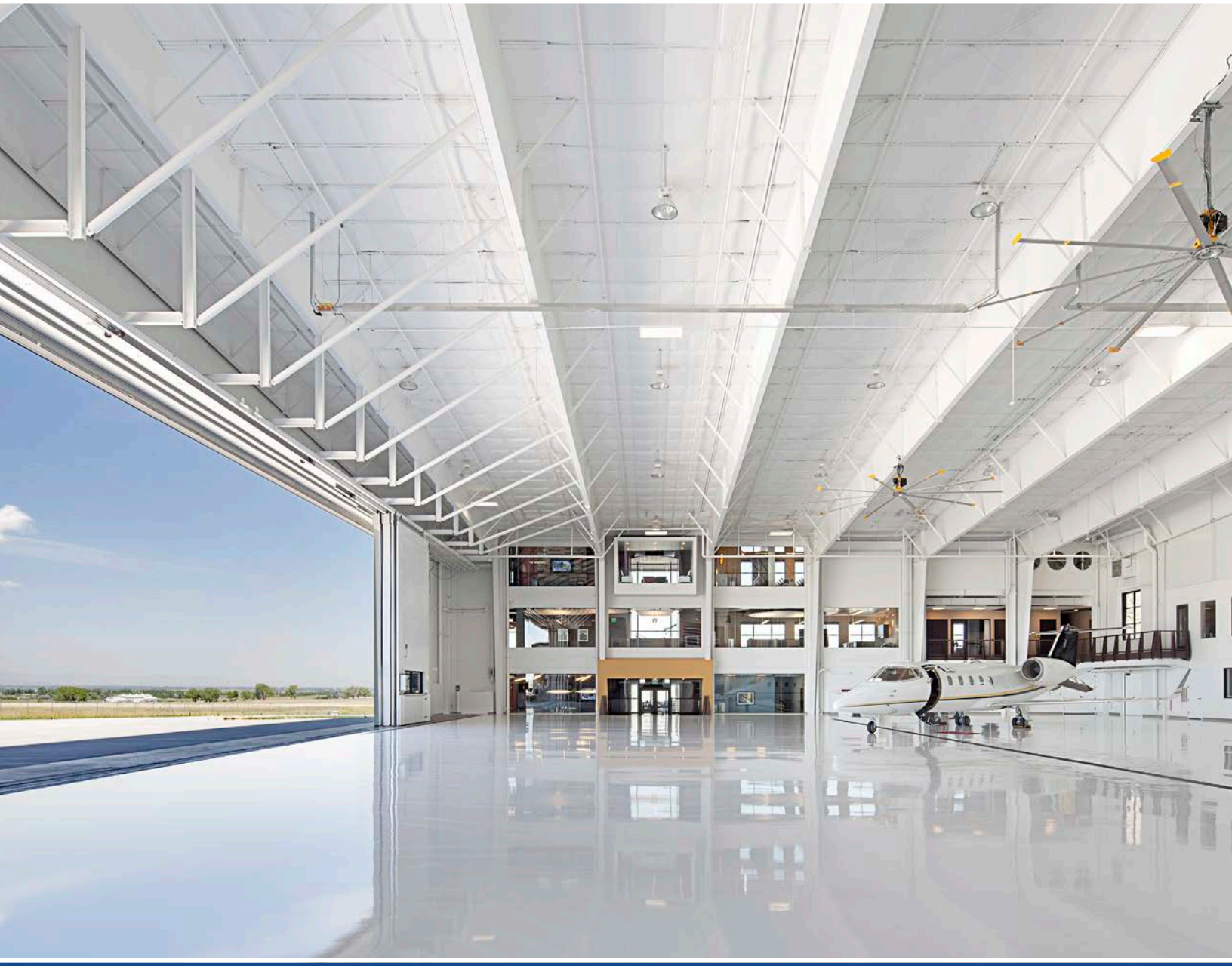
CONTRACTOR'S GUIDE:

Filled Cavity Systems for Metal Buildings



LAMTEC® CORPORATION

The Most Specified Name in Metal Building Vapor Retarders

THE COMPANY

LAMTEC'S 260,000 square foot facility is situated on a 45-acre site in Northeastern Pennsylvania, convenient to all New York metropolitan area ports and major north-south and east-west interstate highways.

Established in 1975, LAMTEC has grown into a leadership role in the industry. Our philosophy is simple: "Design and manufacture the very best in laminated insulation facings, offer them at competitive pricing, deliver them on time and follow-up with comprehensive technical support."

LAMTEC is ready to help you meet the challenges of today...and tomorrow.

LAMTEC CORPORATION IS ACTIVELY INVOLVED WITH THE FOLLOWING ORGANIZATIONS:

ASHRAE

Proud Member of NIA National Insulation Association™

Metal Building Contractors & Erectors Association

Associate MBMA Member

ASTM International Member

NFPA Member

LAMTEC® CORPORATION

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LAMTEC® products are proudly manufactured in the USA.

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Don’t spec without Lamtec

For 40 years, Lamtec has been developing and manufacturing insulation facings and vapor retarders for Pre-Engineered Metal Buildings.

Lamtec offers the largest line of Underwriters Laboratories (UL) Classified and Factory Mutual (FM) Approved insulation facings for the Metal Building industry. The entire WMP® series of products have been specifically designed for Metal Building applications.

Metal building insulation facing and vapor retarders are an integral part of an aesthetic and functional building envelope.

About Lamtec Products

Condensation Control

Moisture Permeance

Water vapor passing through insulation to the cold exterior surfaces of the building can condense, degrading the thermal performance of the insulation system as well as contributing to corrosion, mold, mildew, and odor. Left unchecked, condensation will degrade the effectiveness of the insulation system and reduce the service life of the building components.

Lamtec’s insulation facings are designed to reduce condensation and its damaging effects by controlling moisture movement through the insulation system. With permeance ratings as low as 0.02 Perm, Lamtec’s facings are tested, effective vapor retarders.

Air Permeance

Air leakage has the potential to transport significant quantities of moisture though the insulation to the cold exterior cladding resulting in wintertime condensation. Controlling air leakage with an effective air barrier is an important aspect in reducing condensation and its damaging effects.

With an air permeance rating well below the code specified air barrier requirements of 0.004 cfm/ft2 at 1.57 psf, Lamtec’s WMP Metal Building facings are tested, effective air barriers. Lamtec facings are both low permeance air barriers and low permeance vapor retarders.

Fire Performance

Lamtec’s insulation facings are tested in accordance with ASTM E84 and have Flame Spread Ratings ≤25 and Smoke Developed Ratings ≤50. In addition, many of Lamtec’s metal building facings are UL Classified, and FM Approved for use with fiberglass insulation in accordance with FM 4880 (a full-scale room fire test).

