

Public Review Draft

Proposed Addendum bk to Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

First Public Review (March 2020)
(Draft Shows Proposed Changes to Current Standard)

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(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 addendum updates the envelope criteria in Informative Appendix E based on changes to fenestration requirements in ANSI/ASHRAE/IES Standard 90.1-2019. For vertical fenestration and skylights, Section 7.4.2.1 of this standard specifies that the requirements in Tables 5.5-0 through 5.5-8 of ANSI/ASHRAE/IES Standard 90.1 be modified by reducing the U-factor by 5%. Additionally, for skylights and east- and west-oriented vertical fenestration, each solar heat gain coefficient (SHGC) in Tables 5.5-0 through 5.5-8 shall be reduced by 5% except where the SHGC requirement is designated as “NR” (no requirement). The tables in Informative Appendix E list the updated calculated values for fenestration under the new criteria. There are no changes to the opaque envelope requirements.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum bk to 189.1-2017

Revise Tables E-0 through E-8 as follows. Portions of tables not shown are unchanged.

INFORMATIVE APPENDIX E BUILDING ENVELOPE TABLES

The first nine tables are in I-P units, followed by nine tables in SI units. U-factors, C-factors, F-factors, and *SHGC* in these tables meet the requirements of Section 7.4.2.1, although the R-values in most cases provide more insulation than is required in Section 7.4.2.1. These R-values represent common assemblies in building construction. Assemblies with lower R- values are allowed to be used the meet the criteria of Section 7.4.2.1 when they meet the appropriate U-factor, C-factor, or F-factor criteria.

Table E-0 (Supersedes Table 5.5-0 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements For Climate Zone 0 (A,B)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.30	E&W-0.21, N&S-0.22	1.10 (for all types)	0.30	E&W-0.21, N&S-0.22	1.10 (for all types)	0.88	NR (for all types)	NR (for all types)
Metal framing, fixed	0.48	E&W-0.21, N&S-0.22		0.48	E&W-0.21, N&S-0.22		1.14		
Metal framing, operable	0.62 0.59	E&W-0.19, N&S-0.20		0.62 0.59	E&W-0.19, N&S-0.20		1.14		
Metal framing, entrance door	0.79	E&W-0.19, N&S-0.20		0.79	E&W-0.19, N&S-0.20		1.05		
Skylight, 0% to 3% of Roof									
All types	0.74 0.67	0.33 0.29	NR	0.74 0.67	0.33 0.29	NR	1.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-1 (Supersedes Table 5.5-1 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 1 (A,B)* (I-P)

