



WHITE PAPER R-Boost™ Elevated Insulation System

Metal buildings usually must meet the insulation requirements of either following energy code depending on what building code has been adopted and is enforced in the jurisdiction where the site is located.

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

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

Nucor Building Systems has calculated U-factors for the R-Boost™ Elevated Insulation System to satisfy the “performance” compliance path for ASHRAE 90.1 and IECC. The system utilizes the Nucor CFR panel and two layers of fiberglass insulation up to a combined R-57. The details of the available assemblies are provided for your convenience in the below table.

Path to Compliance

As shown below Section C401 of the IECC allows commercial buildings to comply with requirements set forth in ASHRAE.

Section C401

General

C401.1 Scope. The provisions in this chapter are applicable to commercial buildings and their building sites.

C401.2 Application. Commercial buildings shall comply with one of the following.

1. **The requirements of ANSI/ASHRAE/IESNA 90.1**
2. The requirements of Sections C402 through C405. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.

A system such as R-Boost™ with a built up cavity to accommodate two layers of fiberglass insulation above the purlins is not listed in Sections A2 through A8, so calculations for the R-Boost™ Elevated Insulation System were completed and are in compliance based on the use of a 3 dimensional finite difference and finite volume computer model that was prepared by Morrison Hershfield Limited. The use of such a model is acceptable as detailed in ASHRAE 90.1 Section A1.2 and subsequent section A9.2

NORMATIVE APPENDIX A

RATED R-VALUE OF INSULATION AND ASSEMBLY U-FACTOR, C-FACTOR, AND F-FACTOR DETERMINATIONS

A1. GENERAL

A1.2 Applicant-Determined Assembly U-Factors, C-Factors, F-Factors, or Heat Capacities. If the building official determines that the proposed construction assembly **is not adequately represented in Sections A2 through A8**, the applicant shall determine appropriate values for the assembly using the assumptions in **Section A9**.

A9. DETERMINATION OF ALTERNATE ASSEMBLY U-FACTORS, C-FACTORS, F-FACTORS, OR HEAT CAPACITIES

A9.2 Required Procedures. Two- or three-dimensional finite difference and finite volume computer models shall be an acceptable alternative method to calculating the thermal performance values for all assemblies and constructions listed below. The following procedures shall also be permitted to determine all alternative U-factors, F-factors, and C-factors.

- a. Roofs
 1. Roofs with insulation entirely above deck: testing or series calculation method.
 2. **Metal building roofs:** testing, or for single-layer and double-layer systems, calculation method in Section A9.4.5.

Digital copies of the report detailing the 3-dimensional finite difference and finite volume computer model are available on request.

R-Boost™ Elevated Insulation System Clip & Insulation Thickness Requirements

Roof Panel & Framing Type	Description	Thermal Spacer Block (TSB)	Clip	Insulation R-Value (Below Bridge)	Insulation R-Value (Over Top of Bridge)	U-Factor
CFR / Purlin	R-Boost / R-19 + R-19	3/4" x 3" x 1'-11" (R-3.75)	Tall	R-19	R-19	0.033
	R-Boost / R-19 + R-25	3/4" x 3" x 1'-11" (R-3.75)	Tall	R-19	R-25	0.031
	R-Boost / R-19 + R-30	1" x 3" x 1'-11" (R-5)	Super Tall	R-19	R-30	0.029
	R-Boost / R-19 + R-38	3/4" x 3" x 1'-11" (R-3.75)	Super Tall	R-19	R-38	0.028
	R-Boost / R-25 + R-38	3/4" x 3" x 1'-11" (R-3.75)	Super Tall	R-25	R-38	0.026
CFR / Joist	R-Boost / R-19 + R-19	3/4" x 3" x 1'-11" (R-3.75)	Tall	R-19	R-19	0.033
	R-Boost / R-19 + R-25	3/4" x 3" x 1'-11" (R-3.75)	Tall	R-19	R-25	0.032
	R-Boost / R-19 + R-30	1" x 3" x 1'-11" (R-5)	Super Tall	R-19	R-30	0.029
	R-Boost / R-19 + R-38	3/4" x 3" x 1'-11" (R-3.75)	Super Tall	R-19	R-38	0.028
	R-Boost / R-25 + R-38	3/4" x 3" x 1'-11" (R-3.75)	Super Tall	R-25	R-38	0.026

Disclaimer of Liability Technical information contained herein is furnished without charge or obligation and is given and accepted at recipient's sole risk. Because conditions of use may vary and are beyond our control, Nucor Building Systems makes no representation about, and is not responsible or liable for the accuracy or reliability of data associated with particular uses of any product described herein. Nothing contained in this bulletin shall be considered a recommendation.