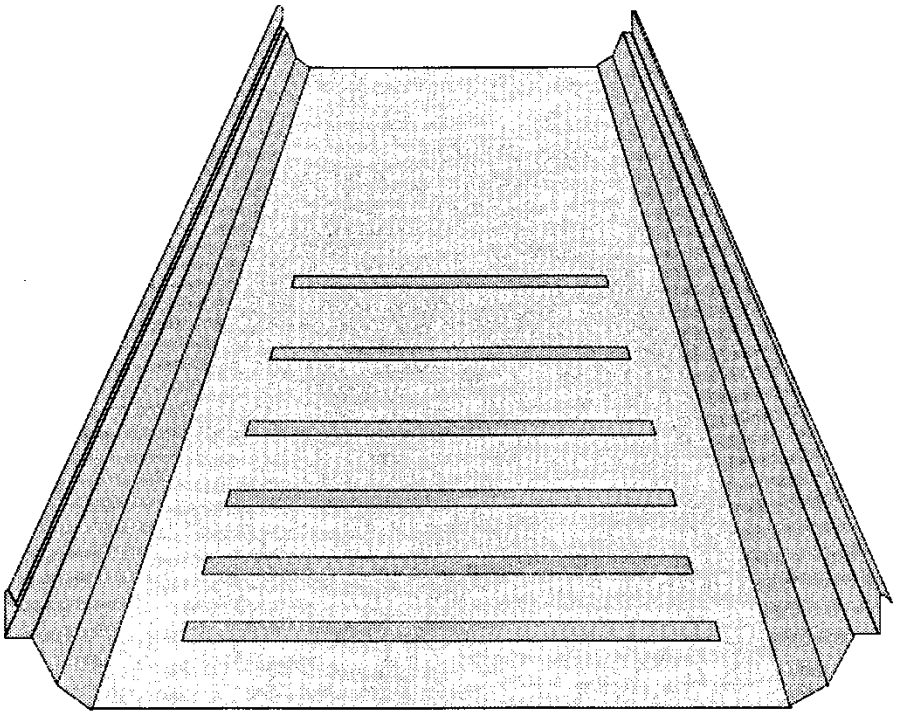
BUTLER®



**MAY 2011**

**AUSTRALIA – VERSION 1**

# Introduction

This manual is furnished as a supplement to the other Erection Manuals and drawings. The design features of the MR-24® roof system call for careful planning in handling and locating panels on the structure well in advance of the actual installation to avoid costly delays.

**Note:** Variations from the contents of the manual can occur because of specific customer requirements and subsequent engineering changes. Always refer to the Erection Drawings supplied with the shipment which will govern specific part and assembly arrangements and applicable installation details.

# Table of Contents

# Safety Guidelines

## Safety

Safety must be a prime concern throughout the entire erection process. This manual contains safety information that is important for all workers to know and understand. It is not possible to present complete and comprehensive safety instructions in this manual. All local, state and Federal OHS safety regulations must be followed at all times. The erection contractor has the ultimate responsibility for the safety of workers and must comply with all applicable safety regulations.

These OSHA Regulations should be recognized as a job site requirement and must be fully complied with. Failure to do so may result in worker death or injury as well as substantial fines in the event of an OHS inspection.

**RECOGNISE SAFETY INFORMATION**

This is the safety-alert symbol. When you see this symbol in this manual, be alert to the potential for personal injury. Follow recommended precautions and safe practices.

### Follow Safety Instructions and Warnings

Carefully read and follow all safety and warning messages in this manual as well as the Operating Instructions for the Roof Runner® seaming machine ("seamer") and the starting platform and all applicable erection drawings.

All bundles of roof panels have numerous "Roof Panel Warning Labels" attached to them. This label is designed to inform workers of the hazards associated with falls from roof panels. A copy of this label is found in this manual on page 7.

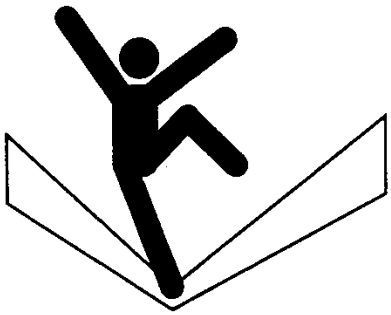
The “Roofing Work Safety Instructions" set out in detail the hazards involved in roof installation as well as suggestions on how to prevent falls and a copy of these instructions is found in this manual.

Eight copies of the Roofing Work Safety Instructions, eight copies of the Roof Panel Warning Label and one “Sign Off Sheet" are provided in the “Roof Warning Packet" that is sent with each roof order The envelope of this packet provides instructions to the roofing crew supervisor to hold a safety meeting and review the Roof Panel Warning Label and Roofing Work Safety Instructions with each member of the roofing crew before roof installation begins.

# A WARNING

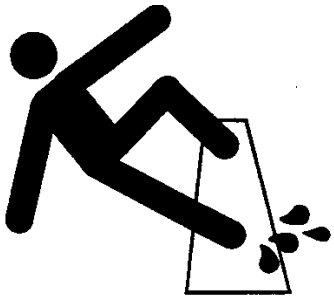
**You may fall from roof and be killed or seriously injured.**

## Any panel can collapse.



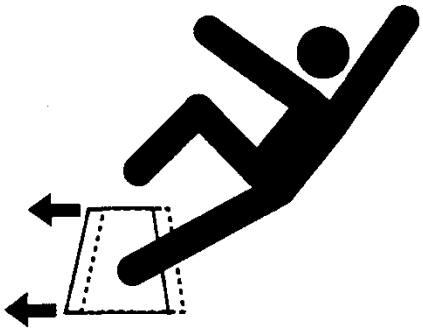
- **Do not step on panels with creased edges.**
- **Do not step on or NEAR edge of panel.**
- **Do not step within 5 feet of panel end.**

## Panels are slippery.



- **Use fall protection.**

## Loose panels may slide out from under you.



- **Do not step on loose panels or stacks of panels.**

## Always use fall protection.

- **Read "Roofing Work Safety Instructions"**

## Roofing Work Safety Instructions

Working off the ground even a few feet can be extremely dangerous. Falls from any height can be fatal. You should be aware of the following hazards while installing roof panels:

### I. Panels can collapse

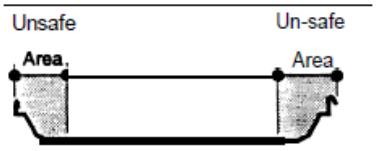
MR24® roof panels can be a safe walking surface (except for slipperiness caused by oil or moisture) ONLY when they are completely seamed.

Panels not completely seamed on each side **are not safe** and can collapse suddenly and without warning.

When installing roof panels, **always** use fall protection.

Follow these additional safety precautions:

1. Never step, kneel or place weight on the raised edge of an MR24®.




2. Use extra care when installing panels with creased or kinked corrugation or edges. Placing weight on any portion of such a panel may cause the panel to collapse.

3. Never stand or work within 1.5m from the end of a panel that is not fully seamed or fastened.

4. When fastening a panel to the structural, stand toward the middle away from the raised edge or edge corrugations of the panel and directly over the roof structural.

5. Never allow more than one worker to stand or work on the same panel between two roof structurals.

**Never use unattached roof panels as a work platform for any purpose.** This is an extremely hazardous practice and should never be done.

### II. Panels can be slippery due to oil or moisture

All roof panels, whether painted or unpainted, are slippery to walk on. Unpainted roof panels are coated with a clear fluid to aid in manufacturing and to protect them from rust during shipping and storage. This fluid contains a small amount of oil which can make the panels very slippery to walk on.

The fluid may leave a coating of oil on the soles of your work boots. This coating may cause you to slip and fall even when you are no longer working on a roof panel.

If a bundle of panels is stored on a slight slope, the oil may run down hill on warm days and collect on one portion of the pane.ls. This makes the oily portion of the panels even more slippery than normal.

Dew, frost or any other moisture on roof panels, whether painted or unpainted, greatly increases the slipperiness of the panels and extra care should be taken. The pitch of the roof (its slope) can also increase the hazard.

Because of these hazardous conditions, it is essential that fall protection be used at all times. It is also recommended that walk-boards be used in the flat of the panel when installing roof panels.

**III. Loose panels may slide out from under you**

Never step on a single roof panel or a stack of several roof panels lying unattached on the roof structurals. The bottom side of roof panels may also have an oil coating. If you step onto a single panel lying unattached on the roof structurals, it may slip causing you to lose your balance and fall. Even a stack of several panels lying unattached on the roof structurals may slip if you step on it.

## How to Prevent Roof Falls

1. **Always use fall protection** - including but not limited to, lifelines, safety belts, lanyards, safety nets, scaffolding, man-lifts, catch platforms, and Sky-Web®.
2. **If You Need a Work Platform** - for laying insulation or any other purpose, you should use a runway as specified in OH&S legislation (A walkboard at least 450mm wide with a toe board and a 1m high railing made of 2 x 4's on one side with another rail halfway between the toe board and the top rail.) **Never** use unattached or partially attached panels as a work platform.
3. **To Avoid Slipping** - wear good work boots while on the roof. The danger from a slip is greatest while installing roof panels or insulation at the edge of the roof. Use walkboards in the flat of panels when installing panels. When working near the edge of the roof, you should use fall protection such as safety lines, safety nets, a catch platform or the like.
4. **To Prevent Panels from Slipping** - Do not step on loose roof panels or even a stack of several roof panels.
5. **Walkboards** - One method to add stability to panels and prevent slips at the leading edge and the eave is to place walkboards in the flat of panels. The boards should run the full length of the roof slope and should be fastened together by drilling a hole near the ends of each board and tying it to the next board with rope. Cut a groove in the bottom of each board so that the board will lie flat and not tip back and forth because of the rope. This will prevent the boards from slipping out from under you when you step on them. Walkboards are not a substitute for appropriate fall protection.

### Fall Protection

Fall protection is required when working at heights. There are many types of fall protection devices available and the erection contractor is responsible for making sure the appropriate device is used in accordance with all local, state and OH&S legislation. Examples of some fall protection devices are:

- Safety belts and lines

- Safety lanyards
- Safety nets
- Catch platforms
- Scaffolds

In additional to the above devices, fall protection at the leading edge of the roof can also be accomplished by utilizing the Sky-Web® fall protection and insulation support system offered by Butler.

The Sky-Web system is an open polyester scrim mesh interwoven on an approximately one half inch by one half inch square grid. The mesh is securely fastened around the perimeter of the building providing workers with protection from falls from the leading edge of roof area The Sky-Web system, once installed, also offers workers below protection from certain falling objects such as tools, roof seamers and roof panels.

**IMPORTANT:** The Sky-Web system protects only the leading edge of the roof surface and other methods of fall protection must be used at the remaining perimeter of the roof. Further, the Sky-Web system does not provide fall protection from heights greater than the plane of the roof and adequate fall protection must be used while installing the Sky-Web system.

For further information on the application, availability and cost of the Sky-Web system, call BlueScope Buildings.

A "safety" clamp suited for use on a fully seamed MR24® roof system is also. The clamp must be attached to a fully seamed panel, the flange of the clamp must be booked to the seam before the three bolts are tightened and connected to a safety line of proper length. BlueScope does not endorse the use of this clamp and does not represent that this clamp meets any local, state or OHS requirement or legislation.

## Roof Runner Seaming Machine and Starting Platform Safety

Installation of the MR24® roof system requires the· use of a seamer and a starting platform. Detailed operation instructions are on page 46 of this manual. In addition, follow the following safety guidelines:

- Always use fall protection when installing panels or working near roof edges.
- Make sure seaming follows laying of panels as closely as possible.
- Locking pliers (not supplied by Butler Manufacturing Company) used to attach starting platform to panels must be in good condition and adjusted to resist a good hard pull (60 pounds).
- Never straddle the starting platform or counter balance the Roof Runner seaming machine with your own weight.
- Never step on the starting platform pan.
- Never tie power cords together or to the seamer.
- Never “ride” the seamer or block vents on the motor in any way.
- Keep the path of the seamer clear at all times and power cords free of entanglements.

The following warning decal is attached to the starting platform pan:


Failure to heed these warning can result in serious injury or even death.