Aesthetics and Functionality

Lamtec’s facings protect the insulation from physical damage as well as water vapor intrusion.

Lamtec’s proprietary white facings provide a clean white interior surface with outstanding light reflectivity, which may allow for reduced lighting loads.

Lamtec’s foil based vapor retarders provide radiant barrier properties for use in applications requiring low emittance surfaces, such as Ice Rinks and Hockey Arenas.

For buildings with extreme artificial and natural lighting conditions, Lamtec offers WMP-UV HD with enhanced UV resistance.

For architectural open ceiling designs, many of Lamtec’s facings are also available in an attractive black finish that is UL Classified.

Lamtec's Metal Building Product Line

Most Popular Facings - General Purpose

WMP-VR - Low Cost Standard Duty (Excellent for Most Chemical Environments)
WMP-VR-R PLUS - Low Cost Standard Duty (Excellent for High Humidity Environments)
WMP-10 - Standard Duty
WMP-30 - Heavy Duty
WMP-50 - Premium Heavy Duty with Added Abuse Resistance

Specialty Facings

WMP-UV HD - Premium Heavy Duty with Added UV Resistance
GYMGUARD - Athletic Facilities and High Traffic Areas (Highly Abuse Resistant)

Low (0.03) Emissivity Facings

ARENASHIELD - Ice Arena Roofs (Highly Abuse Resistant)
RADIANT ICE - Ice Arena and General Purpose (Double Sided Foil with Tear Resistance)
R-3035 HD - Heavy Duty Foil/Scrim/Kraft (FSK)

Facings Available in Black

WMP-VR, WMP-VR-R PLUS, WMP-10, and WMP-50

Applications

✓ GOOD ✓✓ BETTER ✓✓✓ BEST ○ NOT APPLICABLE

This document is intended as a general product guide only. You should consult with your building design professional before making your product selection.

WMP-VR	WMP-VR-R PLUS	WMP-10	WMP-30	WMP-50	WMP-UV HD*	GYMGUARD	ARENASHIELD	RADIANT ICE	R-3035 HD	
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	○	○	✓✓	✓	Agriculture
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	○	Athletic Facility
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	✓	Government/Military
○	○	○	○	○	○	○	✓✓✓	✓✓	✓	Ice Arena Roofs
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	✓	Manufacturing/Industrial
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	✓	Religious/Community
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	✓	Service/Retail
✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	○	✓✓	✓	Warehouse/Distribution

*Best for applications with high UV exposure from intense lighting (natural/artificial). Application examples include: Aircraft Hangars, Retail, Loading Docks, Auto Shops, etc.

Insulation Solutions for Metal Building Roofs:

Filled Cavity systems are the preferred option for insulating Metal Building roofs in order to meet today's stringent energy codes. The two most accepted Filled Cavity systems are Long Tab Banded (LTB) and Liner, with the Long Tab Banded option typically being the most cost effective. Both systems provide comparable enervgy performance.

The primary advantage of LTB is easier access to the purlins for installation and maintenance of electrical, HVAC, and sprinkler systems without unsightly penetrations which compromise the integrity of the vapor retarder and the insulation system. In addition, most of the scheduling complexities associated with other systems are eliminated.

LTB provides the building owner and design professional the most design flexibility with respect to the exposed vapor retarder. The designer can match the right vapor retarder with the application. The specifier can choose from one of Lamtec Corporation's fully engineered vapor retarders including: WMP-VR, WMP-VR-R Plus, WMP-10, WMP-30, WMP-50, WMP-UV HD, etc… In addition, the designer can match the roof and wall vapor retarder / facing for a continuous and finished appearance. Alternate High R-Value Systems typically offer only one or two vapor retarder options.

Key Benefits of a Long Tab Banded System:

- *Proven, cost effective High R-Value insulation system*
- *Meets or exceeds specified U-Values outlined in today's energy codes and standards*
- *Easier, unobstructed access to purlins for electrical, HVAC, sprinkler installation, and maintenance, which reduces the number of penetrations in the vapor retarder*
- *Match roof and wall facing for a more finished appearance*
- *Lamtec's bright white WMP facings provide an attractive installed appearance and may reduce costs associated with lighting requirements*
- *Wide selection of Lamtec's vapor retarders specifically engineered for Metal Building applications*
- *Lamtec is the most trusted and specified name in insulation vapor retarders with the most complete line of UL Classified and FM Approved Metal Building facings*

Filled Cavity (FC) / Long Tab Banded Tested U-Values

Thermal testing of Filled Cavity / Long Tab Banded systems, with Lamtec facing, was conducted in October 2010 and January 2011 at the Butler Manufacturing Research Center located in Grandview, MO, an independent certified laboratory.

Testing was conducted in accordance with ASTM C1363, "Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus".

Finite Element Analysis Modeling was conducted by Engrana LLC.

Filled Cavity / Long Tab Banded systems results:
(Based on standing seam roof panels with thermal spacer block)

ASSEMBLY DESCRIPTIONS	U-VALUE
R19 Faced / R11 Unfaced	0.037
R25 Faced / R11 Unfaced	0.035*
R25 Faced / R19 Unfaced	0.029

*Results based on Finite Element Analysis Modeling

Reports can be downloaded at the following links:

Faced R19 / Unfaced R11
http://www.lamtec.com/cdocs/TestReport2010-49.PDF

Faced R25 / Unfaced R11
http://www.lamtec.com/cdocs/LTBRoofFEM.pdf

Faced R25 / Unfaced R19
http://www.lamtec.com/cdocs/TestReport2011-06.pdf

Using COMcheck to Meet Energy Codes

Today's stringent energy codes offer prescriptive solutions for compliance. Other more cost effective and / or better performing options can easily be substituted by following some simple steps:

1. Go to www.energycodes.gov and click on the DOE link to download the free COMcheck code compliance program.
2. Insert U-Value for a Filled Cavity / Long Tab Banded system shown above into COMcheck by clicking on:
   Envelope / Roof Assembly / Other / Metal Building Roof. This allows you to replace the default values in the prescriptive path with the above alternate U-Value.
3. Generate the Envelope Compliance Certificate and submit to the building official along with supporting test or modeling documentation.

Filled Cavity (FC) / Long Tab Banded Installation Instructions

Materials Required:

- *Faced Fiberglass Insulation with Extended Tabs - Supplied in widths to match purlin spaces and lengths approximately 2 feet longer than bay spaces*
- *Unfaced Fiberglass - Supplied in rolls compatible with roof panel widths*
- *Lamtec Vapor Retarder - As specified*
- *Metal Banding - Supplied in coils, minimum 3/4" wide*
- *Banding Screws - Minimum 1/2" hex-head TEK screws*
- *Thermal Blocks - 3/4" or 1" thick, as specified and where applicable*

Materials shall be inspected for damage, proper sizes, and quantities upon delivery and should be stored in a dry, secure manner. Notify carrier and your laminator of any damaged material, improper sizes, or shortages immediately upon delivery.

