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -10.79	SHGC _{all} -0.39	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -10.79	SHGC _{all} -0.34	U _{all} -10.79	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -7.72	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-1.240	R-0.7 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.192	R-5.3	U-0.153	R-6.7	U-0.459	R-2.3
<i>Walls, Above Grade</i>						
Mass	U-0.857 ^{a, b}	R-1.0 ci ^{a, b}	U-0.701	R-1.3 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-1.045	R-1.1
Steel Framed	U-0.705	R-2.3	U-0.479	R-2.3 + R-0.7 ci	U-1.998	NR
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.606	R-1.1 ci	U-0.496	R-1.5 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.296	R-3.3	U-0.390	R-2.3
Wood Framed and Other	U-0.288	R-3.3	U-0.188	R-5.3	U-1.599	NR
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm	F-1.766	R-1.3 for 300 mm

TABLE 5.5-3 Building Envelope Requirements For Climate Zone 3 (A,B,C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-2.839		U-8.233	
Fenestration (for Zones 3A and 3B; see next page for Zone 3C)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)	Assembly Max. U (Fixed/ Operable)	Assembly Max. SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, % of Wall</i>						
<u>Nonmetal framing: all^c</u>	U-3.69	SHGC-0.25 all	U-3.69	SHGC-0.25 all	U-6.81	SHGC-NR all
<u>Metal fr: curtainwall/ storefront^d</u>	U-3.41		U-3.41		U-6.81	
<u>Metal framing: entrance door^d</u>	U-5.11		U-5.11		U-6.81	
<u>Metal framing: all other^d</u>	U-3.69		U-3.69		U-6.81	
0-10.0%	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.39 SHGC _{north} -0.49	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.39 SHGC _{north} -0.49	U _{fixed} -6.03 U _{oper} -7.24	SHGC _{all} -NR SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.25 SHGC _{north} -0.49	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.39 SHGC _{north} -0.49	U _{fixed} -6.03 U _{oper} -7.24	SHGC _{all} -NR SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.25 SHGC _{north} -0.39	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.25 SHGC _{north} -0.39	U _{fixed} -6.03 U _{oper} -7.24	SHGC _{all} -NR SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.25 SHGC _{north} -0.39	U _{fixed} -3.24 U _{oper} -3.80	SHGC _{all} -0.25 SHGC _{north} -0.39	U _{fixed} -6.03 U _{oper} -7.24	SHGC _{all} -NR SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.64 U _{oper} -2.67	SHGC _{all} -0.19 SHGC _{north} -0.26	U _{fixed} -2.64 U _{oper} -2.67	SHGC _{all} -0.19 SHGC _{north} -0.26	U _{fixed} -5.54 U _{oper} -5.77	SHGC _{all} -NR SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -6.64	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.19	U _{all} -6.64	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -7.38	SHGC _{all} -0.65	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.38	SHGC _{all} -0.34	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.92	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.19	U _{all} -3.92	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^b Insulation is not required for non-residential mass walls in Climate Zone 3A located below the "Warm-Humid" line, and in Zone 3B.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-3 (continued) Building Fenestration Requirements For Climate Zone 3C