Fenestration	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.48	E&W-0.24, S-0.25, N-0.35	1.10 (for all types)	0.48	E&W-0.24, S-0.25, N-0.35	1.10 (for all types)	0.88	NR (for all types)	NR (for all types)
Metal framing, fixed	0.54 0.48	E&W-0.22, N&S-0.23		0.54 0.48	E&W-0.22, N&S-0.23		1.14		
Metal framing, operable	0.62 0.59	E&W-0.20, N&S-0.21		0.62 0.59	E&W-0.20, N&S-0.21		1.14		
Metal framing, entrance door	1.05 0.79	E&W-0.20, N&S-0.21		1.05 0.79	E&W-0.20, N&S-0.21		1.05		
Skylight, 0% to 3% of Roof									
All types	0.74 0.67	0.33 0.29	NR	0.74 0.67	0.33 0.29	NR	1.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-2 (Supersedes Table 5.5-2 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 2 (A,B)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.35	E&W-0.24, S-0.25, N-0.35		0.35	E&W-0.24, S-0.25, N-0.35		0.88		
Metal framing, fixed	0.54 <u>0.43</u>	E&W-0.24, N&S-0.25	1.10 (for all types)	0.54 <u>0.43</u>	E&W-0.24, N&S-0.25	1.10 (for all types)	1.14 <u>0.48</u>	NR (for all types)	NR (for all types)
Metal framing, operable	0.62 <u>0.57</u>	E&W-0.22, N&S-0.23		0.62 <u>0.57</u>	E&W-0.22, N&S-0.23		1.14 <u>0.62</u>		
Metal framing, entrance door	0.79 <u>0.73</u>	E&W-0.22, N&S-0.23		0.73	E&W-0.22, N&S-0.23		0.79 <u>0.73</u>		
Skylight, 0% to 3% of Roof									
All types	0.62	0.33 <u>0.29</u>	NR	0.62	0.33 <u>0.29</u>	NR	4.74 <u>0.86</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-3 (Supersedes Table 5.5-3 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 3 (A,B,C)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.34	E&W-0.24, S-0.25, N-0.35		0.33	E&W-0.24, S-0.25, N-0.35		0.83		
Metal framing, fixed	0.43 <u>0.40</u>	E&W-0.24, N&S-0.25	1.10 (for all types)	0.47 <u>0.40</u>	E&W-0.24, N&S-0.25	1.10 (for all types)	1.14 <u>0.48</u>	NR (for all types)	NR (for all types)
Metal framing, operable	0.57 <u>0.51</u>	E&W-0.22, N&S-0.23		0.57 <u>0.51</u>	E&W-0.22, N&S-0.23		1.14 <u>0.62</u>		
Metal framing, entrance door	0.73 <u>0.65</u>	E&W-0.22, N&S-0.23		0.65	E&W-0.22, N&S-0.23		0.73		
Skylight, 0% to 3% of Roof									
All types	0.52	0.33 <u>0.29</u>	NR	0.52	0.33 <u>0.29</u>	NR	4.62 <u>0.86</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-4 (Supersedes Table 5.5-4 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 4 (A,B,C)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.29	E&W-0.34, S-0.36, N-0.46	1.10 (for all types)	0.29	E&W-0.34, S-0.36, N-0.46	1.10 (for all types)	0.48	NR (for all types)	NR (for all types)
Metal framing, fixed	0.36 0.34	E&W-0.34, N&S-0.36		0.36 0.34	E&W-0.34, N&S-0.36		0.69 0.48		
Metal framing, operable	0.44 0.43	E&W-0.31, N&S-0.33		0.44 0.43	E&W-0.31, N&S-0.33		0.77 0.62		
Metal framing, entrance door	0.65 0.60	E&W-0.31, N&S-0.33		0.65 0.60	E&W-0.31, N&S-0.33		0.73		
Skylight, 0% to 3% of Roof									
All types	0.48	0.38	NR	0.48	0.38	NR	1.09 0.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-5 (Supersedes Table 5.5-5 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 5 (A,B,C)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.29	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	0.29	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	0.43	NR (for all types)	NR (for all types)
Metal framing, fixed	0.36 0.34	E&W-0.36, S-0.38, N-0.48		0.36 0.34	E&W-0.36, S-0.38, N-0.48		0.59 0.48		
Metal framing, operable	0.44 0.43	E&W-0.31, S-0.33, N-0.43		0.44 0.43	E&W-0.31, S-0.33, N-0.43		0.67 0.62		
Metal framing, entrance door	0.65 0.60	E&W-0.31, S-0.33, N-0.43		0.65 0.60	E&W-0.31, S-0.33, N-0.43		0.73		
Skylight, 0% to 3% of Roof									
All types	0.48	0.38	NR	0.48	0.38	NR	0.93 0.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-6 (Supersedes Table 5.5-6 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 6 (A,B)* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.29	E&W-0.38, S-0.40, N-0.50		0.29	E&W-0.43, S-0.45, N-0.55		0.43		
Metal framing, fixed	0.34 <u>0.32</u>	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	0.34 <u>0.32</u>	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	0.48 <u>0.37</u>	NR (for all types)	NR (for all types)
Metal framing, operable	0.43 <u>0.40</u>	E&W-0.32, S-0.34, N-0.44		0.43 <u>0.40</u>	E&W-0.32, S-0.34, N-0.44		0.56 <u>0.46</u>		
Metal framing, entrance door	0.65 <u>0.60</u>	E&W-0.32, S-0.34, N-0.44		0.65 <u>0.60</u>	E&W-0.32, S-0.34, N-0.44		0.73 <u>0.65</u>		
Skylight, 0% to 3% of Roof									
All types	0.48 <u>0.45</u>	0.38	NR	0.48	0.38	NR	0.84 <u>0.71</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; Ls = liner system (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.4); E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-7 (Supersedes Table 5.5-7 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 7* (I-P)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.27	E&W-0.43, S-0.45, N-0.55		0.27	E&W-0.43, S-0.45, N-0.55		0.30		
Metal framing, fixed	0.34 <u>0.28</u>	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	0.34 <u>0.28</u>	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	0.36 <u>0.34</u>	NR (for all types)	NR (for all types)
Metal framing, operable	0.38 <u>0.34</u>	E&W-0.34, S-0.36, N-0.46		0.38 <u>0.34</u>	E&W-0.34, S-0.36, N-0.46		0.42		
Metal framing, entrance door	0.65 <u>0.60</u>	E&W-0.34, S-0.36, N-0.46		0.65 <u>0.60</u>	E&W-0.34, S-0.36, N-0.46		0.73 <u>0.60</u>		
Skylight, 0% to 3% of Roof									
All types	0.48 <u>0.42</u>	NR	NR	0.48 <u>0.42</u>	NR	NR	0.84 <u>0.71</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (see ANSI/ASHRAE/IES Standard 90.1, Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-8 (Supersedes Table 5.5-8 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 8* (I-P).