## Other Roof Installation Hazards

INSULATION - Blanket insulation has no load bearing strength and cannot support a workers weight. Always use fall protection. The use of fiberglass blanket insulation may cause an allergic or other physical reaction to some people.

WIND - Carrying roof panels on windy days is extremely hazardous. Panels may act like a sail, throwing you off balance and causing you to fall. Blown panels may also hit and injure other workers.

BUTLER LITE*PANL• translucent roof panel - Do not walk or stand on Lite*Panl roof sheets at any time. Always place walkboards on or barricades around Lite*Panl roof sheet area

# Material Handling and Storage

## Handling Panels

### Full Crates: Unloading and Storage

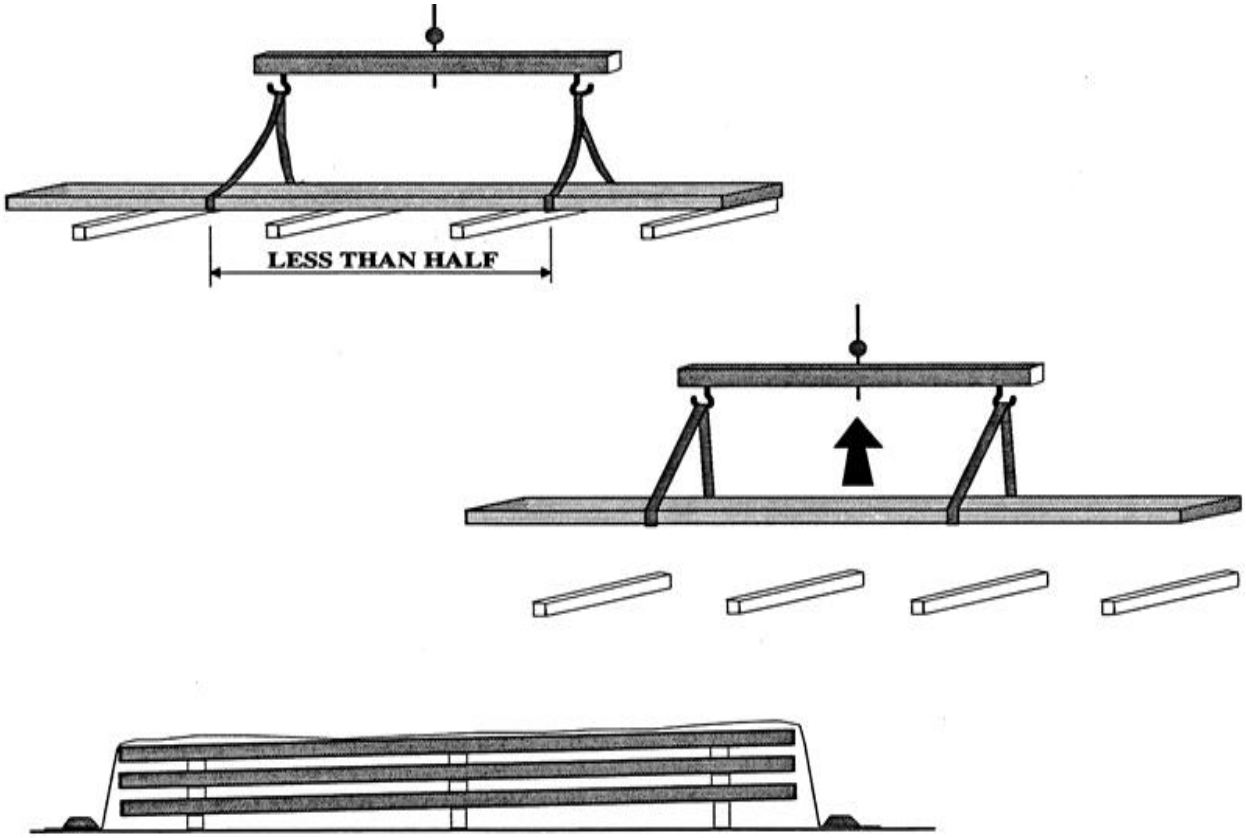
When unloading crates of panels upon arrival of shipment or handling to preload onto roof structurals, it is important to rig the bundles properly for a safe lift.

Incorrect handling may break the panel crate, severely damaging panels beyond use.

When using a crane and wire rope sling, examine the wood crating to make sure the wood prevents the slings from damaging the panels. Nylon slings are necessary when handling crates that have been opened or no longer have the wood crating for protection. The distances between the slings should be a little less than half the length of the panel.

With 12m panels, the slings should be a little less than 6m apart, which will allow the bundle to arch slightly as the lift is made. The use of a spreader bar is preferred.

When using a forklift for unloading, spread the forks and make a test lift at the centre of the crate. If upward bow is not excessive, carefully lift. If the crates are too long or the fork cannot be used under the crate safely, use a spreader bar and slings from the forks. Normal crates of 32 panels will weigh approximately 1820kg maximum. When unloading and storing at jobsite, always place dunnage under the crate, cover and slope for drainage of water from rain or snow.



## Full Crates: Preloading

Plan where and how panels will be loaded on the roof structurals. Decide whether to preload as the structurals are being erected or wait until after structurals are complete.

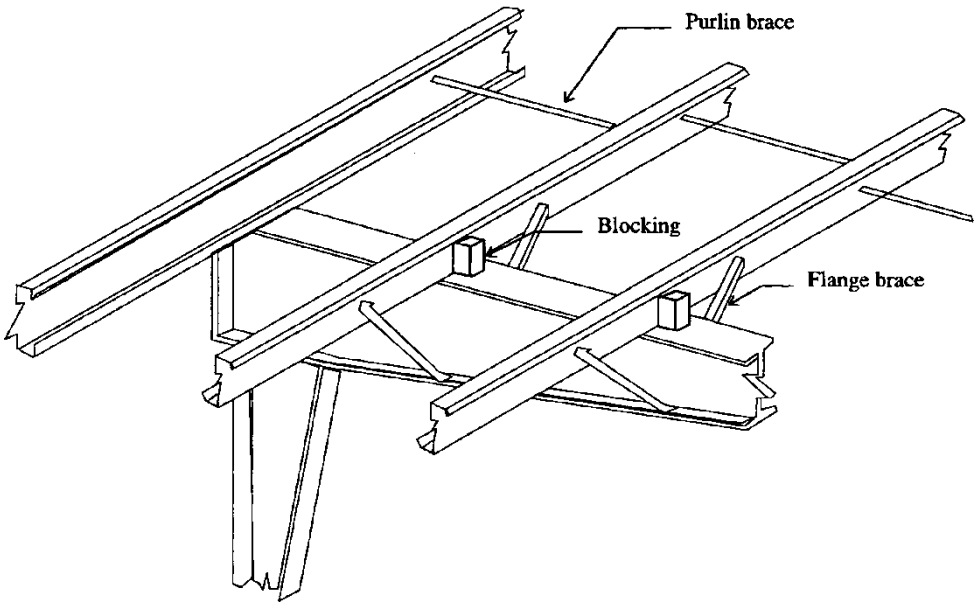
Preloading is usually the most effective method on moderate to large buildings, but individual project details must be taken into consideration: the buildings size, site condition, the type or method of installing insulation and equipment to be used.

To help you with your preload planning, a panel location schedule is furnished with the erection drawings indicating the roof area covered by the contents of each panel bundle.

IMPORTANT: Full bundles of panels are t90 heavy to load onto roof structurals at mid-bay locations and should be positioned near the main frames.

On standard purlin structural systems, the "Z" purlin should be blocked for additional support. This blocking can be made from dunnage or crate material cut to the height of the "Z" purlin and positioned under the flange of the purlin and bear on the main frame top flange.

Install all purlin and flange braces and all bolts and nuts before preloading.



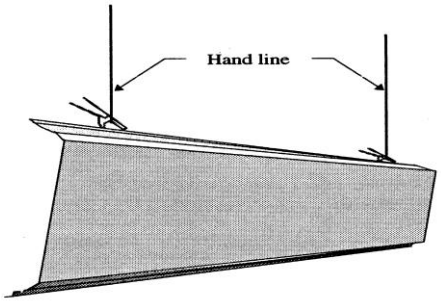

**On truss purlin structural systems, no blocking is required but full crates of panel bundles should still be positioned near the main frames.**

## Single Panel

To prevent buckling of the panel when band carrying a single panel, two workmen should grip the corrugation edge on the same side of the panel and lift in unison, distributing the

weight, allowing the panel to bang sideways. Longer panels may require another workman in the middle.

CAUTION: Always wear gloves when handling panels.




When handling panels from the ground to the roof, use locking pliers type clamps over the corrugation edge positioned toward each end to distribute the weight Attach a line to the clamps and then pull the lines smoothly up to the roof allowing the panel to bang sideways.

WARNING: Carrying roof panels on windy days is extremely hazardous. Panels may act like a sail throwing you off balance and causing you to fall. Always use fall protection.

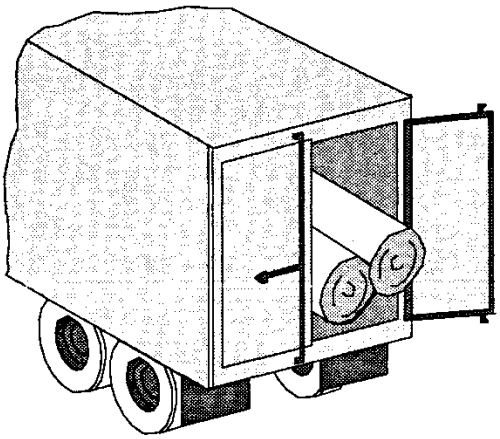
Blown panels may also hit and injure other workers. Keep loose panels secured to prevent wind damage.

Bundles of loose panels should be banded to the purlins at the end of the work day. Steel banding should be tensioned so that wind will not loosen the bundle. Using a rope or wire lashup may allow the panel to loosen during a strong wind resulting in panel damage.

## Insulation Storage

Inspect the insulation upon arrival at the jobsite to insure that it is exact as ordered. If the insulation is defective, it should not be installed and the supplier should be contacted immediately.

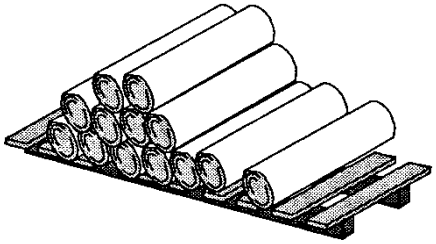
Insulation must be stored in a dry protected area. A storage trailer provides very good protection.



If a dry protection area is not available at the site, the insulation should be placed at the end of the building where the roof panels will first be applied. This will provide protection for the

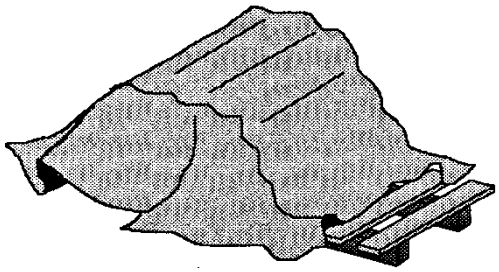
insulation material until the building is completed.

Elevate all packages above the ground or slab to prevent possible contact with surface water. Facings utilizing Kraft paper are especially susceptible to moisture. All facings are fragile and subject to impact damage. Care in handling must be exercised. Do not allow the rolls of insulation to be thrown off the shipping vehicle, kicked, or placed in contact with sharp objects during storage.



Plastic bags used for wrapping should have holes in each end to ventilate the insulation. Do not remove plastic bags until insulation is needed.

Packages can be left uncovered during the day, weather permitting, but should be protected at night with a tarp or other covering.



Use the insulation as soon as possible after delivery. On large projects, the insulation can be supplied in phases as construction progresses. The longer the insulation is in storage, the more likely it will be damaged or stolen.

## Hardware, Fasteners and Sealant Storage

All building materials used for the roof installation should be checked, separated and stored in a dry protected area so that they are not damaged, stolen or lost before using.

Do not store heavy materials on boxes of sealant as this will damage the sealant beyond use.