Fenestration- (for Zone 3C)	Nonresidential		Residential		Semiheated	
	Assembly	Assembly-Max.	Assembly	Assembly-Max.	Assembly	Assembly-Max.
	Max.-U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max.-U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max.-U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing,% of Wall</i>						
0-10.0%	U _{fixed} -6.93	SHGC _{all} -0.64	U _{fixed} -6.93	SHGC _{all} -0.64	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.82	U _{oper} -7.24	SHGC _{north} -0.82	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -6.93	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -0.64	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -6.93	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -6.93	SHGC _{all} -0.34	U _{fixed} -6.93	SHGC _{all} -0.34	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -6.93	SHGC _{all} -0.29	U _{fixed} -4.14	SHGC _{all} -0.25	U _{fixed} -5.64	SHGC _{all} -NR
	U _{oper} -7.24	SHGC _{north} -0.39	U _{oper} -4.60	SHGC _{north} -0.64	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass,% of Roof</i>						
0-2.0%	U _{all} -11.24	SHGC _{all} -0.64	U _{all} -11.24	SHGC _{all} -0.39	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -11.24	SHGC _{all} -0.39	U _{all} -11.24	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic,% of Roof</i>						
0-2.0%	U _{all} -10.79	SHGC _{all} -0.65	U _{all} -10.79	SHGC _{all} -0.65	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -10.79	SHGC _{all} -0.39	U _{all} -10.79	SHGC _{all} -0.34	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All,% of Roof</i>						
0-2.0%	U _{all} -7.72	SHGC _{all} -0.64	U _{all} -7.72	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.72	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-1.240	R-0.7 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.192	R-5.3	U-0.153	R-6.7	U-0.459	R-2.3
<i>Walls, Above Grade</i>						
Mass	U-0.857 ^a	R-1.0 ci ^a	U-0.592	R-1.7 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.642	R-2.3	U-0.761	R-1.8
Steel Framed	U-0.705	R-2.3	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-0.504	R-2.3

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C) (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.606	R-1.1 ci	U-0.496	R-1.5 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.214	R-5.3	U-0.390	R-2.3
Wood Framed and Other	U-0.288	R-3.3	U-0.188	R-5.3	U-0.376	R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.644	R-1.3 for 600 mm	F-1.454	R-1.8 for 900 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-2.839		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^c	U-2.27	SHGC-0.40 all	U-2.27	SHGC-0.40 all	U-6.81	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-2.84		U-2.84		U-6.81	
Metal framing: entrance door ^d	U-4.83		U-4.83		U-6.81	
Metal framing: all other ^d	U-3.12		U-3.12		U-6.81	
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.64	SHGC _{all} -0.25	U _{fixed} -2.64	SHGC _{all} -0.25	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -5.56	SHGC _{all} -0.19	U _{all} -11.24	SHGC _{all} -NR

TABLE 5.5-4 Building Envelope Requirements For Climate Zone 4 (A,B,C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -7.38	SHGC _{all} -0.65	U _{all} -7.38	SHGC _{all} -0.62	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -7.38	SHGC _{all} -0.34	U _{all} -7.38	SHGC _{all} -0.27	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.36	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.29	SHGC _{all} -0.19	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-0.982	R-0.9 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.192	R-5.3	U-0.153	R-6.7	U-0.300	R-3.3
<i>Walls, Above Grade</i>						
Mass	U-0.701	R-1.3 ci	U-0.513	R-2.0 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.324	R-2.3 + R-2.3	U-0.698	R-1.9
Steel Framed	U-0.479	R-2.3 + R-0.7 ci	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
⁷ Wood Framed and Other	U-0.504	R-2.3	U-0.504	R-2.3	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-6.473	NR	C-6.473	NR
<i>Floors</i>						
Mass	U-0.496	R-1.5 ci	U-0.420	R-1.8 ci	U-1.825	NR
Steel Joist	U-0.296	R-3.3	U-0.214	R-5.3	U-0.390	R-2.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376	R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.454	R-1.8 for 900 mm	F-1.454	R-1.8 for 900 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-3.975		U-3.975	
Non-Swinging	U-8.233		U-2.839		U-8.233	