When installing any insulation system, the Builder, Erector, and Insulation Installer must meet federal and state OSHA safety and fall protection standards.

Banding:

The banding should be installed perpendicular to the purlins. It should be cut in lengths that are long enough to run from eave to eave or eave to ridge, depending upon the roof design. For gabled buildings, be sure to add extra length to accommodate for the irregular roof geometry. The Long Tab Banded installation method is also referred to as a "Filled Cavity system" (FC) in the ASHRAE standards and manuals.

Spacing:

For purlins spaced 5' on center, the banding should be spaced a maximum of 30" on center.

For purlins 4' or less on center, banding can be placed a maximum of 48" on center.

Enough banding should be cut to accommodate the spacing specified above.

The banding should be attached to the bottom of the eave strut and to each purlin using TEK screws. Be sure to pull the banding as tight as possible and keep all subsequent runs parallel.

It is extremely important to be as neat and accurate as possible when laying out the metal banding because it will be visible from the interior of the building. The more accurate the installation, the better the project will look when the job is completed.

Installation of the Lower Long Tab Faced Insulation:

Now that you have created the insulation support system with the metal banding, it is time to organize the insulation that has been provided for the roof.

The faced insulation layer should be installed between and parallel to the purlins.

Filled Cavity (FC) / Long Tab Banded Installation Instructions (cont)

These rolls will have been custom laminated to a specific length and width to fit each purlin space. As such, each roll of insulation will have a “roll tag” indicating its correct location. It is important to use the correct roll of insulation in the correct location.

Once the faced insulation has been organized, the insulation should be unrolled into the cavity between the purlins, on top of the metal banding. The long tabs should be extended over the top of each purlin and oriented such that the tabs from adjacent runs are overlapped to create a continuous vapor retarder. The overlapping tabs should be taped with a suitable tape or sealant.

NOTE: It is important that the tabs not be pulled so tight that they cause the lower edges of the insulation to pull away from the sides of the purlins.

At the end wall, the insulation should be peeled back from the facing approximately 6” to 12” and removed. This will create an extended tab that can be attached to the rake angle with tape or sealant.

At the internal purlin bracing, it is important that the insulation is not excessively compressed. The ASHRAE 90.1 Standard addresses this by stating: “U-Value in Table A2.3.3 shall not be used where the insulation is substantially compressed by the bracing between the purlins”.

In cases where the bracing will “substantially compress” the insulation, the bracing should be temporarily removed to allow the faced insulation to be installed, and then replaced.

In applications where this is not practical, the insulation and facing can be cut to fit around the bracings. This is best accomplished as follows:

Determine where the insulation will need to be cut to fit the bracing.

Cut the entire width of the fiberglass and laminated facing, but only cut a portion of each tab beyond the edges of the fiberglass, to accommodate the bracing offset* on the purlin. It is preferred that the facing is not cut completely from edge to edge.

*The bracing offset is the distance from the top of the bracing to the purlin’s lower flange.

For example: If the bracing is located 3” above the bottom flange of the purlin, cut the full width of the fiberglass and laminated facing, plus an additional 3” beyond each edge of the fiberglass, leaving the remainder of the tab intact.

After the insulation has been installed, the facing can be sealed from the bottom with a suitable tape to encapsulate the bracing.

Filled Cavity (FC) / Long Tab Banded Installation Instructions (cont)

It is important to note that the faced layer of insulation must be installed in the entire width of the roof slope before the top layer of unfaced fiberglass, thermal spacer blocks (where applicable), and roof sheets can be installed.

Installation of the Top Layer of Unfaced Insulation and the Roof:

Unroll the unfaced insulation perpendicular to the purlins, making certain that there are no gaps between the edges of adjacent runs.

In cases where it is necessary to splice the unfaced insulation, this can be done by overlapping the ends approximately 1-2 inches before installing roof panels as follows:

For standing seam roofs, the roof clips and thermal spacer blocks should be installed and the roof panels attached with appropriate fasteners as indicated by the building manufacturer or supplier. Care should be used to be certain the thermal spacer blocks remain in place directly above the purlins.

For screw down roofs, the panels should be attached with appropriate fasteners as indicated by the building manufacturer or supplier.

Planning:

It is important to plan the project to make certain that there is no exposed insulation at the end of the work day or at the onset of inclement weather.

Suggested Practices:

- *Only install the insulation as far out as you can sheet in one day or as weather permits.*
- *Do not leave any insulation exposed to the elements overnight. The system is not designed to support the added weight associated with heavy rain or snow.*
- *As the erector / installer, you assume responsibility for all materials once on-site. It is in your best interest to protect the insulation from getting wet.*

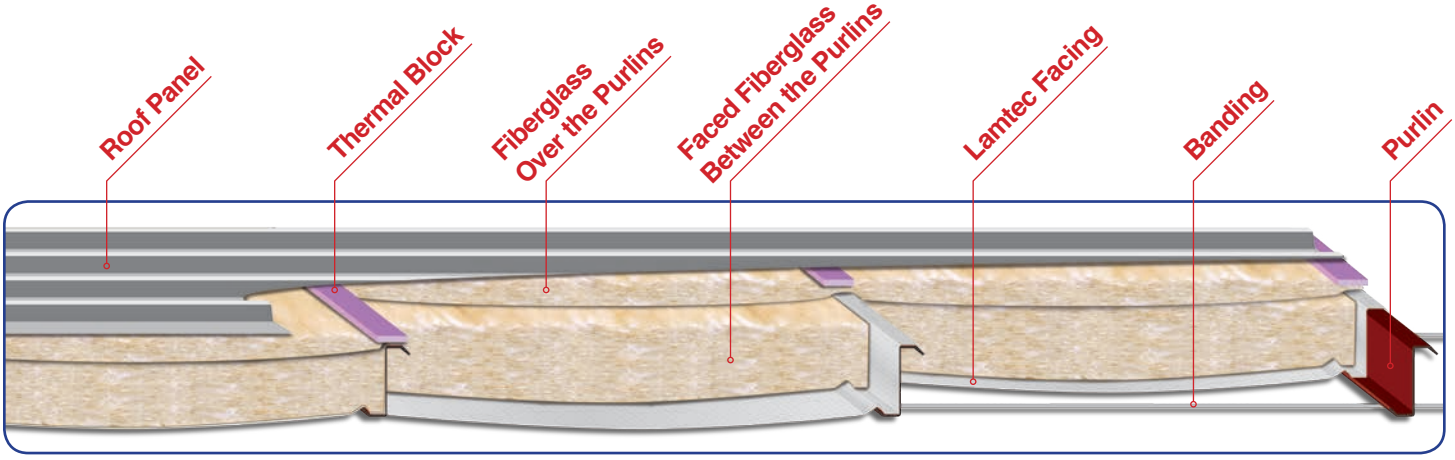
Filled Cavity (FC) / Long Tab Banded Installation Instructions (cont)

