

## Energy Code Compliance Guide

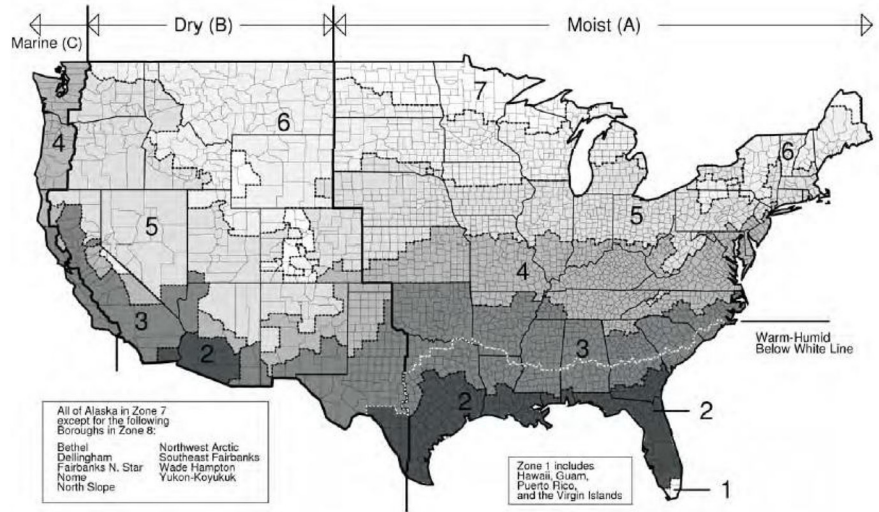
Depending on what building code has been adopted and is enforced in the jurisdiction where the site is located, metal buildings usually have to meet the insulation requirements of either:

1. ASHRAE Standard 90.1, or
2. The ICC International Energy Conservation Code (IECC)

While both ASHRAE 90.1 and the IECC use the same climate zone map for the U.S. (see Figure 1), the insulation requirements in each climate zone for the two documents vary. In addition, both ASHRAE 90.1 and the IECC provide two compliance paths – “performance” (max. U-factor) and “prescriptive” (min. R-value).

The requirements for those paths are listed in Tables 1 and 2, for both wall and roof assemblies. NOTE: for the specific

**Figure 1**  
ICC/ASHRAE Climate Zone Map



requirements currently adopted in each state go to: <http://bcap-ocean.org/code-status-commercial>

In addition, the calculated U-factors for some typical

wall and roof assemblies, using Owens Corning's Certified R, MBI Plus, OptiLiner™ and ELAMINATOR® metal building insulation products and systems, are provided for your convenience (Tables 3 and 4).

**Table 1 - Roof Assembly Requirements**

Climate Zone	ASHRAE 90.1								IECC			
	Nonresidential (conditioned)				Semiheated				Metal Building <sup>1</sup>			
	Performance		Prescriptive		Performance		Prescriptive		Performance		Prescriptive	
	2007	2010	2007	2010	2007	2010	2007	2010	2009	2012	2009	2012
1	0.065	0.065	R-19.0	R-19.0	1.28	0.167	NR	R-6.0	0.065	0.044	R-19	R19+R11 ls <sup>2</sup>
2	0.065	0.055	R-19.0	R13+R13	0.167	0.097	R-6.0	R-10.0	0.055	0.035	R13+R13	R19+R11 ls
3	0.065	0.065	R-19.0	R13+R13	0.097	0.097	R-10.0	R-10.0	0.055	0.035	R13+R13	R19+R11 ls
4	0.065	0.065	R-19.0	R13+R13	0.097	0.097	R-10.0	R-10.0	0.055	0.035	R13+R13	R19+R11 ls
5	0.065	0.065	R-19.0	R13+R13	0.097	0.083	R-10.0	R-13.0	0.055	0.035	R13+R13	R19+R11 ls
6	0.065	0.065	R-19.0	R19+R13	0.097	0.072	R-10.0	R-16.0	0.049	0.031	R19+R13	R25+R11 ls
7	0.065	0.065	R-19.0	R19+R13	0.097	0.072	R-10.0	R-16.0	0.049	0.029	R19+R13	R30+R11 ls
8	0.049	0.035	R13+R19	R-19+R-11 ls <sup>2</sup>	0.072	0.065	R-16.0	R-19.0	0.035	0.029	R19+R11	R30+R11 ls

1. Climate Zone 1 is a thru-fastened roof without thermal spacer block, Climate Zones 2-8 are standing seam roofs with R-5 thermal spacer block.