TABLE 5.5-5 Building Envelope Requirements For Climate Zone 5 (A,B,C) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-1.99</u>	<u>SHGC-0.40 all</u>	<u>U-1.99</u>	<u>SHGC-0.40 all</u>	<u>U-6.81</u>	<u>SHGC-NR all</u>
<u>Metal fr: curtainwall/ storefront^d</u>	<u>U-2.56</u>		<u>U-2.56</u>		<u>U-6.81</u>	
<u>Metal framing: entrance door^d</u>	<u>U-4.54</u>		<u>U-4.54</u>		<u>U-6.81</u>	
<u>Metal framing: all other^d</u>	<u>U-3.12</u>		<u>U-3.12</u>		<u>U-6.81</u>	
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.93	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.64	SHGC _{all} -0.26	U _{fixed} -2.64	SHGC _{all} -0.26	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.36	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -6.64	SHGC _{all} -0.39	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -6.25	SHGC _{all} -0.77	U _{all} -6.25	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.25	SHGC _{all} -0.62	U _{all} -6.25	SHGC _{all} -0.62	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -3.92	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-0.982	R-0.9 ci
Metal Building Attic and Other	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
	U-0.153	R-6.7	U-0.153	R-6.7	U-0.300	R-3.3
<i>Walls, Above Grade</i>						
Mass	U-0.592	R-1.7 ci	U-0.513	R-2.0 ci	U-3.293	NR
Metal Building	U-0.642	R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.479	R-2.3 + R-0.7 ci	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
Wood Framed and Other	U-0.504	R-2.3	U-0.365	R-2.3 + R-0.7 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-6.473	NR	C-0.678	R-1.3 ci	C-6.473	NR
<i>Floors</i>						
Mass	U-0.496	R-1.5 ci	U-0.363	R-2.2 ci	U-1.825	NR
Steel Joist	U-0.214	R-5.3	U-0.214	R-5.3	U-0.390	R-2.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376	R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-1.264	NR	F-1.264	NR
Heated	F-1.454	R-1.8 for 900 mm	F-1.350	R-1.8 for 1200 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)	Max. U	SHGC (All Orientations/ North-Oriented)
	(Fixed/ Operable)		(Fixed/ Operable)		(Fixed/ Operable)	
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	<u>U-1.99</u>	<u>SHGC-0.40 all</u>	<u>U-1.99</u>	<u>SHGC-0.40 all</u>	<u>U-3.69</u>	<u>SHGC-NR all</u>
<u>Metal fr. curtainwall/ storefront^d</u>	<u>U-2.56</u>		<u>U-2.56</u>		<u>U-3.41</u>	
<u>Metal framing: entrance door^d</u>	<u>U-4.54</u>		<u>U-4.54</u>		<u>U-5.11</u>	
<u>Metal framing: all other^d</u>	<u>U-3.12</u>		<u>U-3.12</u>		<u>U-3.69</u>	
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.40	U _{fixed} -3.24	SHGC _{all} -0.40	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.40	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR

TABLE 5.5-6 Building Envelope Requirements For Climate Zone 6 (A,B) (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -3.24	SHGC _{all} -0.39	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -3.80	SHGC _{north} -0.49	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.64	SHGC _{all} -0.26	U _{fixed} -2.64	SHGC _{all} -0.26	U _{fixed} -5.64	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -2.67	SHGC _{north} -0.49	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.46	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.49	U _{all} -5.56	SHGC _{all} -0.36	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -4.94	SHGC _{all} -0.71	U _{all} -4.20	SHGC _{all} -0.65	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -4.94	SHGC _{all} -0.58	U _{all} -4.20	SHGC _{all} -0.55	U _{all} -10.79	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.49	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.49	U _{all} -3.29	SHGC _{all} -0.39	U _{all} -7.72	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.360	R-2.6 ci	U-0.360	R-2.6 ci	U-0.982	R-0.9 ci
Metal Building	U-0.369	R-3.3	U-0.369	R-3.3	U-0.551	R-1.8
Attic and Other	U-0.153	R-6.7	U-0.153	R-6.7	U-0.300	R-3.3
<i>Walls, Above Grade</i>						
Mass	U-0.513	R-2.0 ci	U-0.453	R-2.3 ci	U-3.293	NR
Metal Building	U-0.324	R-2.3 + R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.365	R-2.3 + R-1.3 ci	U-0.365	R-2.3 + R-1.3 ci	U-0.705	R-2.3
Wood Framed and Other	U-0.504	R-2.3	U-0.291	R-2.3 + R-1.3 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.678	R-1.3 ci	C-0.678	R-1.3 ci	C-6.473	NR