## Trims and Flashing

Check these parts· for damage and store in a protected area. The trim parts may be covered with a strippable film to eliminate transit scratching. If the part is not to be protected from the weather while in storage, then the film must be removed. This is to avoid sun exposure which will make the film brittle and difficult to remove.

Strategically place materials so they are near their use to prevent unnecessary handling.

## Equipment and Tools

Installation procedures illustrated in this manual will require the following tools and materials:

- Roof Runner seaming machine - leased from BlueScope Buildings.
- Starting platform - furnished with first seamer lease.
- Derailer - furnished with first seamer lease.
- Lock-Rivet™ fastener tools- purchased from Dynamic Fastener Service.
- Nylon slings 10cm wide 3m & 3.6m long or 12mm cable, 3m & 4.2m long, eyes both ends.
- Electric Impact Wrench – 12mm drive with 12cm long drive extension and 9.5mm magnetic socket.
- Electric drill with 8mm and 3.5mm drill bits.
- Double faced insulation tape or adhesive.
- Aligning punches, tapered 30mm to 9mm x 220mm long-sharpened.
- Open barrel caulking gun.
- Steel banding equipment or rope.
- Speed wrench with 10mm socket.
- Hardhats.
- Utility knife.
- Gloves.
- Insulation stapler and staples.
- Locking pliers.
- Blind rivet pulling tool.
- Hacksaw.
- Tin snips - right and left.
- Steel tape measure.
- Dry string line.
- Tarps or plastic sheeting.
- Hand lines.
- Appropriate fall protection equipment including: body safety belt; safety nets; safety line/lanyard; catch platform; Sky-Web system; safety clamp; etc.

The installation of Scrubolt fasteners will require a 12mm square drive impact wrench using a 9mm Hex, 1/2 drive magnetic socket An extension drive at least 12m long will also be required when installing the Scrubolt for panel clip attachment and ridge closure.

All other tools are the normal tools required for the installation of pre-engineered buildings with the exception of the seamer, starting platform and derailer which are covered later in the manual.

# Fasteners

## Description

The shipping manifest will list the use location of the roof fasteners that are shipped for each roof. The use location may also be shown on the roof panel layout drawing. The code and description of the fasteners listed in this manual are:

- 095984 AIZN head steel Scrubolt fastener
- 096902 Scrubolt fastener
- 097196 Scrubolt fastener - green
- 096306 Lock-Rivet fastener- green washer
- 096583 Lock-Rivet fastener- gold washer
- 097190 Stainless steel flange nut
- 097124 Blind rivet

## Fastener installation: Scrubolt fasteners

These fasteners are designed to fasten materials together by making threads in structurals with factory punched holes.

Install Scrubolt fasteners with a 12mm drive impact wrench with a 10mm magnetic socket. Drive Scrubolt fasteners until materials to be joined are pulled together and continue to tighten until the neoprene begins to expand just beyond the edge of the metal washer.

**Un-driven**

**Correctly Driven**

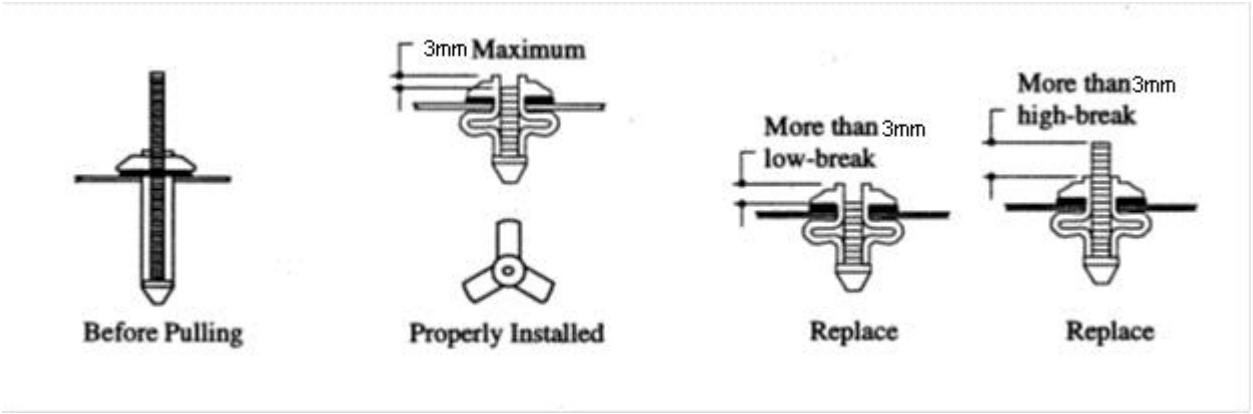
**Over Driven**

## Fastener Installation: Lock-Rivet Fasteners

- All holes for Lock-Rivet fasteners should be factory pre-punched or drilled with an 8mm diameter bit. To function properly the rivet must be used in a free-fit hole surrounded by a flat, smooth surface.
- The lock rivet must be perpendicular to the surface and firmly seated against the surface before the pulling tool is used. The pulling tool is manufactured by Olympic Fastening Systems and distributed by Dynamic Fastener Service.
- A properly installed rivet will be firmly seated and occasionally a very small part of the neoprene washer will be showing.
- A properly installed rivet will always have three tines expanded on the underneath side.
- The rivet stem will break off from a point slightly above the head to a point as much

as 3mm below. If the break off point is more than 3mm below the head, a malfunction is indicated, and the rivet should be replaced.

- If the rivet stem breaks off high, it is because of using the wrong fastener for the grip range or the pulling head of the tool needs repair; these should be replaced
- To remove a malfunctioned rivet, first drive the stem down with a tapered punch and cut through the head of the rivet with Lock-Rivet fastener cutters, which can be purchased from Dynamic Fastener Service. As an alternative method, hold the head of the fastener with pliers and drill the centre of head out with a 8mm diameter bit.




## Sealants

The use and proper application of all sealants shown in this manual or on the erection drawings is critical. All surfaces in contact with sealant must be clean.

Install roll sealant by pressing on the paper backing to get good adhesion and work into surfaces. To cut, use a utility knife. Never attempt to tear the sealant or it will stretch. Remove paper backing just before laying the lapping material.

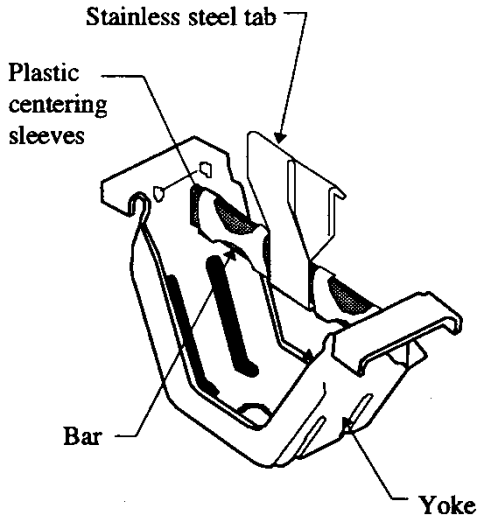
When using cartridge sealant, pay special attention to the size of bead that is required. The code and description of sealant listed in this manual are:

- 025392 Cartridge type Panlastic® sealant with embedded nylon cubes
- 016688 Cartridge type grey sealant
- 027893 Ribbon type Panlastic sealant 3mm x 25mm x 7.5m roll with embedded nylon cubes
- 560185 Foam type sealant 20mm x 18m roll
- 042717 Pre-cut 25mm ribbon type Panlastic sealant with embedded nylon cubes

## Panel Clips

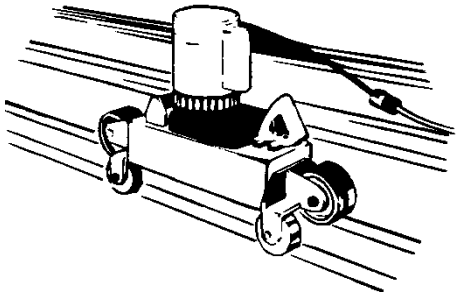
The MR-24™ roof system differs considerably from other metal building roof systems because of the unique method used to fasten the roof panels to each other and to the structurals. There are no through fasteners used with these roof panels except at the eave structurals. Instead, panels with factory applied sealant are joined together by a mechanically formed lock seam. Concealed clips secure the panels to the roof structurals.

These clips have a wrap-around stainless steel tab that is rolled into the Pittsburgh double-lock standing seam. A tab is wrapped around a bar that is attached to the roof structural by a yoke. When the roof expands or contracts, the tab moves on the bar to compensate for the movement without damage. The tabs are centred by plastic sleeves that break away as movement occurs.



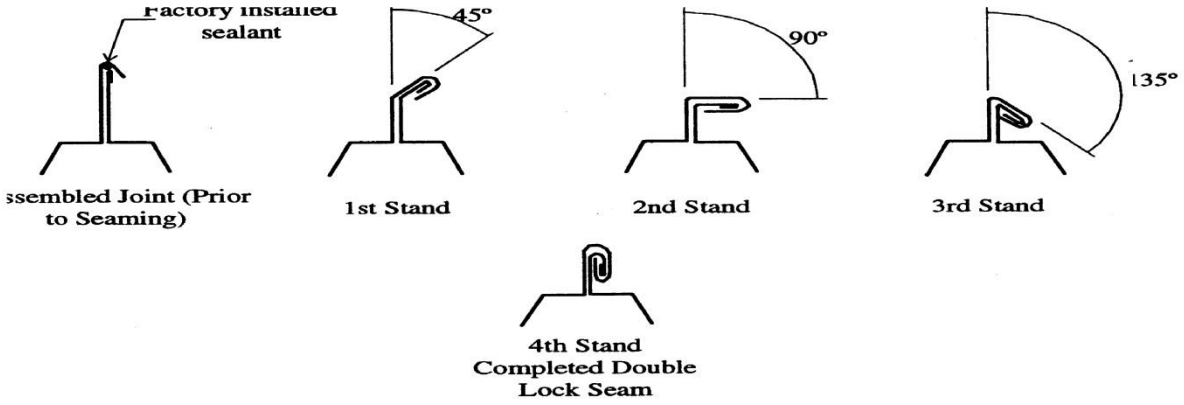
# Roof Runner Seaming Machine

The Pittsburgh double-lock seam at the panel side lap is made with a self-propelled machine, the seamer. This machine, operated by one man quickly wraps, compresses, locks and seals the standing edges of adjacent roof panels in one continuous operation. After all the panels are installed, the result is a single metal membrane covering the entire structure.



### Double Lock Seam

The seamer contains four sets of forming rolls or “stands." Each stand performs a metal forming operation as the machine passes over the seam.



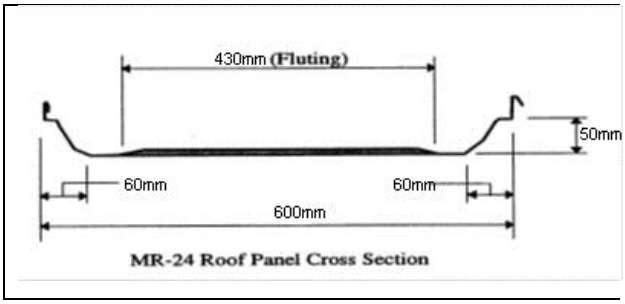

WARNING: Safe, efficient use of the seamer requires a starting platform for starting the double-lock seam at the eaves.

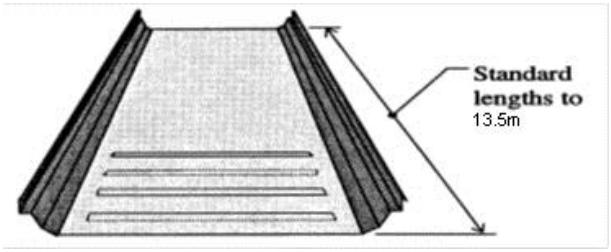
The seamer, available exclusively through BlueScope Buildings is leased only on terms of 30 days or 12 months, and requires signing of a lease agreement. One starting platform is furnished with the first seamer lease.

# Roof Panels

Standard MR 24® roof system panels are 600mm wide and available in lengths up to 13.5m Longer panels are available in special cases.

