



# ENERGY STAR Single-Family New Homes ENERGY STAR Multifamily New Construction F-Factor Additional Guidance

## Guidance on SFNH Item 3.2 & MFNC Item 3.4 of the National Rater Field Checklist

Item 3.2 of the ENERGY STAR Single-Family New Homes (SFNH) National Rater Field Checklist and Item 3.4 of the ENERGY STAR Multifamily New Construction (MFNC) National Rater Field Checklist (Rater-F) require that for slabs on grade in CZ 4-8,  $\geq R-5$  slab edge insulation is installed to the depth specified in the Item. As an alternative, slab assemblies with an F-Factor equivalent to that of the insulation required by the Item may be used.

The F-Factor, as defined by the IECC, is the perimeter heat loss factor for slab on grade floors. It is an approximation of the total amount of heat transmitted through the slab, expressed per unit length of slab perimeter. It is similar to the U-factor of an assembly, which is instead expressed per unit area of the assembly.

### Exhibit 1: Slab edge insulation requirements in the Rater Field Checklists

Program	Requirement
SFNH	For slabs on grade in CZ 4-8, 100% of slab edge insulated to $\geq R-5$ at the depth specified by the 2009 IECC and aligned with the thermal boundary of the walls.  Footnote: ... “Slab assemblies with an F-Factor equivalent to that of the insulation required in Item 3.2 may be used where calculated in accordance with ASHRAE 90.1-2022 Appendix A...”
MFNC	For slabs on grade in CZ 4-8, 100% of slab edge insulated to $\geq R-5$ at a depth of 2 ft., or 4 ft. for heated slabs in CZ 6-8, & aligned with the thermal boundary of the walls.  Footnote: ... “Slab assemblies with an equivalent F-Factor equivalent to that of the insulation required in Item 3.2 may be used where calculated in accordance with ASHRAE 90.1-2022 Appendix A...”

This document provides further guidance on how to determine the F-Factor to be able to use this alternative.

#### Vertical Insulation F-Factor:

To determine the F-Factor for a vertical insulation assembly, determine the R-value and depth of the slab edge insulation. Vertical slab edge insulation extends from the top of the slab downward. The depth of the insulation is measured from the top of the slab. The F-Factor is determined in accordance with Table A6.3.1 from ASHRAE 90.1-2019. The vertical insulation section from this table is presented below in Exhibit 2 and two examples are shown in Example 1a and 1b.

### Exhibit 2: Assembly F-Factor for slab on grade floors using vertical insulation

Unheated Slabs					
Insulation Depth (inches)	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
12 in. vertical	0.61	0.60	0.58	0.57	0.567
24 in. vertical	0.58	0.56	0.54	0.52	0.510
36 in. vertical	0.56	0.53	0.51	0.48	0.472
48 in. vertical	0.54	0.51	0.48	0.45	0.434
Heated Slabs					
Insulation Depth (inches)	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
12 in. vertical	1.06	1.02	1.00	0.98	0.986
24 in. vertical	0.99	0.95	0.90	0.86	0.843
36 in. vertical	0.95	0.89	0.84	0.79	0.762
48 in. vertical	0.91	0.85	0.78	0.72	0.688

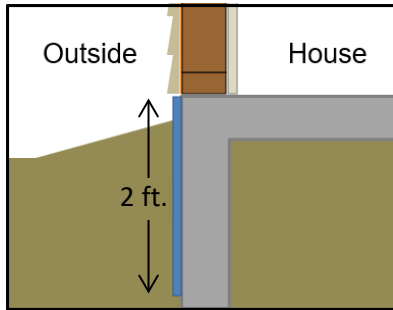


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In CZ 4, for unheated slabs, SFNH Item 3.2 and MFNC Item 3.4 of the National Rater Field Checklist (Rater-F) require R-5 insulation to a depth of 2ft. Using this assembly, as shown in Example 1a, achieves an F-Factor of 0.58.