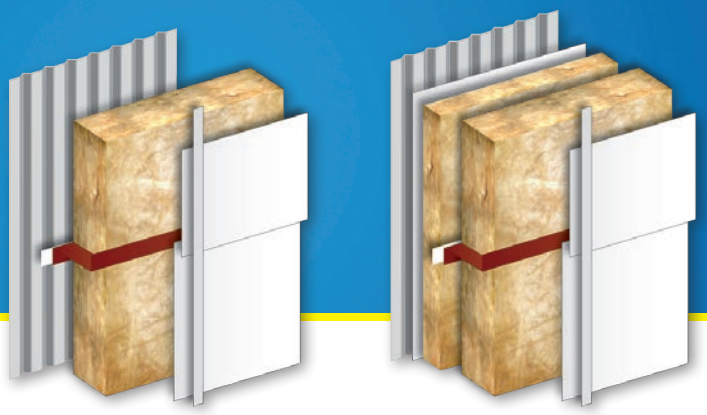
Notes:

When applicable, it is suggested that the building manufacturer be contacted early in the design stage and advised of the insulation system being installed.

It may be possible for them to engineer the roof system with the bracing at the bottom of the purlins or possibly eliminate them completely.

These instructions are meant to be a guide; they are not the only way to install this type of system. Modifications will likely be necessary to accommodate project variables. A cross section diagram has been provided to illustrate the final installed system.





Single Layer Wall System

Double Layer Wall System

Insulation Solutions for Metal Building Walls:

While today's stringent energy codes prescribe Continuous Insulation (CI) for Metal Building walls, there are other options that are tested, code-acceptable, and more cost effective.

Filled Cavity insulation systems, with either a single layer or a double layer of fiberglass, are a cost effective way to meet today's demanding energy codes for Metal Building walls. These systems can achieve U-Factors as low as 0.035. Tested systems are available for every climate zone and energy code.

Filled Cavity insulation systems featuring Lamtec facings provide the building owner and design professional the most design flexibility in terms of the exposed vapor retarders. The specifier can choose from one of Lamtec's industry leading vapor retarders including WMP-VR, WMP-VR-R Plus, WMP-10, WMP-30, WMP-50, WMP-UV HD, etc… In addition, the designer can match the roof and wall vapor retarder / facing for a continuous and finished appearance.

Alternate High R-Value systems typically offer only one or two vapor retarder options.

Key Benefits Include:

- *Proven, cost effective High R-Value insulation system*
- *Meets or exceeds prescribed U-Values as outlined in today's energy codes and standards*
- *Match roof and wall facing for a more finished appearance*
- *Lamtec's bright white WMP facings provide an attractive installed appearance and may reduce costs associated with lighting requirements*
- *Wide selection of Lamtec's vapor retarders specifically engineered for Metal Building applications*
- *Lamtec is the most trusted and specified name in vapor retarders with the most complete line of UL Classified and FM Approved Metal Building facings*

Filled Cavity Metal Building Wall Insulation Systems Hot Box Test Results

Thermal testing of the Filled Cavity Fiberglass Wall Insulation Systems was conducted at the Butler Manufacturing Research Center located in Grandview, MO, an independent certified laboratory.

Testing was conducted in accordance with ASTM C1363, “Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus”.

Filled Cavity Fiberglass Wall Insulation Systems results:

ASSEMBLY DESCRIPTIONS*	U-VALUE*
R-25 with 1/8” Foam Thermal Break Strip:	0.059
R-30 with 1/4” Foam Thermal Break Strip:	0.052
R-25 / R-10:	0.047
R-25 / R-16:	0.042
R-30 / R-16:	0.039

*Per ASHRAE 90.1-2016, Appendix Table A3.2.3

Using COMcheck to Meet Energy Codes

Today’s stringent energy codes offer prescriptive solutions for compliance. Other more cost effective and / or better performing options can easily be substituted by following some simple steps:

1. Go to www.energycodes.gov and click on the DOE link to download the free COMcheck code compliance program.
2. Insert U-Value for a Filled Cavity Wall system shown above into COMcheck by clicking on: Envelope / Exterior Wall Assembly / Other / Metal Building Wall. This allows you to replace the default values in the prescriptive path with the above alternate U-Value.
3. Generate the Envelope Compliance Certificate and submit to the building official along with supporting test or modeling documentation.

Filled Cavity – Double Layer Wall Systems Installation Instructions

Materials Required:

- *NAIMA 202 or equivalent faced fiberglass insulation - Supplied in rolls at the specified R-Value with 2-3" tabs and / or one 6" tab sealed with a suitable tape (where applicable), in widths to match girt spaces and lengths as specified*
- *NAIMA 202 or equivalent faced or unfaced fiberglass insulation - Supplied in rolls at the specified R-Value, in standard lengths and widths*
- *Lamtec Vapor Retarder - As specified*
- *Metal Banding - Supplied in coils, minimum 3/4" wide*
- *Banding Screws - Minimum 1/2" hex-head TEK screws*
- *Foam Thermal Break Strip - 1/8" or 1/4" thick x 3" wide (where applicable)*
- *Other - A suitable tape, adhesive, or sealant*

Materials shall be inspected for damage, proper sizes, and quantities upon delivery and should be stored in a dry, secure manner. Notify carrier and your laminator of any damaged material, improper sizes, or shortages immediately upon delivery.

Side and End Walls:

Outer Layer Installed Perpendicular to the Girts:

Prior to installing the fiberglass, either 1/8" or 1/4" Foam Thermal Break Strip (where applicable) should be applied to the exterior side of the outer girt flange surfaces and any other exposed secondary framing.

Once the Foam Thermal Break Strip has been installed, the wall insulation can be temporarily attached to the eave strut or rake angle with clamps, and rolled downward from the roof edge on the outside of the girts until it can be held in place with the wall panels. If faced, the facing should be installed to the outside, between the insulation and the wall panels.

The width of the wall insulation should extend 12" beyond the leading edge of the wall panel being installed. At the end of the wall, the fiberglass should also extend 12" beyond the last wall panel to allow for the insulation to wrap around the corner.

Adjacent and additional rolls of insulation should be installed in the same manner with edges of the fiberglass blanket butted tightly together.