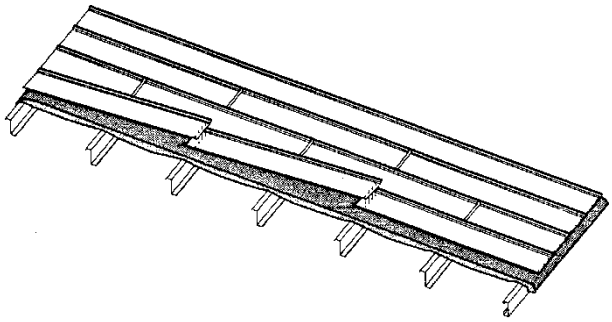
On roofs that do not fit the 600mm module panels in widths other than 600mm will be factory supplied.



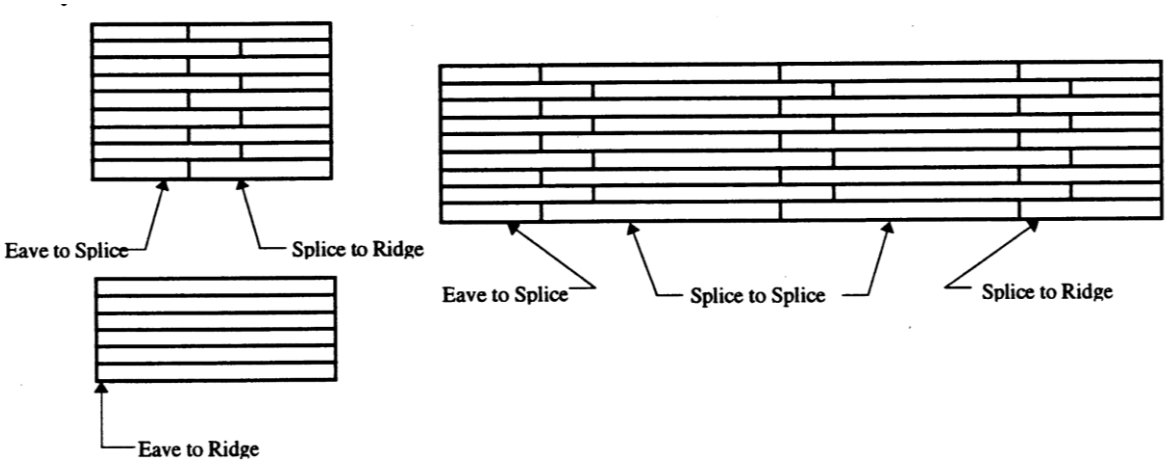




## Panel usage

Four different types of panels are available and the type of panel or panels supplied will vary depending on the width of the roof. For example, some roofs will only require a single panel which will run from eave to ridge; some may require two, an eave and a ridge panel; other size roofs may require a combination of eave and ridge panels and one or more splice panels.



- Always refer to your roof panel layout for specific panel requirements. All panels are pre-punched and pre-notched where end splices are required.
- Whenever one or more panel splices are required, the end laps of adjacent rows of panels are always staggered for the entire roof length. Carefully follow the roof panel layout given for your particular roof.
- When panel splices are required, the panels are crated with alternating lengths in the same crate. Panels may be used as they come out of the crate to obtain the staggered lap pattern.




## Exceptions

When Butler Lite*Panl translucent roof panels are required, the panels will be in a separate carton or another crate marked miscellaneous.

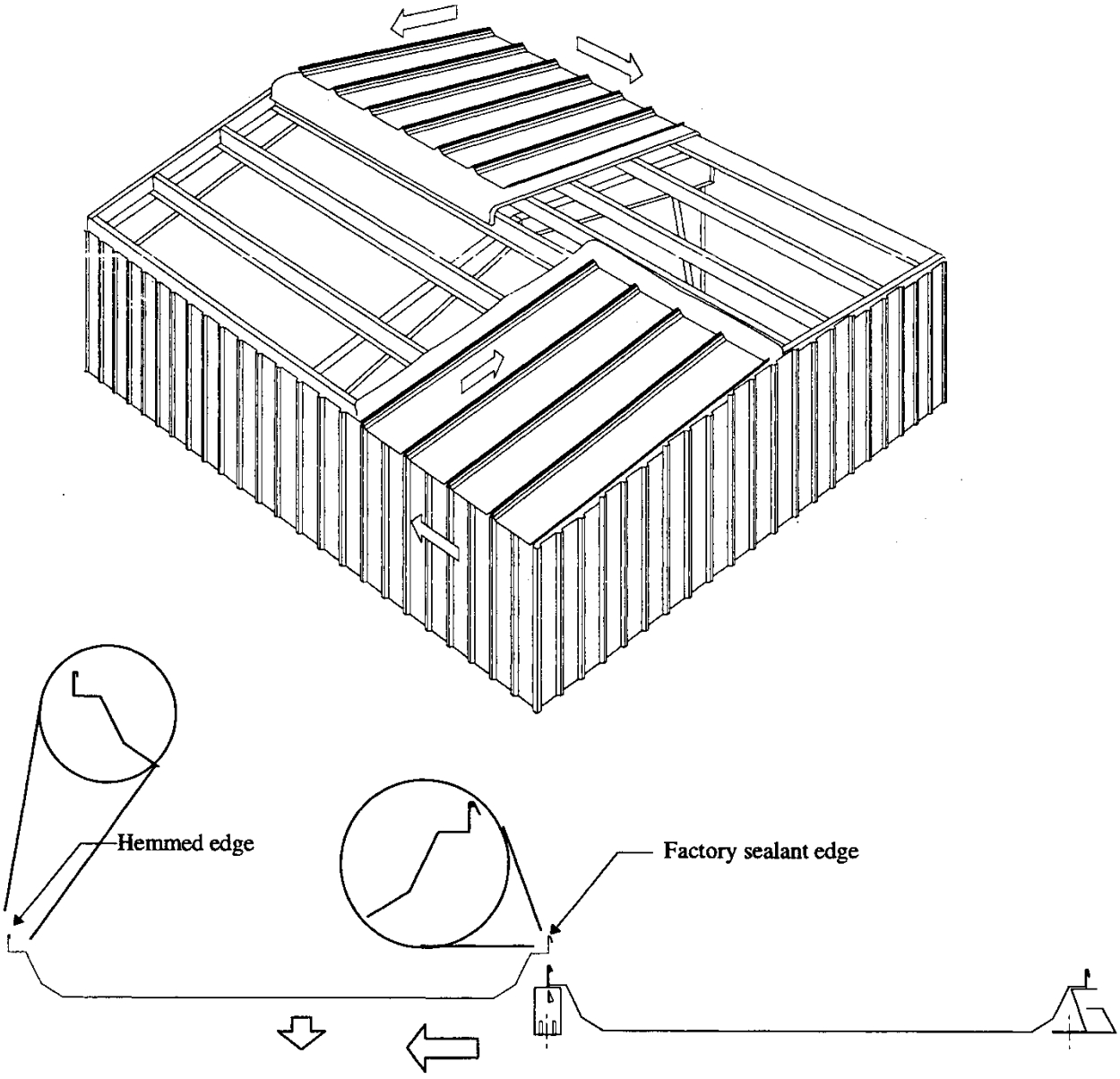
Verify the Butler Lite*Panl roof panel location shown on the roof panelling layout drawing and make adjustment to the owner drawing as required.

WARNING: Do not walk or stand on Butler Lite*Panl roof panels at any time. Always place walkboards on or a barricade around Butler Lite*Panl roof panel area.

# Roof Installation

## Direction of panel installation

Panels are designed for installation so that the factory applied sealant (hooked) edge is to the right and the hemmed (straight) edge is to the left when on the ground and facing the eave of the roof. This enables the panels to engage the lockseam tabs and each other for forming the lockseam.



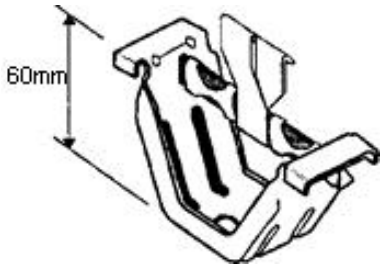

**Panel Installation Sequence**

## Insulation

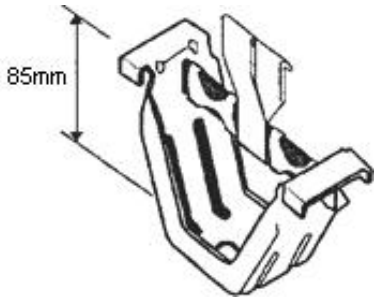
There are two insulation systems used with the MR-24® roof system:

- Basic blanket insulation system.
- Insulated purlin system.

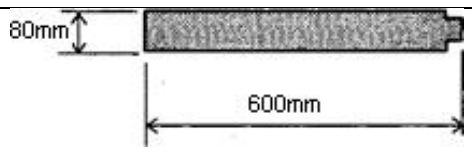
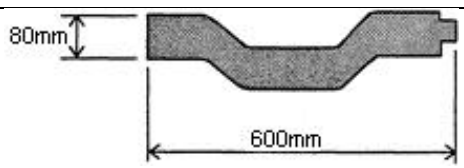
The **Basic Blanket System** uses a 60mm high panel clip to support the roof panel. The blanket insulation is installed over and compressed between the roof structural members and the roof panels.




The **Insulated Purlin System** uses 85mm high panel clip to support the roof panel and the panel is raised above the roof structural. The blanket insulation is installed over the roof structurals in the same manner as the basic blanket system but in addition, a polystyrene foam spacer block is installed on top of the blanket insulation over the roof structurals between the panel clips.



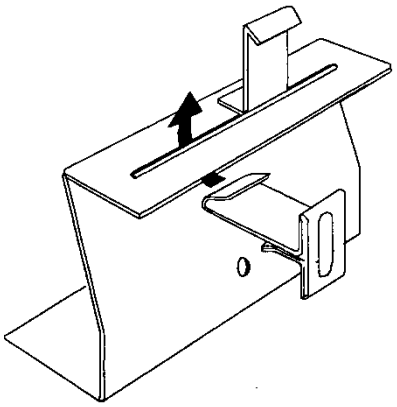

The thermal blocks provide additional insulation between the roof panels and structurals when the blanket insulation is compressed Standard Purlin and Delta Joist structural systems spacer blocks are 85mm wide by 600mm long by 1.9cm thick. Note that the shape of the Truss Purlin structural system spacer block is different so that it has complete bearing on the wider truss purlin flange. The Truss Purlin structural system spacer block is 20mm thick.

| | |
|---|---|
|  |  |
| Standard Purlin System | Truss Purlin System |

## TRIM CLIPS

Two lock seam tabs must be field assembled to the trim clips and are used to anchor the panel and the endwall trim or gable trim transition when formed into the lockseam. The two tabs are always installed so the lip of the tab is to the right when on the ground and facing the eave of the building. Insert tabs through the slot from beneath the clip and secure in place by bending the short leg of the tab down against the clip. Adjust the tabs so they are butted against each other and centred in the slot.

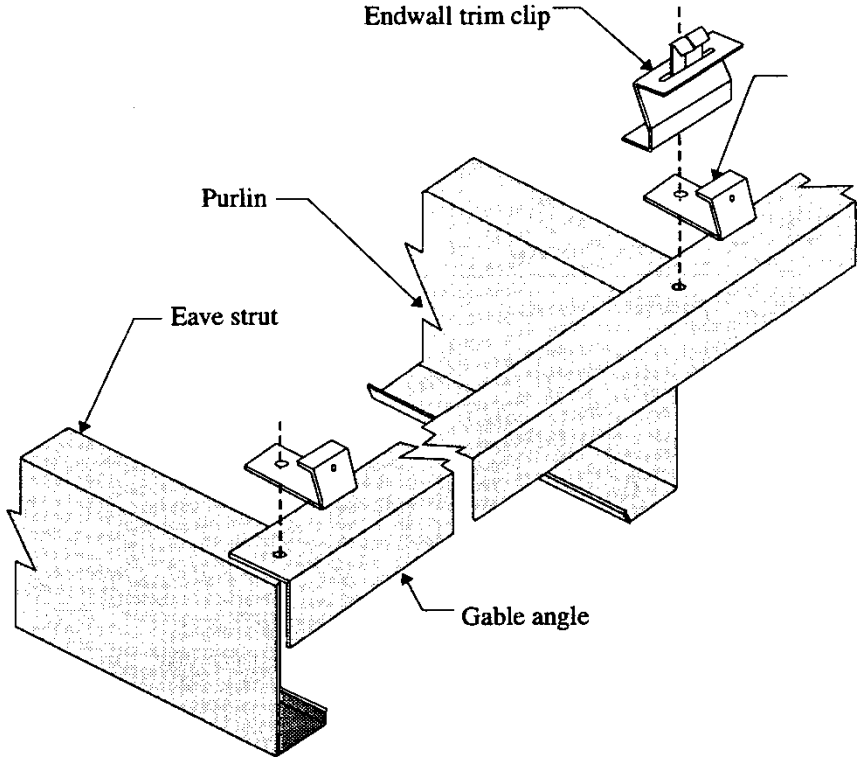
These tabs must be assembled to the endwall trim clips and installed with the gable angle.