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly	Insulation Min.	Assembly	Insulation Min.	Assembly	Insulation Min.
	Maximum	R-Value	Maximum	R-Value	Maximum	R-Value
<i>Floors</i>						
Mass	U-0.496	R-1.5 ci	U-0.363	R-2.2 ci	U-0.780	R-0.7 ci
Steel Joist	U-0.214	R-5.3	U-0.214	R-5.3	U-0.296	R-3.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.376	R-2.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-1.264	NR	F-0.935	R-1.8 for 600 mm	F-1.264	NR
Heated	F-1.454	R-1.8 for 900 mm	F-1.350	R-1.8 for 1200 mm	F-1.766	R-1.3 for 300 mm
<i>Opaque Doors</i>						
Swinging	U-3.975		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233	
Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
Nonmetal framing: all ^e	U-1.99	SHGC-0.45 all	U-1.99	SHGC-NR all	U-3.69	SHGC-NR all
Metal fr: curtainwall/ storefront ^d	U-2.27		U-2.27		U-3.41	
Metal framing: entrance door ^d	U-4.54		U-4.54		U-5.11	
Metal framing: all other ^d	U-2.56		U-2.56		U-3.69	
0-10.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -3.24	SHGC _{all} -0.49	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -3.80	SHGC _{north} -0.64	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -2.64	SHGC _{all} -0.36	U _{fixed} -2.64	SHGC _{all} -0.36	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -0.64	U _{oper} -2.67	SHGC _{north} -0.64	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -6.64	SHGC _{all} -0.68	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -11.24	SHGC _{all} -NR
2.1-5.0%	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -6.64	SHGC _{all} -0.64	U _{all} -11.24	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -4.94	SHGC _{all} -0.77	U _{all} -3.46	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR
2.1-5.0%	U _{all} -4.94	SHGC _{all} -0.71	U _{all} -3.46	SHGC _{all} -0.77	U _{all} -10.79	SHGC _{all} -NR

TABLE 5.5-7 Building Envelope Requirements For Climate Zone 7 (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.92	SHGC _{all} -0.68	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -7.72	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -3.92	SHGC _{all} -0.64	U _{all} -7.72	SHGC _{all} -NR

ε Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.273	R-3.5 ci	U-0.273	R-3.5 ci	U-0.527	R-1.8 ci
Metal Building	U-0.278	R-2.3 + R-3.3	U-0.278	R-2.3 + R-3.3	U-0.409	R-2.8
Attic and Other	U-0.153	R-6.7	U-0.153	R-6.7	U-0.192	R-5.3
<i>Walls, Above Grade</i>						
Mass	U-0.453	R-2.3 ci	U-0.404	R-2.7 ci	U-0.857 ^a	R-1.0 ci ^a
Metal Building	U-0.324	R-2.3 + R-2.3	U-0.324	R-2.3 + R-2.3	U-0.642	R-2.3
Steel Framed	U-0.365	R-2.3 + R-1.3 ci	U-0.315	R-2.3 + R-1.8 ci	U-0.705	R-2.3
Wood Framed and Other	U-0.291	R-2.3 + R-1.3 ci	U-0.291	R-2.3 + R-1.3 ci	U-0.504	R-2.3
<i>Wall, Below Grade</i>						
Below Grade Wall	C-0.678	R-1.3 ci	C-0.678	R-1.3 ci	C-6.473	NR
<i>Floors</i>						
Mass	U-0.363	R-2.2 ci	U-0.321	R-2.6 ci	U-0.780	R-0.7 ci
Steel Joist	U-0.214	R-5.3	U-0.183	R-6.7	U-0.296	R-3.3
Wood Framed and Other	U-0.188	R-5.3	U-0.188	R-5.3	U-0.288	R-3.3
<i>Slab-On-Grade Floors</i>						
Unheated	F-0.935	R-1.8 for 600 mm	F-0.900	R-2.6 for 600 mm	F-1.264	NR
Heated	F-1.350	R-1.8 for 1200 mm	F-1.350	R-1.8 for 1200 mm	F-1.644	R-1.3 for 600 mm
<i>Opaque Doors</i>						
Swinging	U-2.839		U-2.839		U-3.975	
Non-Swinging	U-2.839		U-2.839		U-8.233	