Faced Inner Layer Installed Between the Girts:

Filled Cavity – Double Layer Wall Systems Installation Instructions (cont)

When girt spacing allows, the faced insulation should be installed horizontally, parallel to, and between the girts, completely filling the cavity.

The tabs should be taped to the exposed face on the inner girt flanges and sealed to the facing tab from adjacent girt space (where applicable) with a suitable tape, adhesive, or sealant to form a continuous vapor retarder. It may be necessary to peel the facing from the fiberglass at the girt flange to allow the insulation to fill the cavity.

When girt spaces are wider than the available fiberglass width, it is acceptable to install additional runs of fiberglass horizontally to completely fill the girt space.

As an alternative, the faced insulation can be installed vertically and the facing tabs sealed with a suitable tape, adhesive, or sealant.

When multiple fiberglass runs are installed to fill the girt cavity, it is important that the edges of the fiberglass from adjacent runs are in direct contact with each other and that the facing tabs are overlapped and sealed with a suitable tape, adhesive, or sealant to form a continuous vapor retarder.

At the main frames and corners, the insulation should completely fill the girt cavity behind the column (where applicable). The faced insulation can be cut vertically and the facing should be sealed to the column with a suitable tape, adhesive, or sealant. When the faced insulation is installed behind the column, it is important to trim and seal the facing at the upper and lower girt intersections with a suitable tape, adhesive, or sealant.

At the building corners, the insulation should wrap completely around and the facing should be sealed to the facing on the adjacent insulation run with a suitable tape, adhesive, or sealant to maintain the continuity of the vapor retarder layer and help reduce air leakage.

NOTE:

- *As a general rule, to reduce the potential for moisture to wick into the insulation, the lower edge of fiberglass should be protected by wrapping it with a layer of facing. This can be an extension of the facing from the inner layer (or outer layer) of insulation or a separate facing layer. To help reduce air leakage, a sealant can be applied between the slab and wrapped facing.*
- *If the inner and outer layers of insulation are faced, one facing layer should be perforated or breathable (high moisture permeance) to prevent a "Double Vapor Barrier" situation. Consult local codes and architect / building engineer for vapor retarder orientation in your climate zone.*

Banding:

Filled Cavity – Double Layer Wall Systems Installation Instructions (cont)

The banding should be installed perpendicular to the girts 30” on center.

The banding should be cut long enough to run from eave or rake to the base angle.

Planning:

The banding should be positioned over the facing, pulled straight and taut and attached to the interior face of the girts with 1/2” or 3/4” TEK screws.

It is important to plan the installation progress of the wall panels to make certain that there is no exposed insulation at the end of the work day or at the onset of inclement weather.

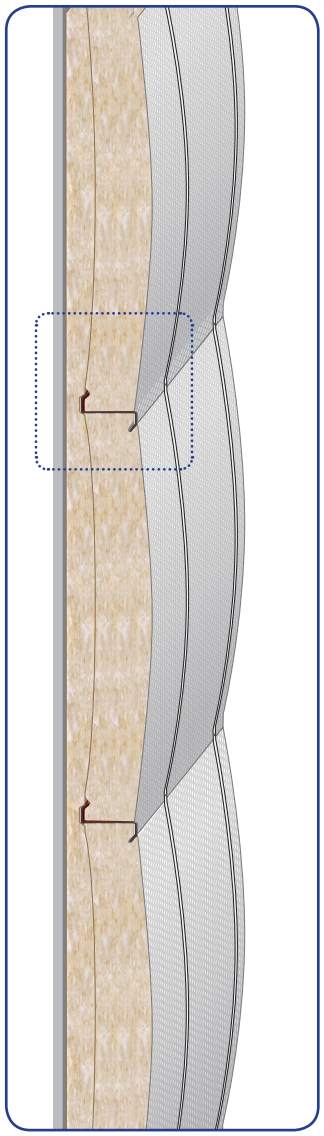
Suggested Practices:

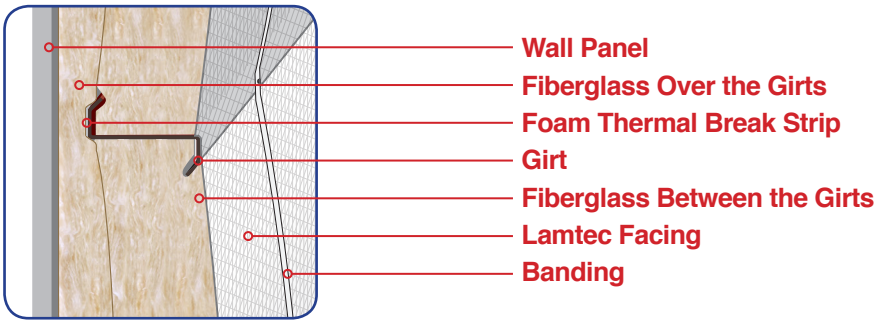
- *Only install the insulation as far out as you can cover with wall panels in one day or as weather permits.*
- *Do not leave any insulation exposed overnight; the system is not designed to be exposed to heavy rain or snow.*
- *As the erector / installer, you assume responsibility for all materials once on-site. It is in your best interest to protect the insulation from getting wet.*

Note:

These instructions are meant to be a guide; they are not the only way to install this type of system. Modifications will likely be necessary to accommodate project variables. A cross section diagram has been provided to illustrate the final installed system.

Filled Cavity – Double Layer Wall Systems
Installation Instructions (cont)





Filled Cavity – Single Layer Wall Systems Installation Instructions

Materials Required:

- *NAIMA 202 or equivalent unfaced fiberglass insulation - Supplied in rolls at the specified R-Value, in standard lengths and widths*
- *Lamtec Vapor Retarder - As specified*
- *Metal Banding - Supplied in coils, minimum 3/4" wide*
- *Banding Screws – Minimum 1/2" hex-head TEK screws*
- *Foam Thermal Break Strip - Minimum 1/8" or 1/4" thick x 3" wide (where applicable)*
- *Insul-Hold insulation supports*
- *Other - A suitable tape, adhesive, or sealant*

Materials shall be inspected for damage, proper sizes, and quantities upon delivery and should be stored in a dry, secure manner. Notify carrier and your laminator of any damaged material, improper sizes, or shortages immediately upon delivery.

Side and End Walls:

Prior to installing the metal wall panels, Foam Thermal Break Strip should be applied to the exterior side of the outer girt flange surfaces and any other exposed secondary framing.

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

Insul-Hold Insulation Supports:

Prior to installing the wall panels, cut a minimum of 24" long sections of the Insul-Hold coils and attach to the outer flange of the wall girts, approximately 36" to 48" on center. With the arrows pointing up, bend the arrows inward at a 45° angle.

