Recommendations for Installing Fiber Glass Insulation in Metal Buildings

What is Fiber Glass Metal Building Insulation?

Fiber glass insulation for metal buildings is called NAIMA 202-96®(Rev.2000) insulation. The standard designation means the insulation meets the requirements of the NAIMA 202-96 (Rev.2000) Standard and is certified for thermal performance by the National Association of Home Builders (NAHB) Research Center for use in metal buildings. Once the unfaced insulation is produced, a vapor retarder is applied to the fiber glass blanket by a laminator, and the insulation is re-rolled and compressed for shipment to the job site in custom lengths and widths to fit the building.

What Does Metal Building Insulation Do?

Controls Heat Flow

Metal building insulation acts as a barrier to slow down the movement of heat, keeping it inside the building in winter and outside the building in summer. By controlling the rate of heat transfer through the building, insulation reduces energy consumption, resulting in lower fuel bills and a cleaner environment.

Prevents Condensation

Metal building insulation with a vapor retarder facing limits the passage of water vapor and prevents it from condensing within the insulation or on the interior surfaces of the building.

Controls Noise

Metal building insulation greatly reduces the level of both exterior and interior noise by reducing transmission of exterior sounds to the interior of the building and absorbing reverberating sounds within the building.

Increases Lighting Efficiency

The laminated facings on the insulation provide a bright, attractive wall and ceiling treatment that acts as a reflector to increase lighting efficiency.

What is the NIA Certified Faced Insulation Standard?

This Standard was developed to assure that the insulation meets 100% of the stated R-value.

The NIA Certified Faced Insulation Standard is a post-lamination certification for flexible faced fiber glass insulation used in metal buildings. It was developed by the National Insulation Association (NIA) to assure builders and building owners that the fiber glass insulation specifically engineered for metal buildings meets 100% of the stated R-value after the lamination process.

The Standard was developed because the lamination process of applying adhesives and a facing to the fiber glass insulation can affect the thickness recovery of the insulation and subsequently its effectiveness.

The NIA Certified Faced Insulation Standard addresses quality issues such as adhesive rates, compression ratios, packaging, handling and storage, moisture, and other things that can impact the thickness recovery and thermal performance of the insulation.

NAIMA 202-96 (Rev.2000) insulation is certified by the National Association of Home Builders.

How is the Insulation Used?

NAIMA 202-96 (Rev.2000) insulation is used as a primary insulation in exterior walls and roofing systems of metal buildings. It is also used as an additional layer of insulation in metal re-roof applications on built-up roofs and single-ply commercial buildings.

How is the Insulation Labeled?

Rolls received at the job site should display the NAHB certification label. This is the assurance that the insulation has been laminated to the NIA Certified Faced Insulation Standard and the R-value ordered is the R-value delivered to the job site. If the insulation rolls have already been opened, check to see if NAIMA 202-96 (Rev.2000) is ink jet printed on the insulation itself.

Residential grade or non-marked insulations are not designed for the metal building market.

Job Site Storage Recommendations

The insulation should be inspected upon arrival at the job site to ensure that it is exactly as ordered. If there is anything wrong with the insulation, it should not be installed. Contact the supplier immediately.

1 Insulation should be stored in a dry, protected area. (See photo A)

2 All packages should be elevated above the ground or slab, preferably on a flat surface, to prevent contact with surface water accumulation. The facing should be protected from tears and punctures to maintain continuity of the vapor retarder. (See photo B)

3 Poly-bags should have holes in each end to aerate the insulation. It is also suggested that the contractor open the ends of the bags to allow better air circulation around the insulation. (See photo C)

4 Packages can be left uncovered during the day, weather permitting, but should be protected at night with polyethylene film, canvas or other covering.

NOTE: Whenever possible, the insulation should be used as soon as possible after it arrives at the job site. The sooner the insulation is installed, the less likely it is to get damaged in storage.