**Tab Assembly**

## ENDWALL TRIM CLIPS

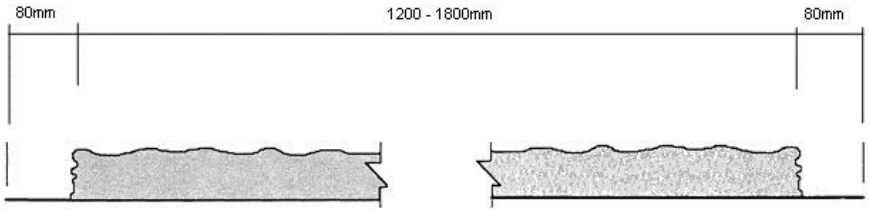
The endwall trim clips installed with 1.25cm thin head bolt and nut at the roof structural to gable angle or overhang rake channel location. The gable trim support is used at the eave member to gable angle location.



## Insulation

Faced fiberglass blanket insulation with a minimum 50mm thickness and a maximum 150mm thickness is required over the roof structurals for all MR-24® roof system installations.

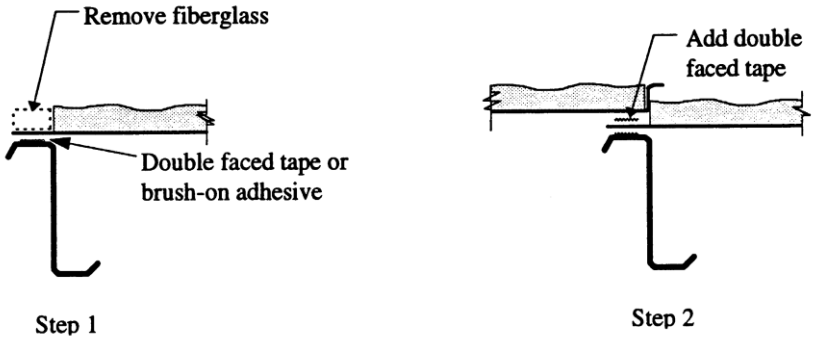
It is recommended that 120 or 180cm wide rolls be used, depending upon facing and or thickness specified. Two tabs are required for stapling rolled insulation together.




WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.

Roll lengths normally are ordered to cover half of the building, from eave structural to the opposite ridge purlin. When they are not long enough to do this because of building width being too wide, a length splice must be made.

Making end splices of insulation over a roof structural is made easy by using double faced tape or brush on adhesive. Using double faced tape to hold the insulation tight to the eave member and ridge structural will not require the use of any weighting or clamping.



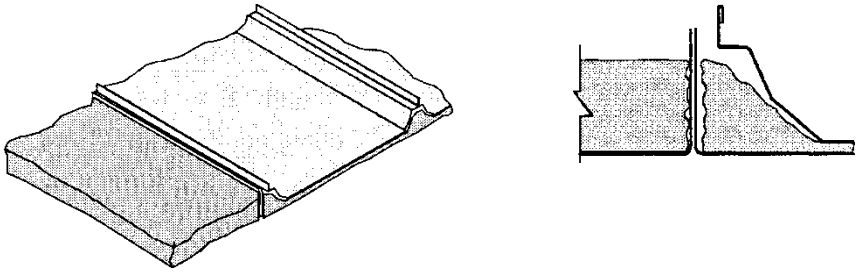

Suggested Method for Length Splice

## Stapling Procedure

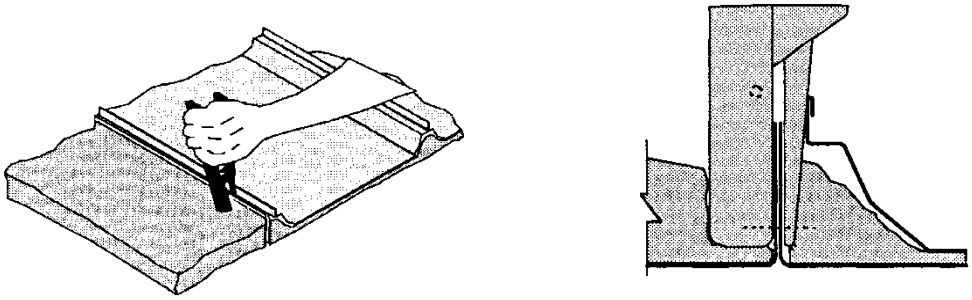
It is essential that the insulation facing provide a continuous complete vapour barrier to prevent airborne moisture from condensing within the insulation and on inside surface of the panel.

The adjacent facing tabs are sealed together at the joints by folding and stapling. A good quality plier-type stapler (such as Bostitch Model P6-8 with 10mm STH 5019 staples or equivalent) should be used.

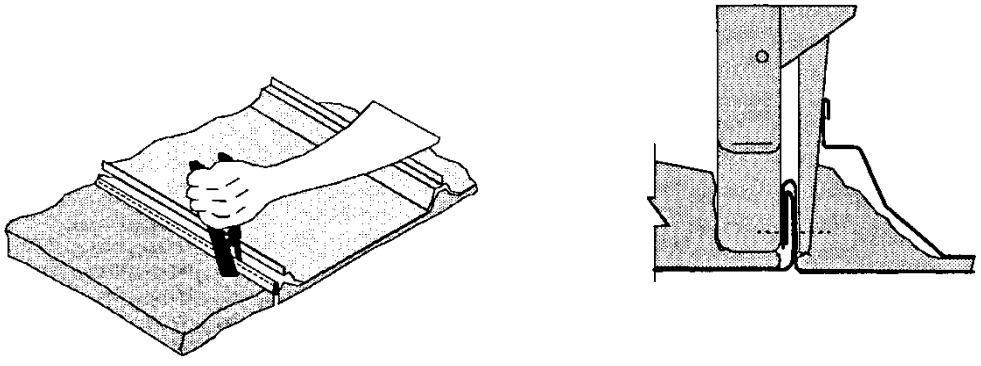
WARNING: Stapling procedure requires work at the leading edge of the roof. Always use fall protection.

1. 

Stapling is done from the topside as the insulation is applied. Pull the adjoining facing tabs outward at the joint and align the top edges of the two tabs.

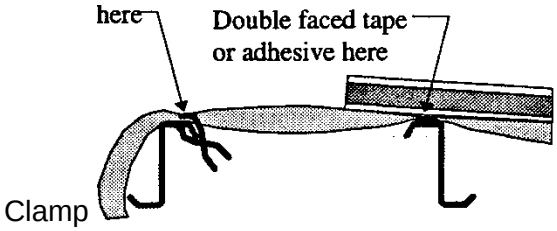
2. 

Staple the two tabs together approximately 12mm from the bottom on 200–250mm centres

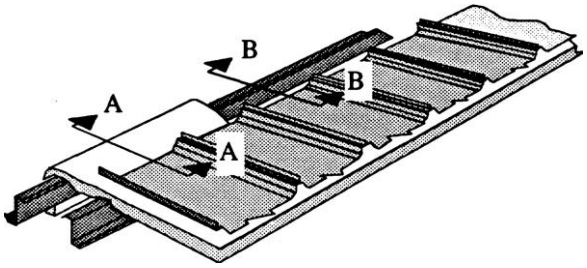
3. 

Fold the tab over and staple again on 100mm centres.

## Installation Procedure: At Ridge Without Interior Ridge Trim



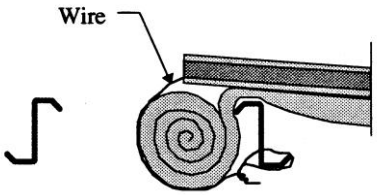

Standard Purlin Structural System




### Section A-A

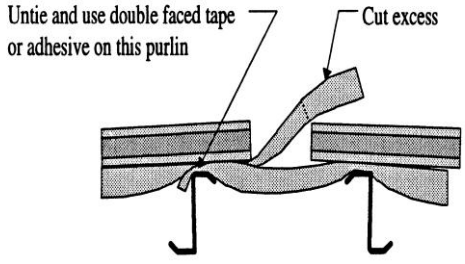
Temporarily clamp insulation to opposite ridge purlin. Install roof panel.

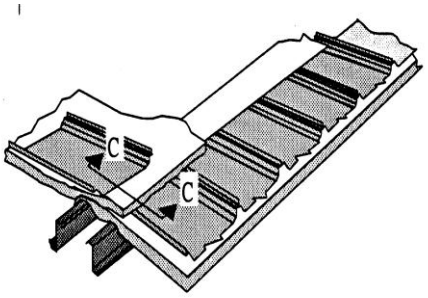
WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.




### Section B-B

After roof panel has been installed, roll up excess insulation and wire to purlin and roof panel to prevent damage from wind or weather.

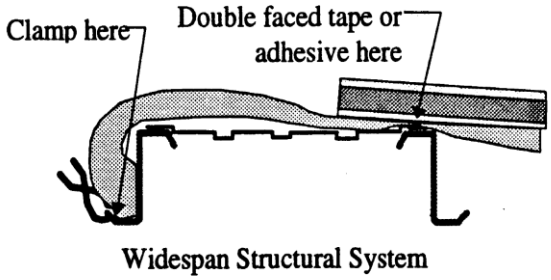


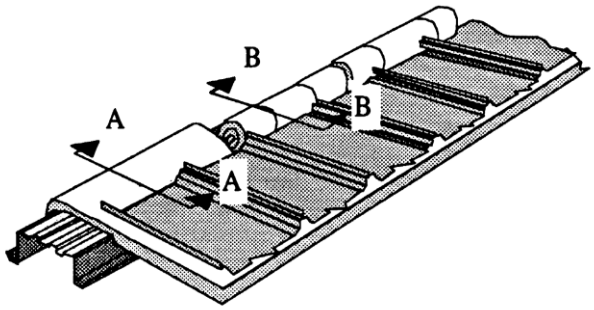




### Section C-C

Pull insulation this side to past ridge. Stretch and cut after panel is in place.

## Installation Procedure: At Ridge with Interior Ridge Trim

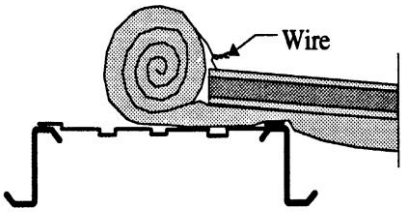



### SECTION A-A

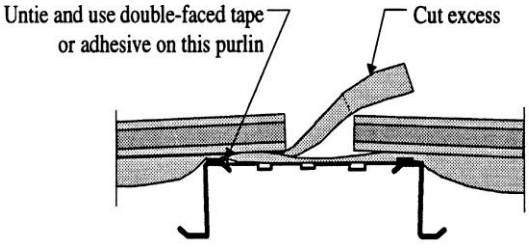
Temporarily clamp insulation to opposite ridge purlin. Install roof panel.

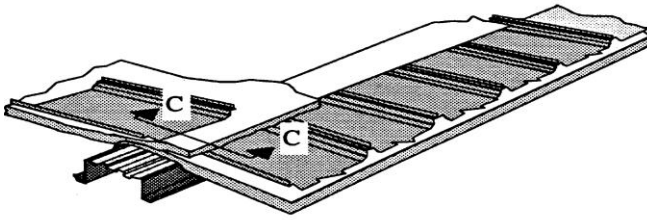
WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.