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	0.24	E&W-0.43, S-0.45, N-0.55		0.24	E&W-0.43, S-0.45, N-0.55		0.30		
Metal framing, fixed	0.28 <u>0.25</u>	<u>E&W-0.38, S-0.40, N-0.50</u>	1.10 (for all types)	0.28 <u>0.25</u>	<u>E&W-0.38, S-0.40, N-0.50</u>	1.10 (for all types)	0.36 <u>0.34</u>		
Metal framing, operable	0.33 <u>0.30</u>	<u>E&W-0.34, S-0.36, N-0.46</u>		0.33 <u>0.30</u>	<u>E&W-0.34, S-0.36, N-0.46</u>		0.42		
Metal framing, entrance door	0.65 <u>0.60</u>	<u>E&W-0.34, S-0.36, N-0.46</u>		0.65 <u>0.60</u>	<u>E&W-0.34, S-0.36, N-0.46</u>		0.73 <u>0.60</u>		
Skylight, 0% to 3% of Roof									
All types	0.39	NR	NR	0.39	NR	NR	0.84 <u>0.71</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (see ANSI/ASHRAE/IES Standard 90.1, Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-0 (Supersedes Table 5.5-0 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements For Climate Zone 0 (A,B)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	4.73	E&W-0.21, N&S-0.22		4.73	E&W-0.21, N&S-0.22		5.02		
Metal framing, fixed	2.70	<u>E&W-0.21, N&S-0.22</u>	1.10 (for all types)	2.70	<u>E&W-0.21, N&S-0.22</u>	1.10 (for all types)	6.48		
Metal framing, operable	3.54 <u>3.34</u>	<u>E&W-0.19, N&S-0.20</u>		3.54 <u>3.34</u>	<u>E&W-0.19, N&S-0.20</u>		6.48	NR (for all types)	NR (for all types)
Metal framing, entrance door	4.48	<u>E&W-0.19, N&S-0.20</u>		4.48	<u>E&W-0.19, N&S-0.20</u>		5.94		
Skylight, 0% to 3% of Roof									
All types	4.05 <u>3.77</u>	0.33 <u>0.29</u>	NR	4.05 <u>3.77</u>	0.33 <u>0.29</u>	NR	9.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-1 (Supersedes Table 5.5-1 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 1 (A,B)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	2.70	E&W-0.24, S-0.25, N-0.35		2.70	E&W-0.24, S-0.25, N-0.35		5.02		
Metal framing, fixed	3.08 <u>2.70</u>	<u>E&W-0.22, N&S-0.23</u>	1.10 (for all types)	3.08 <u>2.70</u>	<u>E&W-0.22, N&S-0.23</u>	1.10 (for all types)	6.48	NR (for all types)	NR (for all types)
Metal framing, operable	3.54 <u>3.34</u>	<u>E&W-0.20, N&S-0.21</u>		3.54 <u>3.34</u>	<u>E&W-0.20, N&S-0.21</u>		6.48		
Metal framing, entrance door	5.94 <u>4.47</u>	<u>E&W-0.20, N&S-0.21</u>		5.94 <u>4.47</u>	<u>E&W-0.20, N&S-0.21</u>		5.94		
Skylight, 0% to 3% of Roof									
All types	4.05 <u>3.77</u>	0.33 <u>0.29</u>	NR	4.05 <u>3.77</u>	0.33 <u>0.29</u>	NR	9.71	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-2 (Supersedes Table 5.5-2 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 2 (A,B)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	2.00	E&W-0.24, S-0.25, N-0.35		2.00	E&W-0.24, S-0.25, N-0.35		5.02		
Metal framing, fixed	2.94 <u>2.43</u>	<u>E&W-0.24, N&S-0.25</u>	1.10 (for all types)	2.94 <u>2.43</u>	<u>E&W-0.24, N&S-0.25</u>	1.10 (for all types)	6.48 <u>2.70</u>	NR (for all types)	NR (for all types)
Metal framing, operable	3.54 <u>3.23</u>	<u>E&W-0.22, N&S-0.23</u>		3.54 <u>3.23</u>	<u>E&W-0.22, N&S-0.23</u>		6.48 <u>3.50</u>		
Metal framing, entrance door	4.48 <u>4.15</u>	<u>E&W-0.22, N&S-0.23</u>		4.15	<u>E&W-0.22, N&S-0.23</u>		4.48 <u>4.15</u>		
Skylight, 0% to 3% of Roof									
All types	3.51	0.33 <u>0.29</u>	NR	3.51	0.33 <u>0.29</u>	NR	9.74 <u>4.85</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-3 (Supersedes Table 5.5-3 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 3 (A,B,C)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.78	E&W-0.24, S-0.25, N-0.35		1.89	E&W-0.24, S-0.25, N-0.35		4.69		
Metal framing, fixed	2.43 <u>2.26</u>	<u>E&W-0.24, N&S-0.25</u>	1.10 (for all types)	2.64 <u>2.26</u>	<u>E&W-0.24, N&S-0.25</u>	1.10 (for all types)	6.48 <u>2.70</u>	NR (for all types)	NR (for all types)
Metal framing, operable	3.24 <u>2.91</u>	<u>E&W-0.22, N&S-0.23</u>		3.24 <u>2.91</u>	<u>E&W-0.22, N&S-0.23</u>		6.48 <u>3.50</u>		
Metal framing, entrance door	4.15 <u>3.67</u>	<u>E&W-0.22, N&S-0.23</u>		3.67	<u>E&W-0.22, N&S-0.23</u>		4.15		
Skylight, 0% to 3% of Roof									
All types	2.97	0.33 <u>0.29</u>	NR	2.97	0.33 <u>0.29</u>	NR	9.17 <u>4.85</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; FC = filled cavity (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.5); E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-4 (Supersedes Table 5.5-4 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 4 (A,B,C)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.67	E&W-0.34, S-0.36, N-0.46		1.67	E&W-0.34, S-0.36, N-0.46		2.75		
Metal framing, fixed	2.05 <u>1.94</u>	<u>E&W-0.34, N&S-0.36</u>	1.10 (for all types)	2.05 <u>1.94</u>	<u>E&W-0.34, N&S-0.36</u>	1.10 (for all types)	3.94 <u>2.70</u>	NR (for all types)	NR (for all types)
Metal framing, operable	2.48 <u>2.43</u>	<u>E&W-0.31, N&S-0.33</u>		2.48 <u>2.43</u>	<u>E&W-0.31, N&S-0.33</u>		4.37 <u>3.50</u>		
Metal framing, entrance door	3.67 <u>3.40</u>	<u>E&W-0.31, N&S-0.33</u>		3.67 <u>3.40</u>	<u>E&W-0.31, N&S-0.33</u>		4.15		
Skylight, 0% to 3% of Roof									
All types	2.70	0.38	NR	2.70	0.38	NR	6.21 <u>4.04</u>	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, N&S = north and south oriented (see Sections 7.4.2.1 and 7.4.2.7).