Filled Cavity – Single Layer Wall Systems Installation Instructions (cont)

Unfaced Insulation Installed Between the Girts:

When girt spacing allows, the unfaced insulation can be installed horizontally, parallel to, and between the girts, completely filling the cavity.

When girt spaces are wider than the available fiberglass blanket width, it is acceptable to install additional runs of fiberglass horizontally to completely fill the girt space. If this is done, make certain to increase the length of the Insul-Hold to accommodate the extra run of insulation.

As an alternative, the unfaced insulation can be installed vertically. When multiple fiberglass runs are installed to fill the girt cavity, it is important that the edges of the blanket from adjacent runs are in direct contact and tight with each other.

At the main frames and corners, the insulation should completely fill the girt cavity behind the column (where applicable).

Vapor Retarder Facing:

The facing (as specified) should cover the full height of the wall. It can be installed vertically or horizontally and should be temporarily secured to the inside girt flanges with a suitable tape. The edges should be sealed to the main column with a suitable tape, adhesive, or sealant. All facing seams should be overlapped and sealed with a suitable tape, adhesive, or sealant.

At the building corners, the facing should wrap completely around and be sealed to the facing on the adjacent insulation run with a suitable tape, adhesive, or sealant to maintain the continuity of the vapor retarder layer and help reduce air leakage.

NOTE:

As a general rule, to reduce the potential for moisture to wick into the insulation, the lower edge of fiberglass should be protected by wrapping it with a layer of facing. This can be an extension of the interior facing or a separate facing layer. To help reduce air leakage, a sealant can be applied between the slab and wrapped facing.

Filled Cavity – Single Layer Wall Systems Installation Instructions (cont)

Banding:

The banding should be installed perpendicular to the girts 30” on center.

The banding should be cut long enough to run from eave or rake to the base angle.

The banding should be positioned over the facing, pulled straight and taut and attached to the interior face of the girts with 1/2” or 3/4” TEK screws.

Planning:

It is important to plan the installation progress of the wall panels to make certain that there is no exposed insulation at the end of the work day or at the onset of inclement weather.

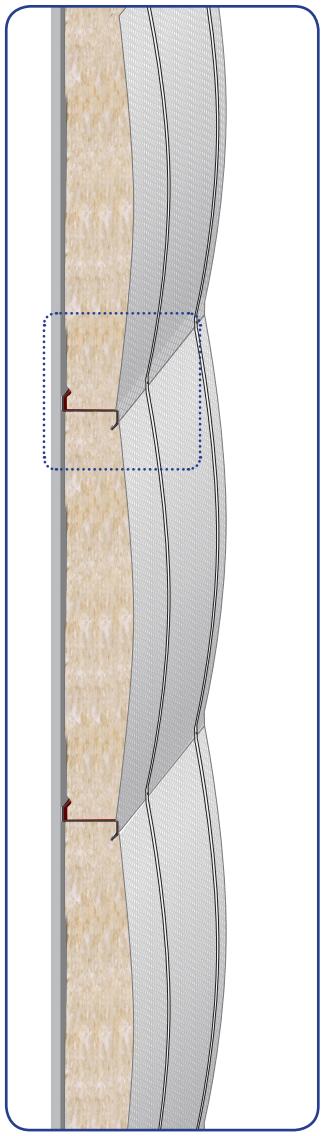
Suggested Practices:

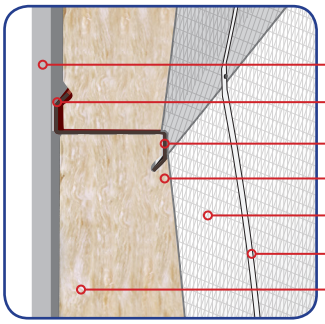
- *Only install the insulation as far out as you can cover with wall panels in one day or as weather permits.*
- *Do not leave any insulation exposed overnight; the system is not designed to be exposed to heavy rain or snow.*
- *As the erector/installer, you assume responsibility for all materials once on-site. It is in your best interest to protect the insulation from getting wet.*

Note:

These instructions are meant to be a guide; they are not the only way to install this type of system. Modifications will likely be necessary to accommodate project variables. A cross section diagram has been provided to illustrate the final installed system.

Filled Cavity – Single Layer Wall Systems
Installation Instructions (cont)





- Wall Panel
- Foam Thermal Break Strip
- Wall Girt
- Cavity Fill Unfaced Insulation (R-25 or R-30)
- Lamtec Facing
- Banding
- Insul-Hold (behind insulation)

IECC 2018 / ASHRAE 2016 Fiberglass Solutions

IECC 2018 Building Envelope Requirements, Table C402.1.4 Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.079	0.059*	Single Layer, Filled Cavity Fiberglass System - R-25 with 1/8" Foam Thermal Break Strip
2			
3			
4	0.052	0.052*	Single Layer, Filled Cavity Fiberglass System - R-30 with 1/4" Foam Thermal Break Strip
5			
6			
7			
8			

* Use with COMcheck - Other Metal Building Wall

IECC 2018 Building Envelope Requirements, Table C402.1.4 Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[a]	0.044	0.037**	Filled Cavity / Long Tab Banded Insulation System - Faced R-19 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
2[a]	0.035	0.035**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
3[a]			
4			
5			
6	0.031	0.029**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-19 with Thermal Blocks and Standing Seam Roof
7	0.029		
8			

** Use with COMcheck - Other Metal Building Roof

[a] Metal Building roofs with a slope less than 2:12, installed directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the following options; 3 year aged Solar Reflectance of 0.55 and a 3 year aged Thermal Emittance of 0.75 or a 3 year aged Solar Reflectance Index of 64, see C402.3 for a list of exceptions.

ASHRAE 90.1-2016 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.094	0.059*	Single Layer, Filled Cavity Fiberglass System - R-25 with 1/8" Foam Tape
2			
3			
4	0.060		
5	0.050	0.042*	Double Layer, Filled Cavity Fiberglass System - R-25 plus R-16 (If both fiberglass layers are faced with a vapor retarder, the vapor retarder toward the cold side of the building MUST be perforated)
6			
7	0.044		Double Layer, Filled Cavity Fiberglass System - R-30 plus R-16 (If both fiberglass layers are faced with a vapor retarder, the vapor retarder toward the cold side of the building MUST be perforated)
8	0.039	0.039*	

* Use with COMcheck - Other Metal Building Wall

ASHRAE 90.1-2016 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[b]	0.041	0.037***	Filled Cavity / Long Tab Banded Insulation System - Faced R-19 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
2			
3			
4	0.037		
5			
6	0.031	0.029***	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-19 with Thermal Blocks and Standing Seam Roof
7	0.029		
8	0.026	----	----

*** Use with COMcheck - Other Metal Building Roof

[b] Metal Building roof panels installed directly above cooled conditioned spaces in Climate Zone 1, shall comply with a minimum 3 year aged Solar Reflectance value of 0.55 and a minimum 3 year aged Thermal Emittance of 0.75 or a minimum 3 year aged Solar Reflectance Index of 64, if not, the roof insulation must be increased by installing a system with a maximum U - Factor of 0.028.