U-Values

The U-value (overall heat transfer coefficient) is a term used to describe and specify the thermal performance of a building envelope assembly such as a roof or sidewall system in a metal building. U-value applies to a complete assembly that has a number of heat flow paths. Each path contains materials in series heat flow.

(U-values required for cities and states across the U.S. are contained in NAIMA publication "ASHRAE 90.1 Compliance for Metal Buildings.")

Vapor Retarders

The vapor retarder used on metal building insulation should be strong enough to withstand handling during installation as well as to function as an aesthetically pleasing interior building finish. Therefore, the facing must have good tensile strength, good rip-stop characteristics and puncture resistance. In addition, it must be fire retardant, provide good light reflectivity, provide a durable, yet aesthetic, appearance and have a low water vapor permeance. (Permeance is a measure of the flow of water vapor through a material). The lower the permeance, the better the vapor retarder. Table 1 is a list of typical vapor retarders.

Table 1: Vapor Retarder Type	Typical Perm Rating
Vinyl	1.0
Polypropylene/Scrim/Kraft (PSK)	.02 - .09
Foil/Scrim/Kraft (FSK)	.02
Polypropylene/Scrim/Foil (PSF)	.02
Vinyl/Scrim/Metallized Polyester (VRP)	.02

Installation Methods

There are a variety of methods for installing metal building insulation. Some are applicable for both new and retrofit construction, while others are suitable for new construction only. These installation methods are not meant to be an endorsement but, rather, to acquaint the reader with a number of insulation application methods. Some metal building manufacturers may have very specific installation procedures which must be followed to comply with warranties. Some of these are patented systems and their use may be restricted. We suggest consulting with the building manufacturer before specifying installation procedures.

(A) Store insulation so it is dry and protected.
(B) All packages should be elevated above the ground or slab.
(C) Poly-bags should have holes in both ends.

Workability Temperatures

It is important to remember that installing faced insulation is not recommended when the temperature falls below the minimum workability temperatures shown in Table 2.

Table 2: Minimum Workability Temperatures	
Vinyl	40°F
Polypropylene/Scrim/Kraft (PSK)	20°F
Foil/Scrim/Kraft (FSK)	10°F
Polypropylene/Scrim/Foil (PSF)	20°F
Vinyl/Scrim/Metallized Polyester (VRP)	20°F

ROOFS

Installation Over Purlins

Insulation should be in lengths that will cover the distance from eave to eave plus an extra 12" on each end to overhang each side of the building. In situations where more than one roll is necessary to span the roof, a ridge pan should be used (see below). The width of the first run of insulation should be one foot wider than the width of the roofing panel. Succeeding runs should be either the same width or twice the width of roof panels. This is done for ease of seaming.

Installation Method

Starting at an end wall of the building, temporarily secure one end of the insulation to the eave strut by using either a spray adhesive, double-faced tape, or mechanical fastener (screws, washers, metal banding or strips). Unroll the insulation across the purlins with the vapor retarder towards the interior. Keep tension on the insulation while the metal panels are being attached over the insulation. This prevents excessive drape which can result in large voids above the insulation and assures the attainment of U–value requirements. Do not overstretch the insulation. This can result in over-compression and reduced R–value. Fasten the insulation at the other eave in the same manner as the first eave. Install the next roll of insulation in the same manner, making sure the rolls are stretched tight (but also allow for full recovery of the insulation blanket), aligned properly and closely butted, and seal the insulation tabs by one of the methods described in the Tab Fastening section.

Vapor retarders function as an aesthetically pleasing interior building finish and should be specified to last the life of the structure.

Installation in Standing Seam Roofs

This installation method is used to install metal building insulation in standing seam roof systems. The use of thermal blocks may be optional since the standing seam roof sheets hold the roof above the purlins, thus reducing the compression of the insulation. A second layer may also be added (see below) if desired.

Thermal Spacer Blocks

To reduce thermal efficiency loss where the insulation is compressed between the purlins and the roof sheet, thermal blocks of rigid polystyrene foam should be installed. These blocks are placed on top of the insulation at the structural members and may be temporarily held in place with double-faced tape or spray adhesive until the roofing panels are put on.