### Section B-B

After roof panel has been installed, roll up excess insulation and wire to purlin and roof panel to prevent damage from wind or weather.



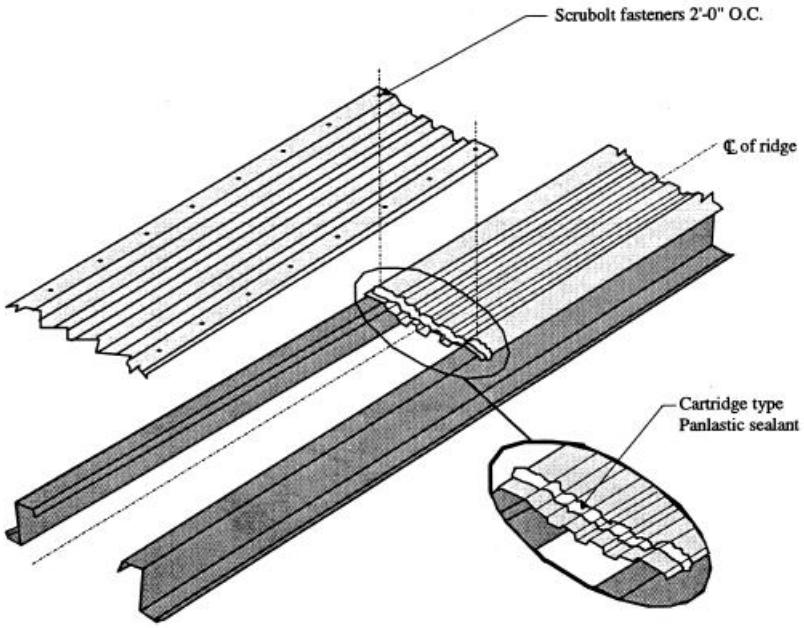




### Section C-C

Pull insulation this side to past ridge. Stretch and cut after panel is in place.

## Interior Ridge Trim

An optional interior ridge trim is furnished to contain the insulation between purlins at the ridge of the building. The interior ridge trim parts must be in place before installing the insulation. Use cartridge type Panlastic sealant at lap. Follow the drawings to position Scrubolt fasteners so they will not interfere with panel clip installation.

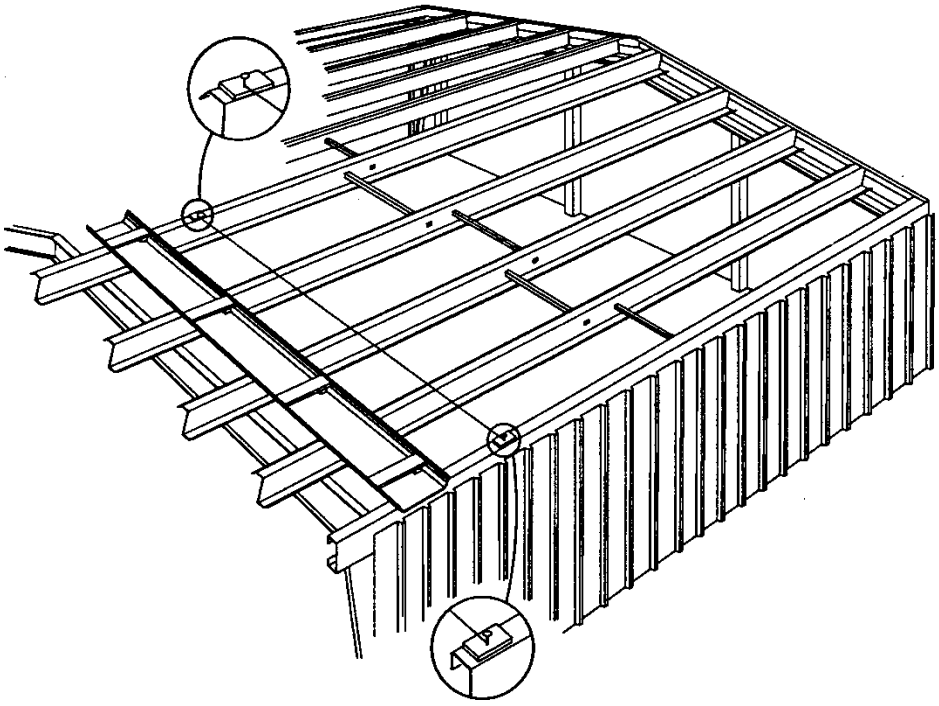



Optional Interior Ridge Trim

# Installation of Roof Panels

The general sequence of roof installation followed in this manual includes:

1. Installation of insulation and roof panels.
2. Installation of perimeter trims which includes endwall trim.
3. Installation of ridge cover.



The installation procedures covered by the manual are general in nature and cover a basic MR 24™ roof system. Other conditions, such as transitions, are covered in the detailed erection drawings and should be referred to prior to beginning work on the roof. In most instances, wall panels will have been previously installed

Prior to the actual installation of the MR-24™ roof system, the structure must be properly plumbed and squared, with the secondary roof members straight and panel attachment holes properly aligned. This may be accomplished by using the dryline technique.

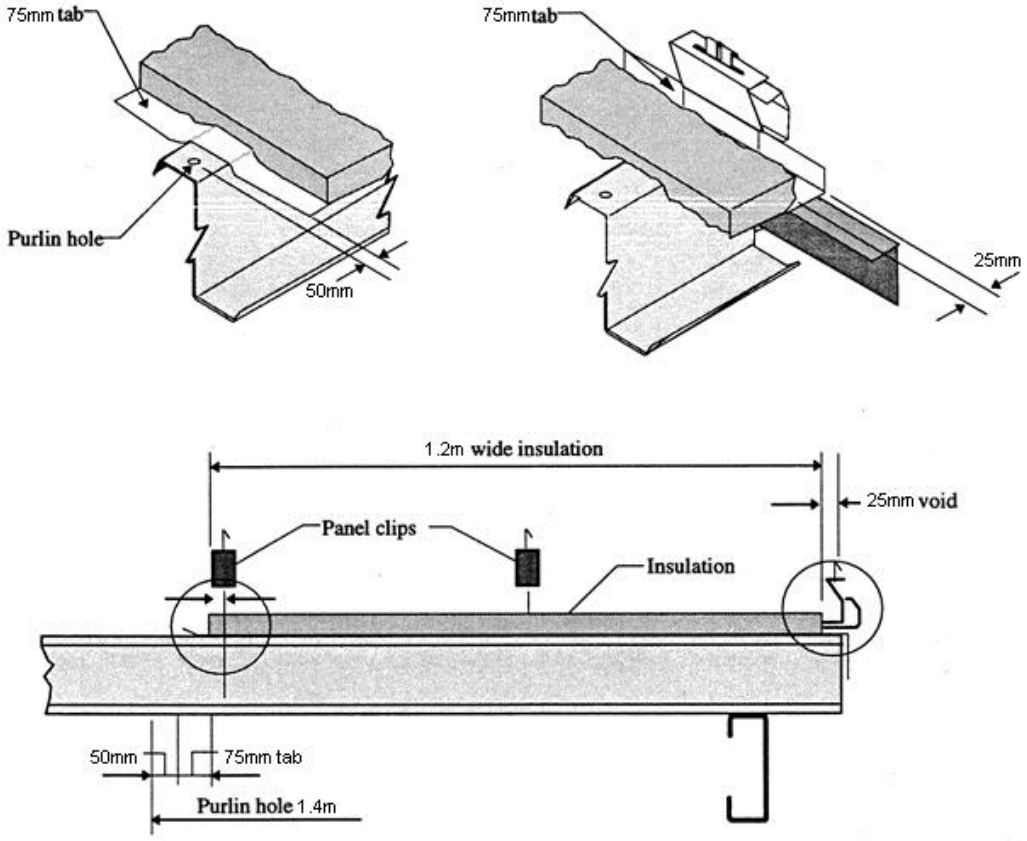
## Dryline Technique

Attach a dryline to the eave strut and the ridge purlin. Select identical holes in these members then sight along the line to make sure all purlin holes are directly under the line. If not, recheck the frame for any sweep or dogleg condition.

WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.

## Insulation Detail

A standard 1.2m wide roll can be used for the starting row of insulation but requires careful positioning. The insulation must be laid so the fiberglass portion of the insulation will clear the panel clips which are installed on 600mm centres. This can be gauged by aligning the edge of the tab 50mm from the next hole in the purlin past the panel clip attachment hole. This will leave a small void (approx. 25mm) in the roof insulation at the endwall which can be filled in later by tucking in insulation from the overlap of the endwall insulation.

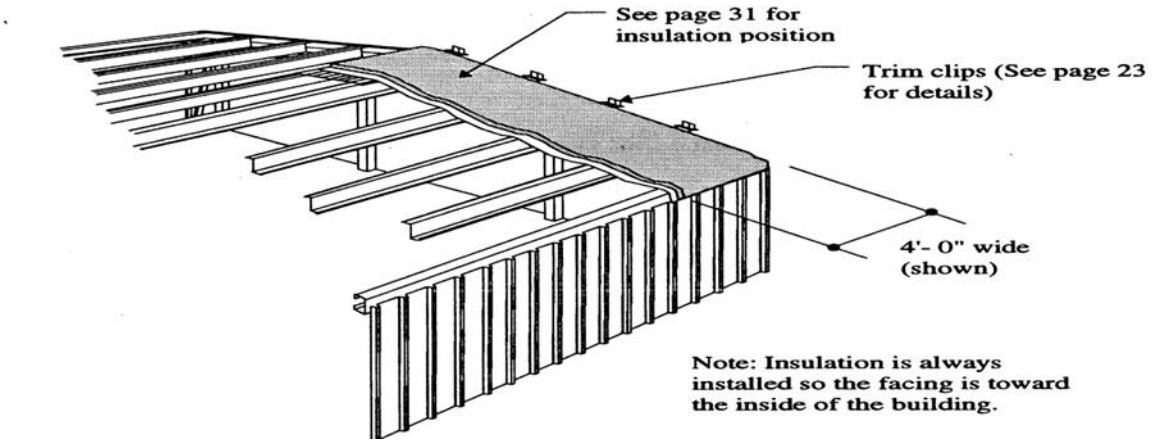



Detail at Endwall Using 1200mm wide insulation

This detail shows the position of the panel clips in relation to the width of the insulation only. Panel clips are installed as the panels are being placed and not out in front of the roof panelling activity.

WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.

**Note:** Insulation is always installed so the facing is toward the inside of the building.



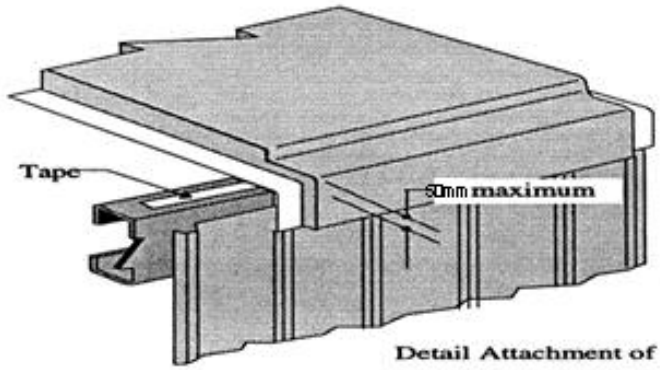

WARNING: Insulation has no load bearing strength and cannot support a worker's weight. Always use fall protection.

## Laying the First Roll of Insulation

Start laying the insulation at the eave and work to the eave and work to the ridge. Position the insulation so that it spans both ridge purlins with an approximate 150mm overhang.

When a 1.2m starter roll is used. align the edge so the fiberglass is 25mm from the edge of the gable angle or rake channel or edge structural. See detail on page 31.