IECC 2015 / ASHRAE 2013
Fiberglass Solutions

IECC 2015 Building Envelope Requirements, Table C402.1.4 Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.079	0.059*	Single Layer, Filled Cavity Fiberglass System - R-25 with 1/8" Foam Thermal Break Strip
2			
3			
4	0.052	0.052*	Single Layer, Filled Cavity Fiberglass System - R-30 with 1/4" Foam Thermal Break Strip
5			
6			
7			
8			

* Use with COMcheck - Other Metal Building Wall

IECC 2015 Building Envelope Requirements, Table C402.1.4 Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[a]	0.044	0.037**	Filled Cavity / Long Tab Banded Insulation System - Faced R-19 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
2[a]	0.035	0.035**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
3[a]			
4			
5			
6	0.031	0.029**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-19 with Thermal Blocks and Standing Seam Roof
7	0.029		
8			

** Use with COMcheck - Other Metal Building Roof

[a] Metal Building roofs with a slope less than 2:12, installed directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the following options; 3 year aged Solar Reflectance of 0.55 and a 3 year aged Thermal Emittance of 0.75 or a 3 year aged Solar Reflectance Index of 64, see C402.3 for a list of exceptions.

ASHRAE 90.1-2013 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.094	0.059*	Single Layer, Filled Cavity Fiberglass System - R-25 with 1/8" Foam Tape
2			
3			
4	0.060		
5	0.050	0.042*	Double Layer, Filled Cavity Fiberglass System - R-25 plus R-16 (If both fiberglass layers are faced with a vapor retarder, the vapor retarder toward the cold side of the building MUST be perforated)
6			
7	0.044		Double Layer, Filled Cavity Fiberglass System - R-30 plus R-16 (If both fiberglass layers are faced with a vapor retarder, the vapor retarder toward the cold side of the building MUST be perforated)
8	0.039	0.039*	

* Use with COMcheck - Other Metal Building Wall

ASHRAE 90.1-2013 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[b]	0.041	0.037***	Filled Cavity / Long Tab Banded Insulation System - Faced R-19 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
2			
3			
4	0.037		
5			
6	0.031	0.029***	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-19 with Thermal Blocks and Standing Seam Roof
7	0.029		
8	0.026	----	----

*** Use with COMcheck - Other Metal Building Roof

[b] Metal Building roof panels installed directly above cooled conditioned spaces in Climate Zone 1, shall comply with a minimum 3 year aged Solar Reflectance value of 0.55 and a minimum 3 year aged Thermal Emittance of 0.75 or a minimum 3 year aged Solar Reflectance Index of 64, if not, the roof insulation must be increased by installing a system with a maximum U - Factor of 0.028.

IECC 2012 / ASHRAE 2010
Fiberglass Solutions

IECC 2012 Building Envelope Requirements, Table C402.1.2 Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.079	0.059*	Single Layer, Filled Cavity Insulation System - R-25 with 1/8" Foam Thermal Break Strip
2			
3			
4	0.052	0.052*	Single Layer, Filled Cavity Insulation System - R-30 with 1/4" Foam Thermal Break Strip
5			
6			
7			
8			

* Use with COMcheck - Other Metal Building Wall

IECC 2012 Building Envelope Requirements, Table C402.1.2 Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[a]	0.044	0.037**	Filled Cavity / Long Tab Banded Insulation System - Faced R-19 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
2[a]	0.035	0.035**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof
3[a]			
4			
5			
6	0.031	0.029**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-19 with Thermal Blocks and Standing Seam Roof
7	0.029		
8			

** Use with COMcheck - Other Metal Building Roof

[a] Metal Building roofs with a slope less than 2:12, installed directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the following options; 3 year aged Solar Reflectance of 0.55 and a 3 year aged Thermal Emittance of 0.75 or an initial Solar Reflectance of 0.70 and an initial Thermal Emittance of 0.75 or a 3 year aged Solar Reflectance Index of 64 or an initial Solar Reflectance Index of 82, see C402.2.1.1 for a list of exceptions.

ASHRAE 90.1-2010 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.093	0.093	Single Layer, Faced R-16 Fiberglass Blanket
2			
3	0.084	0.084	Single Layer, Faced R-19 Fiberglass Blanket
4			
5	0.069	0.059*	Single Layer, Filled Cavity Insulation System - R-25 with 1/8" Foam Thermal Break Strip
6			
7	0.057	0.052*	Single Layer, Filled Cavity Insulation System - R-30 with 1/4" Foam Thermal Break Strip
8			

* Use with COMcheck - Other Metal Building Wall

ASHRAE 90.1-2010 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[b]	0.065	0.065	Single Layer, Faced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
2	0.055	0.055	Double Layer, Faced R-13 plus Unfaced R-13 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
3			
4			
5			
6	0.049	0.049	Double Layer, Faced R-13 plus Unfaced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
7			
8	0.035	0.035**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof

** Use with COMcheck - Other Metal Building Roof

[b] Metal Building roof panels installed directly above cooled conditioned spaces in Climate Zone 1, shall comply with a minimum 3 year aged Solar Reflectance of 0.55 and a minimum 3 year aged Thermal Emittance of 0.75 or a minimum 3 year aged Solar Reflectance Index of 64, if not, the roof insulation must be increased by installing a system with a maximum U - Factor of 0.028.

IECC 2009 / ASHRAE 2007
Fiberglass Solutions

IECC 2009 Building Envelope Requirements, Table C502.1.2 Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.093	0.059*	Single Layer, Filled Cavity Fiberglass System - R -25 with 1/8" Foam Thermal Break Strip
2			
3	0.084	0.059*	Single Layer, Filled Cavity Fiberglass System - R-25 with 1/8" Foam Thermal Break Strip
4			
5	0.069	0.059*	Single Layer, Filled Cavity Fiberglass System - R -25 with 1/8" Foam Thermal Break Strip
6			
7	0.057	0.052*	Single Layer, Filled Cavity Fiberglass System - R -30 with 1/4" Foam Thermal Break Strip
8			

* Use with COMcheck - Other Metal Building Wall

IECC 2009 Building Envelope Requirements, Table C502.1.2 Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.065	0.065	Single Layer, Faced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
2	0.055	0.055	Double Layer, Faced R-13 plus Unfaced R-13 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
3			
4			
5			
6	0.049	0.049	Double Layer, Faced R-13 plus Unfaced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
7			
8	0.035	0.035**	Filled Cavity / Long Tab Banded Insulation System - Faced R-25 plus Unfaced R-11 with Thermal Blocks and Standing Seam Roof