Table E-5 (Supersedes Table 5.5-5 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 5 (A, B, C)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.67	E&W-0.36, S-0.38, N-0.48		1.67	E&W-0.36, S-0.38, N-0.48		2.43		
Metal framing, fixed	2.05 1.94	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	2.05 1.94	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	3.35 2.70		NR (for all types)
Metal framing, operable	2.48 2.43	E&W-0.31, S-0.33, N-0.43		2.48 2.43	E&W-0.31, S-0.33, N-0.43		3.78 3.50		
Metal framing, entrance door	3.67 3.40	E&W-0.31, S-0.33, N-0.43		3.67 3.40	E&W-0.31, S-0.33, N-0.43		4.15		
Skylight, 0% to 3% of Roof									
All types	2.70	0.38	NR	2.70	0.38	NR	5.29 4.04	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-6 (Supersedes Table 5.5-6 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 6 (A,B)* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.62	E&W-0.38, S-0.40, N-0.50		1.62	E&W-0.43, S-0.45, N-0.55		2.43		
Metal framing, fixed	1.94 1.83	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	1.94 1.83	E&W-0.36, S-0.38, N-0.48	1.10 (for all types)	2.75 2.10		NR (for all types)
Metal framing, operable	2.43 2.26	E&W-0.32, S-0.34, N-0.44		2.43 2.26	E&W-0.32, S-0.34, N-0.44		3.18 2.59		
Metal framing, entrance door	3.67 3.40	E&W-0.32, S-0.34, N-0.44		3.67 3.40	E&W-0.32, S-0.34, N-0.44		4.15 3.67		
Skylight, 0% to 3% of Roof									
All types	2.70 2.53	0.38	NR	2.70	0.38	NR	4.59 4.04	NR	NR