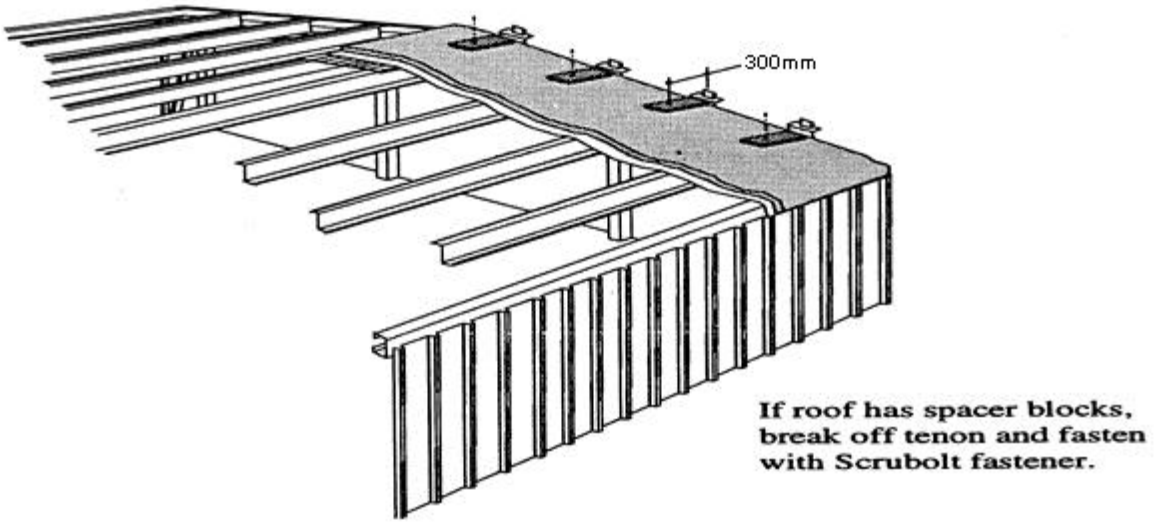
Using double-faced tape, adhesive, or clamp, attach the insulation to the opposite ridge purlin and unroll the insulation across the roof structurals to the eave. Stretch the insulation to provide a taut, smooth inside surface making sure the insulation is properly positioned and in a straight line.



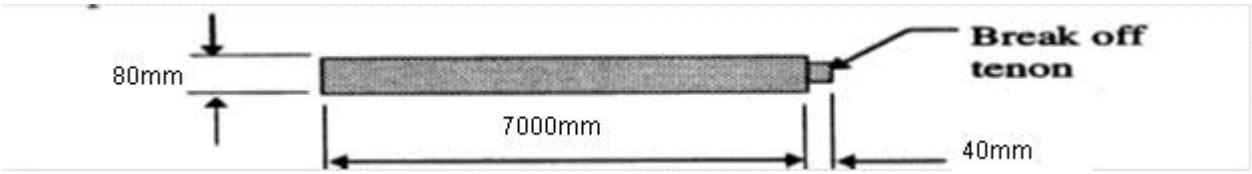

**NOTE:**
Do not use over 50mm thick insulation at eave strut to prevent dimpling of wall panels around fasteners. Peel off excess insulation thickness over eave strut.

Detail Attachment of Insulation to Eave Member

## Thermal Block Installation

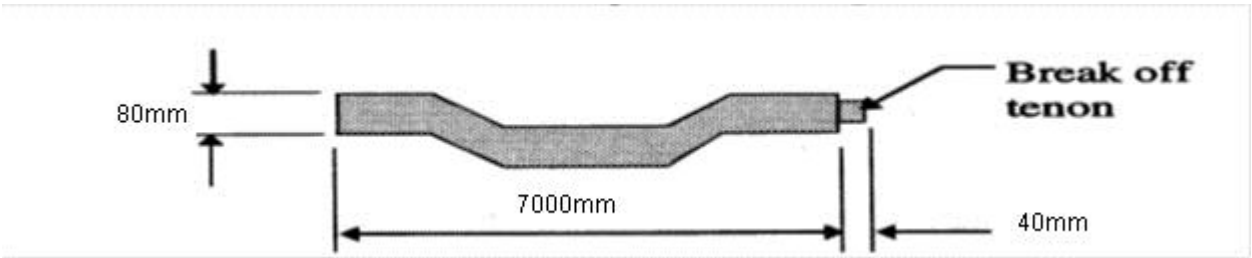



The Standard Purlin structural system thermal block is straight with a tenon at one end that's inserted into the clip. The Truss Purlin building system version has the same tenon but the block is curved so it can distribute panel load to both sides of the truss purlin top chord.




**Standard Purlin Structural System Thermal Block**

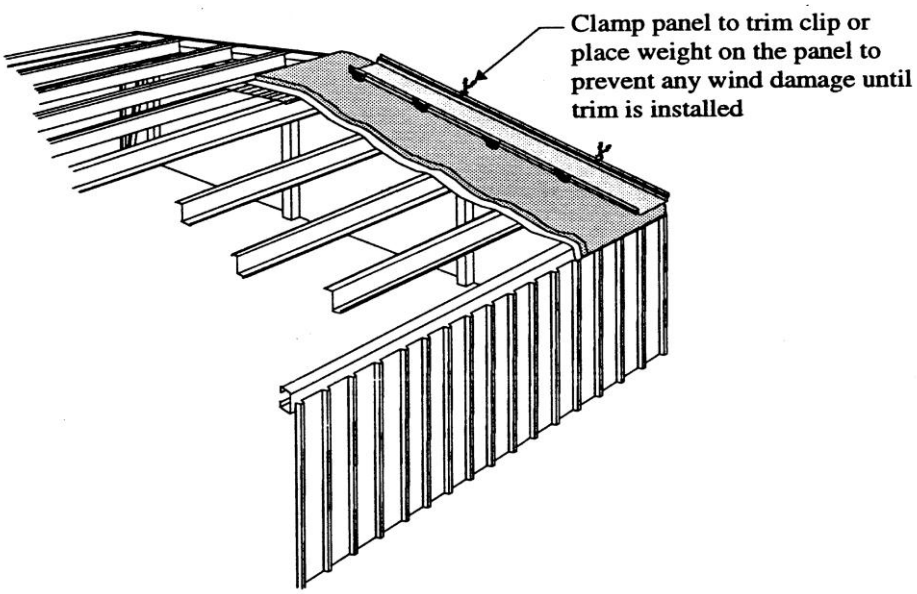
These blocks are standard on the Truss Purlin structural system and optional on the Standard Purlin structural systems.




**Truss Purlin Structural System Spacer Block**

Place thermal blocks over the insulation at each purlin location. Thermal blocks insulate the purlin and support the panel. Only at the starting row of panels is it necessary to break the tenon off of the thermal block to clear the trim clip. To bold this row of thermal blocks in place, fasten to roof structural with a Scrubolt fastener and drive flush with top of thermal block. Thermal blocks are not required at eave member.

## Installation of First Roof Panel




WARNING: Always use fall protection when installing panels.

To install the first panel, position the right band edge of the panel over the trim clip and, using an aligning punch, align the boles in the panel with the boles in the eave member and fasten.

Install panel clips by booking the tab over the panel edge and rotating it into position. An aligning punch is used to find the hole in the roof structural prior to placing the clip. Then the punch can be used to pin the clip in position, with a follow-up workman installing the clip to roof structural Scrubolt fastener.

Install panel clips from the top end of the panel towards the eave to control the panel alignment

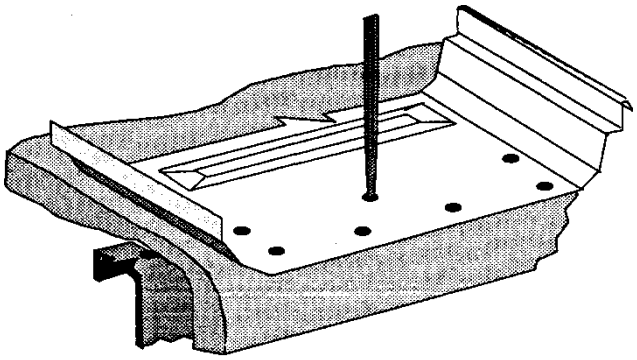
Before installing adjacent panels, apply a bead of gun grade type Panlastic sealant vertically on the inside face of the standing edge of the panel, about 25mm from the end. This seals the end of the standing seam for protection in the event of gutter overflow and eave icing.

IMPORTANT: To avoid wind damage, always secure the edge of the starting panel to the trim clips with clamps or locking pliers, or by placing weight on the panel, since seaming of this panel will not be completed until the endwall trim is installed.

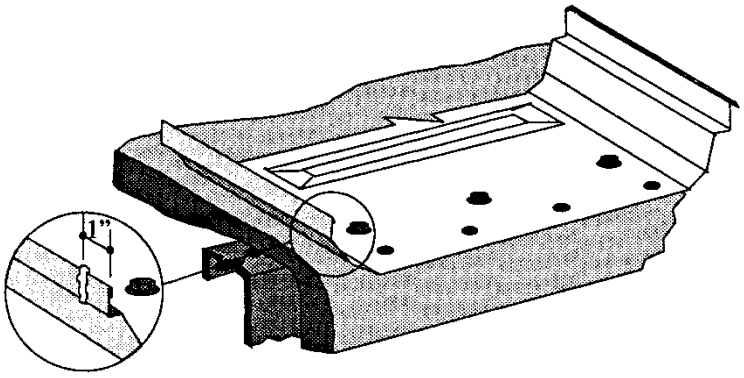
If single panels eave-to-ridge are being installed on the roof, and a 1.2m starter roll of insulation bas been used, the second panel can now be installed.

After installation of the first four runs of panels is completed and lock-seamed together, begin installing panels that have been unloaded on the completed portion of the roof working toward the preloaded bundles. The seaming operation must follow panel installation as closely as possible.

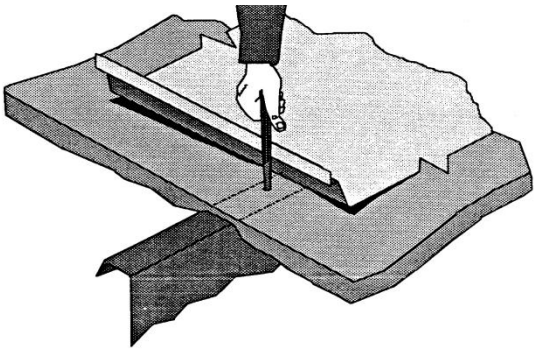
### *Eave Panel Detail*



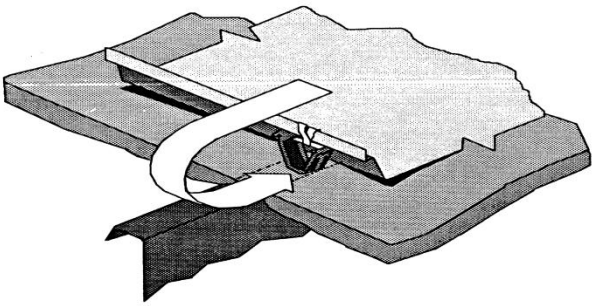
Using a sharpened tapered punch, align the holes in the panel with the holes in the eave member. Then fasten with (3) AIZN head Scrubolt fasteners (095984).



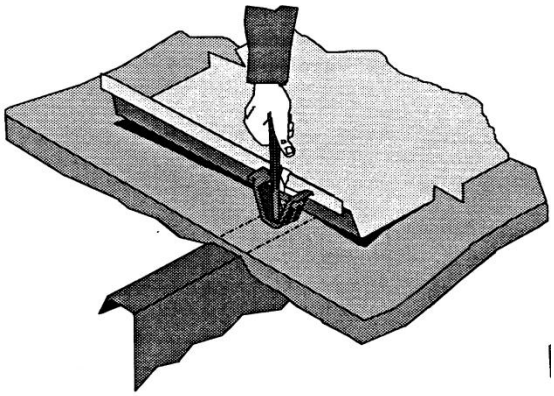
## *Panel Clip Detail*



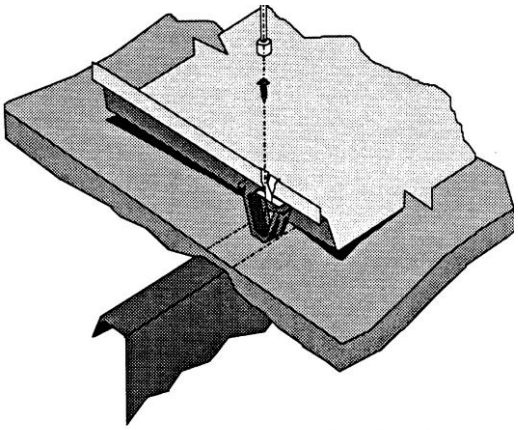
①Use the same punch to find the hole in the roof structural through insulation.