### Example 1a: Vertical Insulation F-Factors – Unheated Slab

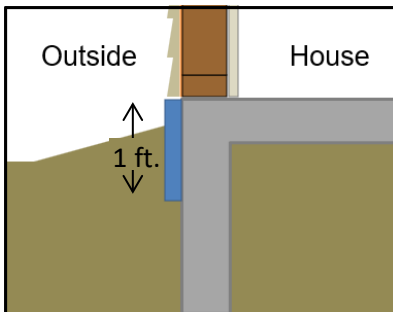


**R-5 to 2 ft. depth  
F-Factor = 0.58**

Insulation Depth (inches)	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
12 in. vertical	0.61	0.60	0.58	0.57	0.567
24 in. vertical	0.58	0.56	0.54	0.52	0.510
36 in. vertical	0.56	0.53	0.51	0.48	0.472
48 in. vertical	0.54	0.51	0.48	0.45	0.434

Any combination of R-value and depth that yields the same F-Factor of 0.58 (or lower) is also compliant. Example 1b shows that R-10 for a depth of 1 ft., would also be compliant.

### Example 1b: Vertical Insulation F-Factors – Unheated Slab



**R-10 to 1 ft. depth  
F-Factor = 0.58**

Insulation Depth (inches)	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
12 in. vertical	0.61	0.60	0.58	0.57	0.567
24 in. vertical	0.58	0.56	0.54	0.52	0.510
36 in. vertical	0.56	0.53	0.51	0.48	0.472
48 in. vertical	0.54	0.51	0.48	0.45	0.434



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### Fully Insulated Slab F-Factor:

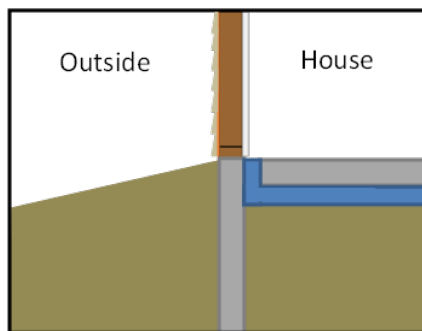
A fully insulated slab, per ASHRAE 90.1-2019 Appendix A, includes continuous insulation from the top of the slab down to the bottom of the slab for the entire perimeter of the slab and continuing underneath the entire slab, providing a complete thermal break between the footer and the slab. The F-Factor for this assembly is determined in accordance with Table A6.3.1 from ASHRAE 90.1-2019. The fully insulated slab section from the table is presented below in Exhibit 3, and an example is shown in Example 2.

### Exhibit 3: Assembly F-Factor for slab on grade floors using fully insulated slab

Unheated Slabs					
	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
Fully insulated slab	0.46	0.41	0.36	0.30	0.261
Heated Slabs					
	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
Fully insulated slab	0.74	0.64	0.55	0.44	0.373

Using the same situation as Example 1, with an unheated slab in CZ 4, any slab insulation assembly that yields an F-Factor of 0.58 (or lower) is also compliant. As shown, a fully insulated slab with R-5 would be compliant, even if it does not vertically extend to a depth of 2 ft. at the slab perimeter.

### Example 2: Fully Insulated Slab F-Factors – Unheated Slab



**R-5**  
**F-Factor = 0.46**

Unheated Slabs					
	Rated R-Value of Edge Insulation				
	R-5	R-7.5	R-10	R-15	R-20
Fully insulated slab	0.46	0.41	0.36	0.30	0.261

### Notes:

The table included in ASHRAE 90.1 Appendix A only includes F-Factors for horizontal insulation, vertical insulation and fully insulated slabs. It does not include combinations of horizontal and vertical insulation. Where an assembly includes a combination of horizontal and vertical insulation, but does not meet the definition of fully insulated, the F-Factor may only be determined using just the horizontal or just the vertical insulation.