* The following definitions apply: c.i. = continuous insulation (ANSI/ASHRAE/IES Standard 90.1, see Section 3.2); NR = no (insulation) requirement; Ls = liner system (see ANSI/ASHRAE/IES Standard 90.1, Section A2.3.2.4); E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-7 (Supersedes Table 5.5-7 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 7* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.54	E&W-0.43, S-0.45, N-0.55		1.54	E&W-0.43, S-0.45, N-0.55		1.73		
Metal framing, fixed	1.78 1.56	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	1.78 1.40	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	2.05 1.94	NR (for all types)	NR (for all types)
Metal framing, operable	2.16 1.94	E&W-0.34, S-0.36, N-0.46		2.16 1.73	E&W-0.34, S-0.36, N-0.46		2.37		
Metal framing, entrance door	3.67 3.40	E&W-0.34, S-0.36, N-0.46		3.67 3.40	E&W-0.34, S-0.36, N-0.46		4.15 3.40		
Skylight, 0% to 3% of Roof									
All types	2.70 2.37	NR	NR	2.70 2.37	NR	NR	4.59 4.04	NR	NR

* The following definitions apply: c.i. = continuous insulation (see ANSI/ASHRAE/IES Standard 90.1, Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).

Table E-8 (Supersedes Table 5.5-8 in ANSI/ASHRAE/IES Standard 90.1)
Example Building Envelope Compliance Values Requirements for Climate Zone 8* (SI)

Fenestration	Nonresidential			Residential			Semiheated		
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall		(for all frame types)			(for all frame types)			(for all frame types)	
Nonmetal framing, all	1.35	E&W-0.43, S-0.45, N-0.55		1.35	E&W-0.43, S-0.45, N-0.55		1.73		
Metal framing, fixed	4.56 1.40	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	4.56 1.40	E&W-0.38, S-0.40, N-0.50	1.10 (for all types)	2.05 1.94	NR (for all types)	NR (for all types)
Metal framing, operable	4.89 1.73	E&W-0.34, S-0.36, N-0.46		4.89 1.73	E&W-0.34, S-0.36, N-0.46		2.37		
Metal framing, entrance door	3.67 3.40	E&W-0.34, S-0.36, N-0.46		3.67 3.40	E&W-0.34, S-0.36, N-0.46		4.15 3.40		
Skylight, 0% to 3% of Roof									
All types	2.21	NR	NR	2.21	NR	NR	4.59 4.04	NR	NR

* The following definitions apply: c.i. = continuous insulation (see ANSI/ASHRAE/IES Standard 90.1, Section 3.2); NR = no (insulation) requirement; E&W = east and west oriented, S = south oriented, N = within 22.5 degrees of north in the Northern Hemisphere (see Sections 7.4.2.1 and 7.4.2.7).