

Technical bulletin

ASHRAE 90.1 Prescriptive Wall Insulation Requirements

Continuous insulation is required by ASHRAE 90.1¹, the U.S. energy standard for all commercial and some residential buildings. Continuous insulation is defined in 90.1 as “insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior, exterior, or is integral to any opaque surface of the building envelope”.

The amount of insulation required for a building depends upon the climate zone in which it resides. The provided tables (reverse side) list ASHRAE 90.1 (2004, 2007 and 2010 editions) prescriptive insulation requirements for wood framed walls, steel framed walls, and mass (concrete, stone, or CMU) walls for each of the 8 U.S. climate zones (Figure 1) defined in 90.1.

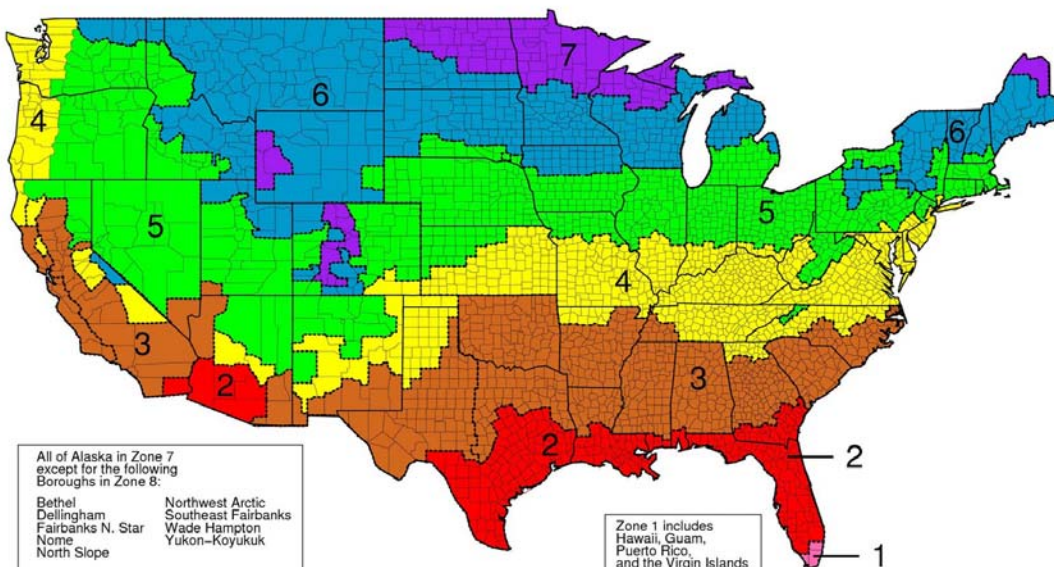
The wood and steel framed tables show prescribed stud cavity R-value as the first number, and continuous insulation R-value as the second number (Ex. 13 + 7.5). The mass wall table shows only the prescribed continuous insulation R-value as there is typically no stud cavity insulation in mass wall construction .

ASHRAE 90.1 applies to residential single or multi-family structures greater than three (3) stories in height above grade. “Non-residential” is defined as all occupancies other than residential. ASHRAE 90.1 also provides prescriptive insulation values for “semi-heated” buildings that are shown in these tables. The values in these tables apply to buildings that are heated and/or cooled as defined in 90.1.

Notes

1. ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1791 Tullie Circle NE, Atlanta GA 30329

Figure 1



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ASHRAE 90.1 Prescriptive Insulation Minimum R-value Requirements

Wood Framed and Other Walls, Above Grade

Zone	ASHRAE 90.1—2004		ASHRAE 90.1 2007 & 2010	
	Non-Residential	Residential	Non-Residential	Residential
1	13	13	13	13
2	13	13	13	13
3	13	13	13	13
4	13	13	13	13 + 3.8
5	13	13	13 + 3.8	13 + 7.5
6	13	13 + 3.8	13 + 7.5	13 + 7.5
7	13	13 + 7.5	13 + 7.5	13 + 7.5
8	13 + 7.5	13 + 7.5	13 + 15.6	13 + 15.6

Steel Framed Walls, Above Grade

Zone	ASHRAE 90.1—2004		ASHRAE 90.1 2007 & 2010	
	Non-Residential	Residential	Non-Residential	Residential
1	13	13	13	13
2	13	13	13	13 + 7.5
3	13	13 + 3.8	13 + 3.8	13 + 7.5
4	13	13 + 7.5	13 + 7.5	13 + 7.5
5	13 + 3.8	13 + 7.5	13 + 3.8	13 + 7.5
6	13 + 3.8	13 + 3.8	13 + 7.5	13 + 7.5
7	13 + 7.5	13 + 7.5	13 + 7.5	13 + 15.6
8	13 + 7.5	13 + 10.0	13 + 7.5	13 + 18.8

Mass Walls, Above Grade*

Zone	ASHRAE 90.1—2004		ASHRAE 90.1 2007 & 2010	
	Non-Residential	Residential	Non-Residential	Residential
1	NR	5.7	NR	5.7
2	NR	5.7	5.7	7.6
3	5.7	7.6	7.6	9.5
4	5.7	9.5	9.5	11.4
5	7.6	11.4	11.4	13.3
6	9.5	11.4	13.3	15.2
7	11.4	13.3	15.2	15.2
8	13.3	15.2	15.2	25.0

*Mass walls are defined as a wall with a heat capacity exceeding:

- (1) 7 Btu/ft² x °F, or,
- (2) 5 Btu/ft² x °F provided that the wall has a material unit weight not greater than 120lb/ft³

Heat capacity is defined as the amount of heat necessary to raise the temperature of a given mass 1°F. Numerically, the heat capacity per unit area of surface (Btu/ft² x °F) is the sum of the products of the mass per unit area of each individual material in the roof, wall, or floor surface multiplied by its individual specific heat