Two-Layer Installation Systems

There are two types of two-layer installation systems, each providing a significant increase in thermal resistance over a single layer system.

First Method

The first method for installing metal building insulation uses the exact same method as that used to install insulation over purlins. The one difference is that the insulation is allowed to drape slightly between each purlin so that a second layer of unfaced insulation can be installed parallel to, or between each purlin.

Second Method

The second method of two-layer installation is to install rigid fiber glass insulation board (48" x 120") with vapor retarder on the underside of the purlins, held in place by mechanical fasteners. Unfaced metal building insulation is then installed between the purlins and on top of the rigid board. For maximum efficiency, in standing seam roofs, thermal blocks of polystyrene rigid foam may be installed on top of the purlins with double-faced tape or spray adhesive. Roof panels are mechanically fastened to the top of the purlins through the thermal blocks.

When installing insulation between the purlins, a support system can be used in place of the rigid board. Several options are available. One is to make a lattice type support using cross banding that is attached to the bottom or placed through the purlins and anchored to the eave strut with support bands. Next, support bands are placed on top of and perpendicular to the cross bands, forming the lattice system. There are a number of patented insulation installation and support systems available, which will provide a suitable support system.

SIDE AND END WALLS

The most common method of insulating side and end walls of metal buildings is the standard method of rolling insulation down the walls. Faced metal building insulation should be cut to length plus an additional 12" (minimum) per sheet for overhang.

- Unroll the insulation and cut the dimension from base angle to eave strut or rake plus 12" extra.

- Install the facing toward the building interior. The width of the first run of insulation should be 12" wider than the width of the wall panel. Succeeding runs should be either the same width or twice the width of wall panels. (See Photo D)

- Attach the insulation to the eave strut of rake angle with clamps or double faced tape. (See Photo E)

- Pull from the bottom end to stretch the insulation tightly outside the girts from the eave or rake to the base angle.

- Before insulation is attached to the base angle, the extra fiber glass should be carefully cut off (approximately 6") and then removed from the facing. Be careful not to cut the facing. After removal of the extra of insulation, fold the extra facing up over the insulation at the bottom and staple to the side tabs to hold in place. Attach to base angle with double faced tape. Maintain the bottom of the insulation 1/2" above the base flashing. (See Photo F)

D

E

F

- Attach the metal wall panel to the structure according to the manufacturer's instructions.

- Place the next roll of insulation in the same manner with edge butted snugly, and fasten tabs using one of the methods described in the Tab Fastening Instructions section.

- If there is no base trim, use a foam or rubber closure. If rodent protection is needed, a foam or rubber closure is recommended.

Tab Fastening Instructions

There are a number of different methods for fastening metal building insulation facing tabs. Most facings are 6" wider than the laminated insulation. The extra facing may be supplied as two 3" tabs, or one 6" tab for all other products. It is recommended that the first roll of insulation (starter roll) be at least 12" wider than the width of the metal roof or wall panel being installed. This ensures the insulation joints are not lined up with the metal panel joints and prevents working directly at the edge of a panel when folding and stapling the tabs.

Two 3" Tabs

If two 3" tabs are supplied, use a plier stapler to fasten the facing tabs together where two adjoining pieces of insulation butt together. First, pull the facing tabs in between the blankets, away from the inside of the building. Then staple approximately every 4" at approximately 1/4 to 1/2" from the edge of the tabs. (See Figure 1a.) After stapling the tabs, fold them over to tuck them between the insulation blankets and staple again. (See Figure 1b.)

One 6" Tab

When working with a 6" tab, spray or brush a good quality moisture-proof adhesive on the back. (See Figure 2.) Extend the tab over the facing of the adjacent roll of insulation and press firmly with a damp cloth along the seam to smooth it and remove excess adhesive. In cases where continuity of the vapor retarder properties of the facing is not critical, it is common practice to install as described, but without the use of adhesive.