TABLE 5.5-8 Building Envelope Requirements For Climate Zone 8 (Continued)

Fenestration	Assembly	Assembly Max.	Assembly	Assembly Max.	Assembly	Assembly Max.
	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)	Max. U (Fixed/ Operable)	SHGC (All Orientations/ North-Oriented)
<i>Vertical Glazing, 0-40% of Wall</i>						
<u>Nonmetal framing: all^c</u>	U-1.99	SHGC-0.45 all	U-1.99	SHGC-NR all	U-3.69	SHGC-NR all
<u>Metal fr. curtainwall/ storefront^d</u>	U-2.27		U-2.27		U-3.41	
<u>Metal framing: entrance door^d</u>	U-4.54		U-4.54		U-5.11	
<u>Metal framing: all other^d</u>	U-2.56		U-2.56		U-3.69	
0-10.0%	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -7.24	SHGC _{north} -NR
10.1-20.0%	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -7.24	SHGC _{north} -NR
20.1-30.0%	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -7.24	SHGC _{north} -NR
30.1-40.0%	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -2.64	SHGC _{all} -NR	U _{fixed} -6.03	SHGC _{all} -NR
	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -2.67	SHGC _{north} -NR	U _{oper} -7.24	SHGC _{north} -NR
40.1-50.0%	U _{fixed} -1.99	SHGC _{all} -NR	U _{fixed} -1.99	SHGC _{all} -NR	U _{fixed} -5.54	SHGC _{all} -NR
	U _{oper} -2.24	SHGC _{north} -NR	U _{oper} -2.24	SHGC _{north} -NR	U _{oper} -5.77	SHGC _{north} -NR
<i>Skylight with Curb, Glass, % of Roof</i>						
0-2.0%	U _{all} -5.56	SHGC _{all} -NR	U _{all} -5.56	SHGC _{all} -NR	U _{all} -7.38	SHGC _{all} -NR
2.1-5.0%	U _{all} -5.56	SHGC _{all} -NR	U _{all} -5.56	SHGC _{all} -NR	U _{all} -7.38	SHGC _{all} -NR
<i>Skylight with Curb, Plastic, % of Roof</i>						
0-2.0%	U _{all} -3.46	SHGC _{all} -NR	U _{all} -3.46	SHGC _{all} -NR	U _{all} -6.25	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.46	SHGC _{all} -NR	U _{all} -3.46	SHGC _{all} -NR	U _{all} -6.25	SHGC _{all} -NR
<i>Skylight without Curb, All, % of Roof</i>						
0-2.0%	U _{all} -3.29	SHGC _{all} -NR	U _{all} -3.29	SHGC _{all} -NR	U _{all} -4.60	SHGC _{all} -NR
2.1-5.0%	U _{all} -3.29	SHGC _{all} -NR	U _{all} -3.29	SHGC _{all} -NR	U _{all} -4.60	SHGC _{all} -NR

^a Exception to A3.1.3.1 applies.

^c Nonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^d Metal framing includes metal framing with or without thermal break. The all other subcategory includes operable windows, fixed windows, and non-entrance doors.

Section 3.2, revise definition as follows:

orientation: the direction an envelope element faces, i.e., the direction of a vector perpendicular to and pointing away from the surface outside of the element. For vertical fenestration, the two categories are north-oriented and all other. (See north-oriented.)