** Use with COMcheck - Other Metal Building Roof

ASHRAE 90.1-2007 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Walls			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1	0.113	0.113	Single Layer, Faced R-13 Fiberglass Blanket
2			
3			
4			
5			
6			
7	0.057	0.052*	Single Layer, Filled Cavity Fiberglass System - R -30 with 1/4" Foam Thermal Break Strip
8			

* Use with COMcheck - Other Metal Building Wall

ASHRAE 90.1-2007 Building Envelope Requirements, Table 5.5 Non-Residential Metal Building Roof			
Climate Zone	Prescriptive Maximum U-Factor	Compliance Options	
		U - Factor	Assembly Description
1[a]	0.065	0.065	Single Layer, Faced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof
2[a]			
3[a]			
4			
5			
6			
7			
8	0.049	0.049	Double Layer, Faced R-13 plus Unfaced R-19 Fiberglass Blanket with Thermal Blocks and Standing Seam Roof

[a] For Metal Building roof panels installed directly above conditioned spaces that are not cooled, where the exterior surface has a Solar Reflectance of 0.70 and a minimum Thermal Emittance of 0.75 or a Solar Reflectance Index of 82, the roof insulation shall comply with a maximum U - Factor of 0.084 for Climate Zone 1, U- Factor of 0.078 for Climate Zone 2, and a U-Factor of 0.076 for Climate Zone 3.

Frequently Asked Questions

1. Energy Codes and Standards use the term prescriptive path. Does prescriptive path mean it is the only option available to demonstrate energy code compliance?

No, alternate systems can easily be substituted using COMcheck or other compliance programs.

2. Can systems not listed in the ASHRAE tables be used to comply with the energy codes?

Absolutely, there are many higher performing and lower cost systems not listed in the tables. As long as there is supporting test or modeling data, the design professional can use alternative systems to satisfy compliance requirements for the building envelope.

3. Is there an advantage to using a higher performing system than prescribed by code?

Yes, the trade-off option allows the specifying and design professional to trade an energy efficient component or assembly in one area with a less energy efficient component in another area, using COMcheck to verify conformity. An example of this approach would be to enter a higher performing roof system into COMcheck, which could offset a lesser performing system for the walls or other areas. The trade-off option can be less restrictive than the prescriptive approach. You are able to modify the components and assemblies of the building design and still satisfy the compliance requirements of the building envelope.

4. What is a Filled Cavity system?

A Filled Cavity system is one that fills the cavity between the purlins / roof panel or girts / wall panel with insulation. There are two types of Filled Cavity systems: Long Tab Banded and Liner.

5. Today's stringent energy codes appear very restrictive and costly with the prescribed insulation options. Do I have any flexibility to value engineer my insulation system design?

Yes, by using the COMcheck trade-off option process and selecting the "Other, Metal Building roof / wall" category, a filled cavity roof or wall insulation system can be substituted to demonstrate compliance. This option allows the specifying and design professionals to trade an energy efficient component or assembly in one area with a less energy efficient component in another area, using COMcheck to verify conformity. An example of this option would be to enter a higher performing roof insulation system which could offset more costly windows, skylights, doors, or other assemblies. This value engineering design approach can be less restrictive than the prescriptive path. You are able to utilize less costly components and assemblies in the building design while still satisfying the compliance requirements of the building envelope. Currently the COMcheck program does not allow trade-offs between the building envelope and lighting or HVAC equipment.

Frequently Asked Questions (cont)

6. What is the difference between Long Tab Banded and Liner Systems? Is one system better than the other?

Both systems fill the cavity, the only difference is the orientation of the facing tabs.

- Long Tab Banded facing tabs are installed tight against the purlin and over-lapped on top of the flange to maintain the continuity of the vapor retarder, see Figure 1.

- Liner facings are installed under the purlins, see Figure 2.

A. Both can be considered Filled Cavity systems.

B. Both when properly installed, fill the cavity between the purlins.

C. Both systems will provide comparable U-Factor results.

D. Both systems, when installed properly, can provide a continuous vapor retarder.

E. Long Tab Banded systems allow for much easier access to the purlins for installation and maintenance of electrical, HVAC, and sprinkler systems without the unsightly penetrations associated with Liner systems. These penetrations can compromise the integrity of the vapor retarder and insulation system.

Figure 1 - Long Tab Banded

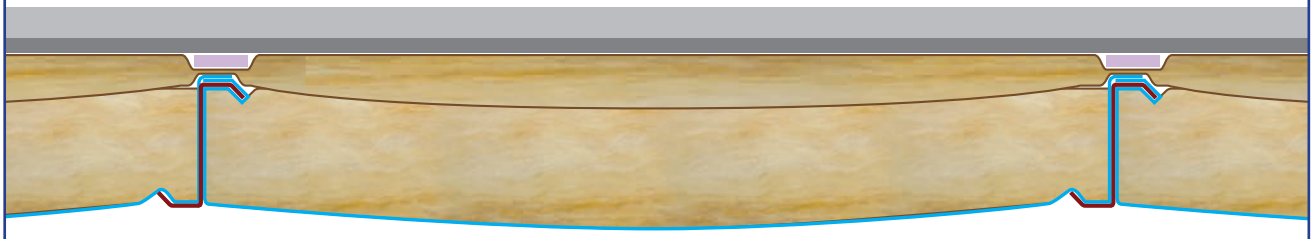
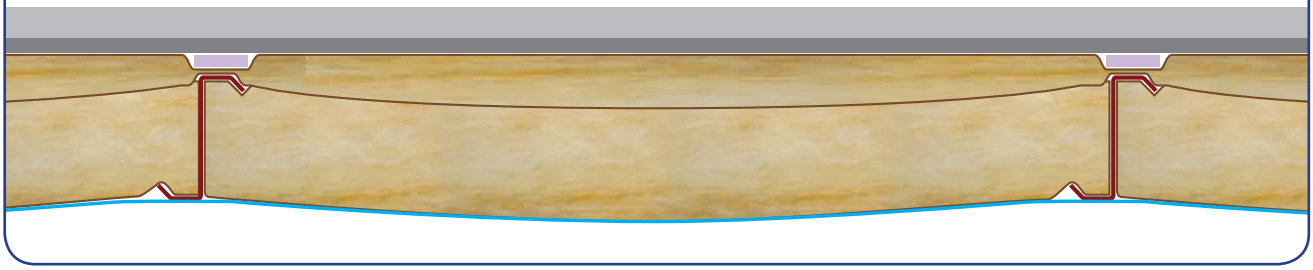


Figure 2 - Liner System



NOTE: The Vapor Retarders have been illustrated in blue for emphasis.

11/2016