2. 'LS' = liner system



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**Table 2 - Wall Assembly Requirements**

Climate Zone	ASHRAE 90.1								IECC			
	Nonresidential (conditioned)				Semiheated				Metal Building			
	Performance		Prescriptive		Performance		Prescriptive		Performance		Prescriptive	
	2007	2010	2007	2010	2007	2010	2007	2010	2009	2012	2009	2012
1	0.113	0.093	R-13.0	R-16.0	1.180	0.113	NR	R-13.0	0.093	0.079	R-16.0	R-13/R6.5ci
2	0.113	0.093	R-13.0	R-16.0	0.184	0.113	R-6.0	R-13.0	0.093	0.079	R-16.0	R-13/R6.5ci
3	0.113	0.084	R-13.0	R-19.0	0.184	0.113	R-6.0	R-13.0	0.084	0.079	R-19.0	R-13/R6.5ci
4	0.113	0.084	R-13.0	R-19.0	0.134	0.113	R-10.0	R-13.0	0.084	0.052	R-19.0	R-13/R13ci
5	0.113	0.069	R-13.0	R13+R5.6ci	0.123	0.113	R-11.0	R-13.0	0.069	0.052	R13+R5.6ci	R-13/R13ci
6	0.113	0.069	R-13.0	R13+R5.6ci	0.113	0.113	R-13.0	R-13.0	0.069	0.052	R13+R5.6ci	R-13/R13ci
7	0.057	0.057	R13+R13	R19+R5.6ci	0.113	0.113	R-13.0	R-13.0	0.057	0.052	R19+R5.6ci	R-13/R13ci
8	0.057	0.057	R13+R13	R19+R5.6ci	0.113	0.113	R-13.0	R-13.0	0.057	0.052	R19+R5.6ci	R-13/R13ci

**Table 3 - ELAMINATOR® Roof Assembly U-factors**

Thermal Break <sup>1</sup>	Certified R <sup>2</sup>		MBI Plus <sup>3</sup>	
	Insulation	U-factor <sup>4</sup>	Insulation	U-factor <sup>4</sup>
R-5	R10	0.084	R10	0.092
R-5	R11	0.080	R11	0.088
R-5	R13	0.074	R13	0.081
R-5	R16	0.064	R16	0.071
R-5	R19	0.059	R19	0.065
R-5	R10/R10	0.057	R10/R10	0.063
R-5	R11/R10	0.056	R11/R10	0.061
R-5	R13/R10	0.054	R13/R10	0.058
R-5	R13/R11	0.053	R13/R11	0.058
R-5	R13/R13	0.050	R13/R13	0.055
R-5	R19/R10	0.048	R19/R10	0.052
R-5	R19/R11	0.047	R19/R11	0.052
R-5	R19/R13	0.046	R19/R13	0.050
R-5	R19/R16	0.045	R19/R16	0.049
R-5	R19/R19	0.044	R19/R19	0.048

- 1"X3" block of FOAMULAR® XPS Foam
- Faced; Insattled using ELAMINATOR® Series 100 machine
- Unfaced; installed ELAMINATOR® Series 300 machine
- Calculation based on standing seam roof (SSR) system

**Table 4 - Wall Assembly U-factors**

Thermal Break	Cavity Insulation	Wall U-factor <sup>1</sup>
None	R16 MBI+	0.074
None	R19 MBI+	0.066
1/8" Foam	R25 MBI+	0.057
1/8" Foam	R30 MBI+	0.049
Certified R13	R30 MBI+	0.042

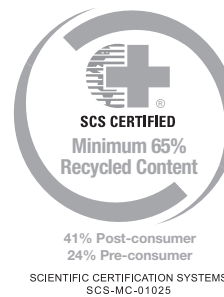
1. Calculations based on Owens Corning™ OptiLiner™ system; 8" girts spaced 5' on center

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