Section 5.2.1, revise as follows:

5.2.1 Compliance. For the appropriate climate, space-conditioning category, and class of construction, the building envelope shall comply with 5.1, General; 5.4, Mandatory Pro-

visions; 5.7, Submittals; and 5.8, Product Information and Installation Requirements; and either

- a. 5.5, Prescriptive Building Envelope Option, provided that
 1. the vertical fenestration area does not exceed 50% 40% of the gross wall area for each space-conditioning category and
 2. the skylight fenestration area does not exceed 5% of the gross roof area for each space-conditioning category,

or

- b. 5.6, Building Envelope Trade-Off Option.

Section 5.5.4.3, revise as follows:

5.5.4.3 Fenestration U-Factor. *Fenestration* shall have a *U-factor* not greater than that specified in Tables 5.5-1 through 5.5-8 for the appropriate *fenestration area*.

Exception to 5.5.4.3: *Vertical fenestration* complying with Exception (c) to 5.5.4.4.1 shall have a *U-factor* not greater than that specified for 40% of the *gross wall area*.

Section 5.5.4.2, revise as follows:

5.5.4.2 Fenestration Area

5.5.4.2.1 Vertical Fenestration Area. The total *vertical fenestration area* shall be less than ~~50%~~ 40% of the *gross wall area*.

Exception to 5.5.4.2.1: *Vertical fenestration* complying with Exception (e) (b) to 5.5.4.4.1.

Section 5.5.4.4, revise as follows:

5.5.4.4 Fenestration Solar Heat Gain Coefficient (SHGC).

5.5.4.4.1 SHGC of Vertical Fenestration. *Vertical fenestration* shall have a *SHGC* not greater than that specified for “all” orientations in Tables 5.5-1 through 5.5-8 for the appropriate total *vertical fenestration area*.

Exceptions to 5.5.4.4.1:

Exceptions to 5.5.4.4.1:

- a. ~~In latitudes greater than 10 degrees, the *SHGC* for north-oriented vertical fenestration shall be calculated separately and shall not be greater than that specified in Tables 5.5-1 through 5.5-8 for north-oriented fenestration. When this exception is used, the *fenestration area* used in selecting the criteria shall be calculated separately for north-oriented and all other oriented fenestration.~~

~~Note to adopting authority: If the project is in the southern hemisphere, change north to south.~~

- a. ~~(b)~~ For demonstrating compliance for *vertical fenestration* only, the *SHGC* in the proposed building shall be reduced by using the multipliers in Table 5.5.4.4.1 for each *fenestration* product shaded by permanent projections that will last as long as the building itself.
- b. ~~(c)~~ *Vertical fenestration* that is located on the street side of the street-level story only, provided that:
 1. the street side of the street-level story does not exceed 20 ft in height,
 2. the *fenestration* has a continuous overhang with a weighted average *projection factor* greater than 0.5, and
 3. the *fenestration area* for the street side of the street-level story is less than 75% of the *gross wall area* for the street side of the street-level story.

When this exception is utilized, separate calculations shall be performed for these sections of the building envelope, and these values shall not be averaged with any others for compliance purposes. No credit shall be given here or elsewhere in the building for not fully utilizing the fenestration area allowed.

**TABLE 5.5.4.4.1
SHGC Multipliers for Permanent Projections**

Projection Factor	SHGC Multiplier (All Other Orientations)	SHGC Multiplier (North-Oriented)
0-0.10	1.00	1.00
>0.10-0.20	0.91	0.95
>0.20-0.30	0.82	0.91
>0.30-0.40	0.74	0.87
>0.40-0.50	0.67	0.84
>0.50-0.60	0.61	0.81
>0.60-0.70	0.56	0.78
>0.70-0.80	0.51	0.76
>0.80-0.90	0.47	0.75
>0.90-1.00	0.44	0.73

5.5.4.4.2 SHGC of Skylights. *Skylights* shall have an *SHGC* not greater than that specified for “all” orientations in Tables 5.5-1 through 5.5-8 for the appropriate total *skylight area*.