Miscellaneous

- Cover any rips or tears with matching facing tape to ensure a tight seal. Do not use patching tape to seal tabs.
- Trim excessive insulation flush at eaves and rakes to keep water out of the insulation .
- Since building and insulation systems differ, it is important that the contractor adhere to the particular erection instructions furnished by the metal building manufacturer and the laminator supplying the insulation.

Figure 1: Two 3″ Tabs

1a. Pull tabs in between blankets and then staple approx. 4″ O.C. approx. 1/4 to 1/2″ from edge of tabs

1b. Fold stapled tabs over, tuck between blankets and staple again

Figure 2: One 6″ Tab

Clothing and Equipment

Clothing

When installing fiber glass insulation:

- Loose fitting, long-sleeved and long-legged clothing is recommended to prevent irritation. A head cover is also recommended, especially when working with material overhead. Gloves are also recommended. Skin irritation cannot occur if there is no contact with the skin. Do not tape sleeves or pants at wrists or ankles.
- To minimize upper respiratory tract irritation, measures should be taken to control the exposure. Such measures will be dictated by the work environment and many include appropriate respiratory protective equipment. See OSHA's Respiratory Protection Standard.
- When appropriate, eye protection should be worn whenever SVF Products are being handled.

For more complete information, please refer to NAIMA publication *Working Smart with Fiber Glass, Rock Wool and Slag Wool Products - Recommended Work Practices for the Installation of Synthetic Vitreous Fibers* (SVF).

Equipment

For cutting insulation, the best knife has been found to be one with a serrated blade. Blades should be replaced periodically as they tend to dull during use. Other equipment may be preferred by the installer. Tools that generate the least amount of dust should be used. If power tools are to be used, they should be equipped with appropriate dust collection systems as necessary.

Fall Protection

Installing Insulation on Metal Building Roofs

Installers engaged in insulating low slope roofs with unprotected sides and edges 15 feet or higher* or more should be protected from falling by: guardrail systems, safety net systems, personal fall arrest systems, or a combination of a warning line system and guardrail system, warning line system and safety net system, warning line system and personal fall arrest system, or warning line system and safety monitoring system.

Installing Insulation in Metal Building Sidewalls

Insulation installers working on, at, above, or near wall openings where the outside bottom edge of the wall opening is six feet or more above lower levels, and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, must be protected from falling by the use of either a guardrail system, a safety net system, or a personal fall arrest system.

* OSHA 29 CFR 1926 subpart R.

About NAIMA

NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Its role is to promote energy efficiency and environmental preservation through the use of fiber glass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials.

In May 1999, NAIMA began implementing a comprehensive voluntary work practice partnership with the U.S. Occupational Safety and Health Administration (OSHA). The program, known as the Health and Safety Partnership Program, or HSPP, promotes the safe handling and use of insulation materials and incorporates education and training for the manufacture, fabrication, installation and removal of fiber glass, rock wool and slag wool insulation products.

For more information, contact:

NAIMA
44 Canal Center Plaza, Suite 310
Alexandria, VA 22314
Phone: 703-684-0084
Fax: 703-684-0427
www.naima.org

NAIMA Metal Building Committee Members

CertainTeed Corp.
P.O. Box 860
Valley Forge, PA 19482
800-233-8990

Knauf Insulation
One Knauf Drive
Shelbyville, IN 46176
800-825-4434

Guardian Building Products, Inc.
P.O. Box 207
Greenville, SC 29602
800-569-4262

Owens Corning
One Owens Corning Pky
Toledo, OH 43659
800-GET-PINK

Johns Manville
P.O. Box 5108
Denver, CO 80217
800-654-3103

NAIMA

North American Insulation Manufacturers Association

44 Canal Center Plaza, Suite 310
Alexandria, VA 22314
Phone: 703-684-0084
Fax: 703-684-0427
www.naima.org

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