Section C3.5, revise as follows:

C3.5 The *U-factor* for *fenestration* in the base envelope design shall be equal to the criteria from Tables 5.5-1 through 5.5-8 for the appropriate climate. The *solar heat gain coefficient (SHGC)* for *fenestration* in the base envelope design shall be equal to the criteria from Tables 5.5-1 through 5.5-7 for Table 5.5-8. For portions of those tables where there are no requirements, the *SHGC* shall be equal to 0.64 for north-oriented and 0.46 for all other *vertical fenestration*, 0.77 for plastic *skylights* on a curb, and 0.72 for all other *skylights* with a curb and without. The visible light transmittance (VLT) for *fenestration* in the base envelope design shall be the VLT factor from Table C3.5 times the *SHGC* criteria as determined in this subsection.

Table G3. Building Envelope, Section 6, Baseline Building Performance, revise as follows:

Equivalent dimensions shall be assumed for each exterior envelope component type as in the *proposed design*; i.e., the total gross area of exterior walls shall be the same in the *proposed* and *baseline building designs*. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on grade shall also be the same in the *proposed* and *baseline building designs*. The following additional requirements shall apply to the modeling of the *baseline building design*:

(a) Orientation. The *baseline building performance* shall be generated by simulating the building with its actual orientation and again after rotating the entire building 90, 180, 270 degrees, then averaging the results. The building shall be modeled so that it does not shade itself.

(b) Opaque assemblies. Opaque assemblies used for new buildings or

Additions shall conform with the following common, lightweight assembly types and shall match the appropriate assembly maximum U-factors in Tables 5.5-1 through 5.5-8:

- Roofs – Insulation entirely above deck
- *Above-grade walls*– Steel-framed
- Floors – Steel-joist
- Opaque door types shall match the proposed design and conform to the U-factor requirements from the same tables.
- Slab-on-grade floors shall match the F-factor for unheated slabs from the same tables.

Opaque assemblies used for *alterations* shall conform with 5.1.3.

(c) Vertical Fenestration. Vertical fenestration areas for new buildings and *additions* shall equal that in the *proposed design* or 40% of gross above-grade wall area, whichever is smaller, and shall be distributed uniformly in horizontal bands across the four orientations. Fenestration U-factors shall match the appropriate requirements in Tables 5.5-1 through 5.5-8 ~~for the applicable vertical glazing percentage for U_{fixed}~~. Fenestration solar heat gain coefficient (SHGC) shall match the appropriate requirements in Tables 5.5-1 through 5.5-8 ~~using the value for SHGC_{all} for the applicable~~

~~vertical glazing percentage~~. All vertical glazing shall be modeled as fixed and shall be assumed to be flush with the exterior wall, and no shading projections shall be modeled. Manual window shading devices such as blinds or shades shall not be modeled. The fenestration areas for envelope *alterations* shall reflect the limitations on area, U-factor, and SHGC as described in 5.1.3.

(d) Skylights and Glazed Smoke Vents. Skylight area shall be equal to that in the proposed building design or 5% of the gross roof area that is part of the *building envelope*, whichever is smaller. If the skylight area of the proposed building design is greater than 5% of the gross roof area, baseline skylight area shall be decreased by an identical percentage in all roof components in which skylights are located to reach the 5% skylight-to-roof ratio. Skylight orientation and tilt shall be the same as in the proposed building design. Skylight U-factor and SHGC properties shall match the appropriate requirements in Tables 5.5-1 through 5.5-8.

(e) Roof albedo. All roof surfaces shall be modeled with a reflectivity of 0.30.

(f) Existing Buildings. For existing *building envelopes*, the *baseline building design* shall reflect existing conditions prior to any revisions that are part of the scope of work being evaluated.

**POLICY STATEMENT DEFINING ASHRAE'S CONCERN
FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES**

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.