②Then remove the punch and install panel clips by hooking the tab over the panel edge and rotating it into position.



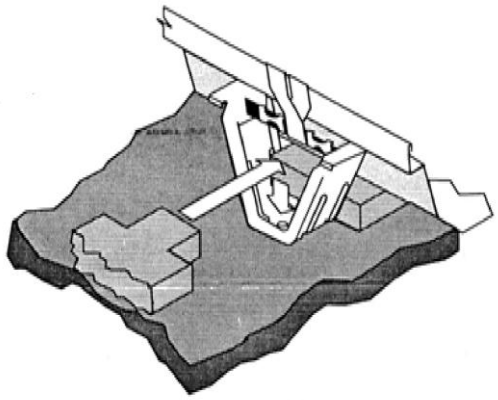
③Temporarily pin the clip in position with punch.



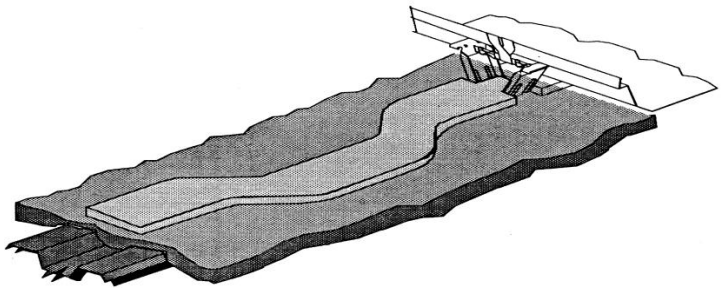
④Next, workman removes punch and installs Scrubolt fastener.

### *Spacer Block Detail*

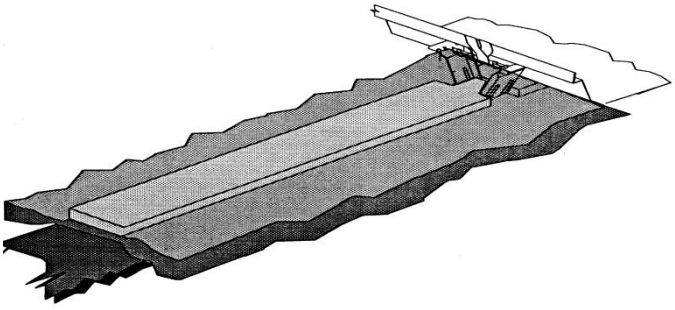
Insert spacer block tenon fully into panel clip and push downward.



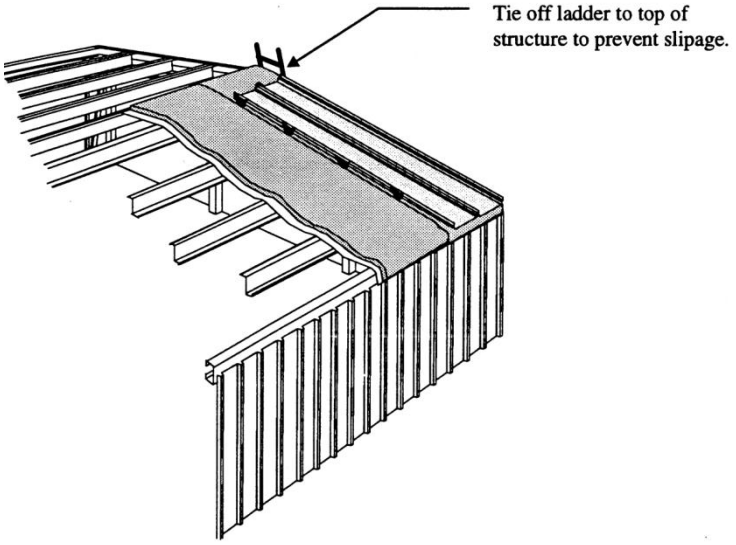
Truss Purlin System Thermal Block Installation



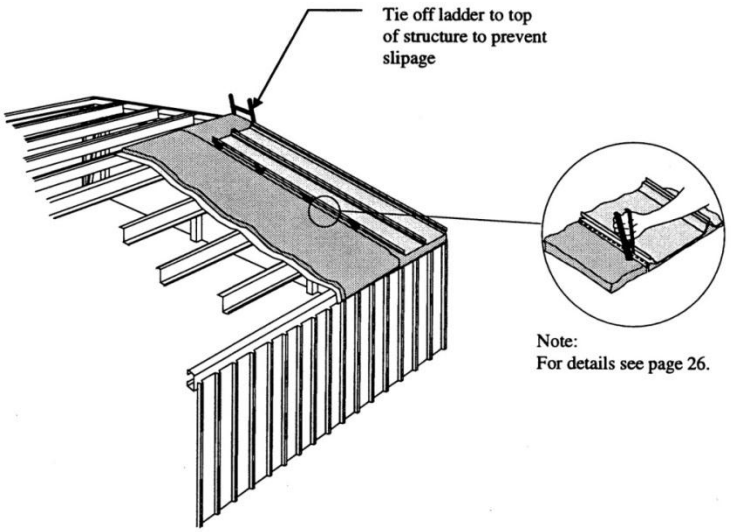
Standard Purlin Thermal Block Installation



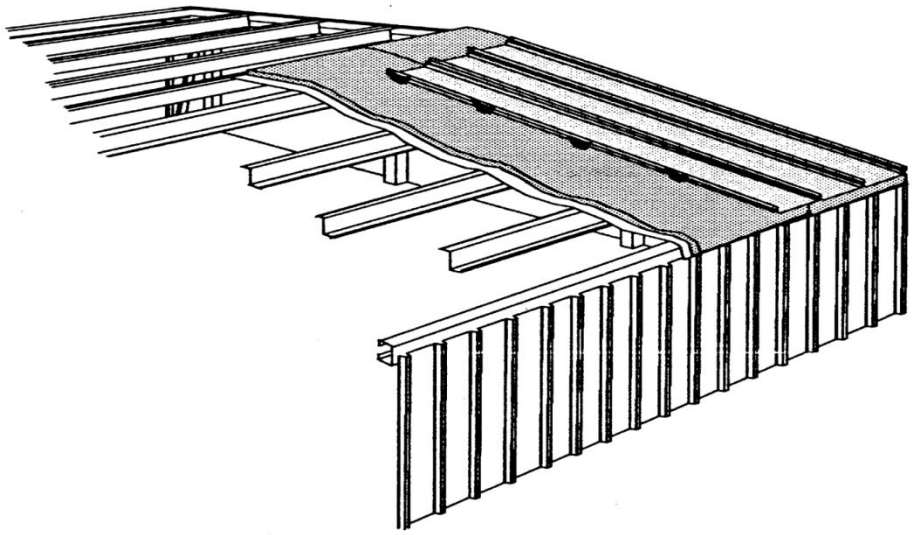
## Position Second Panel



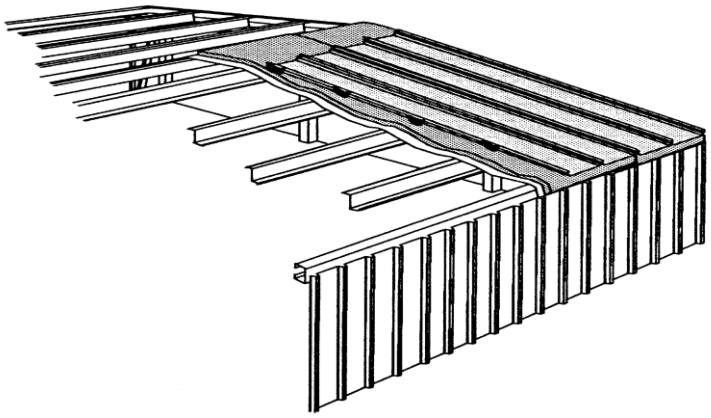

## Stapling Insulation



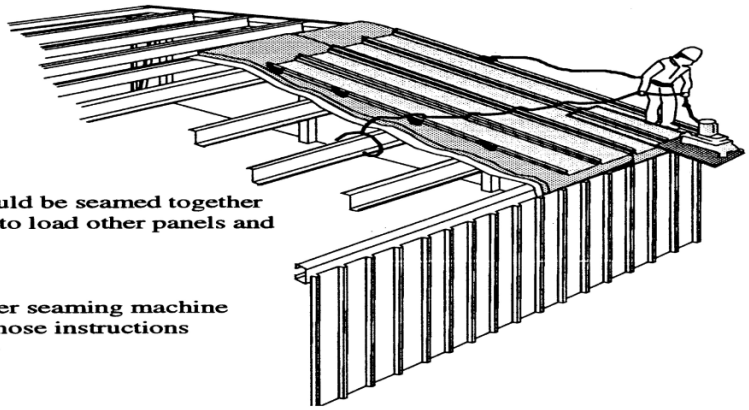
## Installing the Third Panel



## Installing the Fourth Panel



## Seaming the first four panels



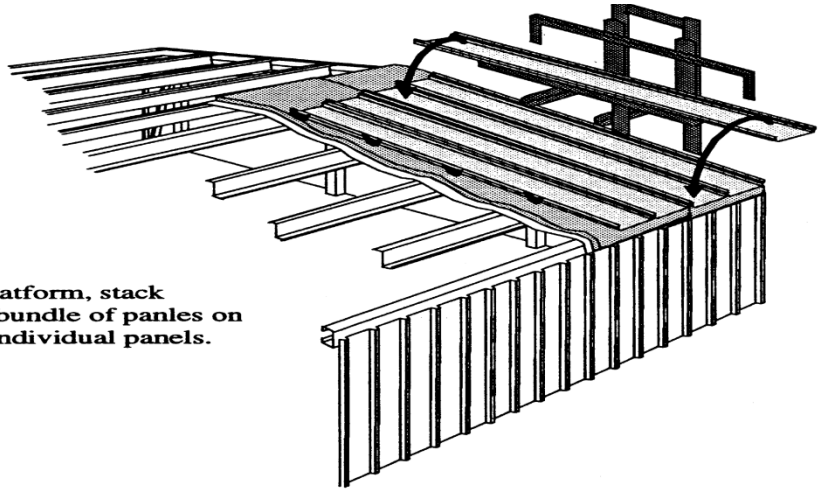
These (4) panels should be seamed together to make a safe place to load other panels and parts.

Note:
For details refer to Roof Runner seaming machine Operations on pp. 43-53 and those instructions provided with the seamer.

These (4) panels should be seamed together to make a safe place to load other panels and parts.

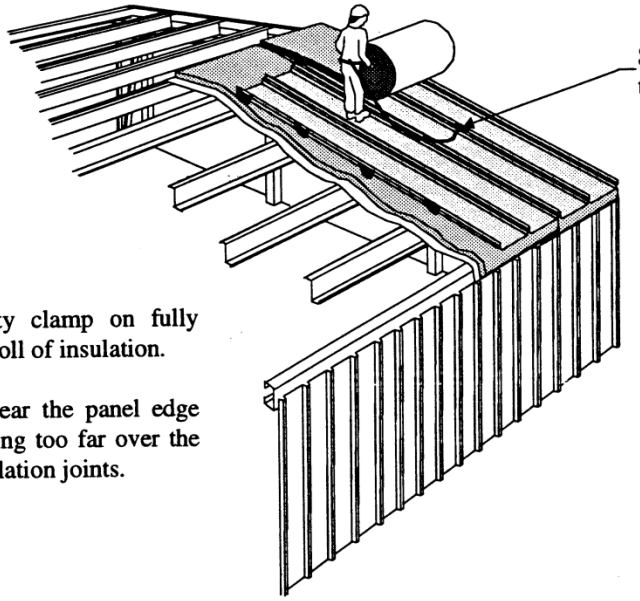
WARNING: For safety, the operator of the seamer must always use fall protection. Always use a starting platform with the seamer.

## Stack Remaining Panels on Finished Roof



Using a crane or forklift with platform, stack remaining panels from starting bundle of panles on finished side of roof and carry individual panels.

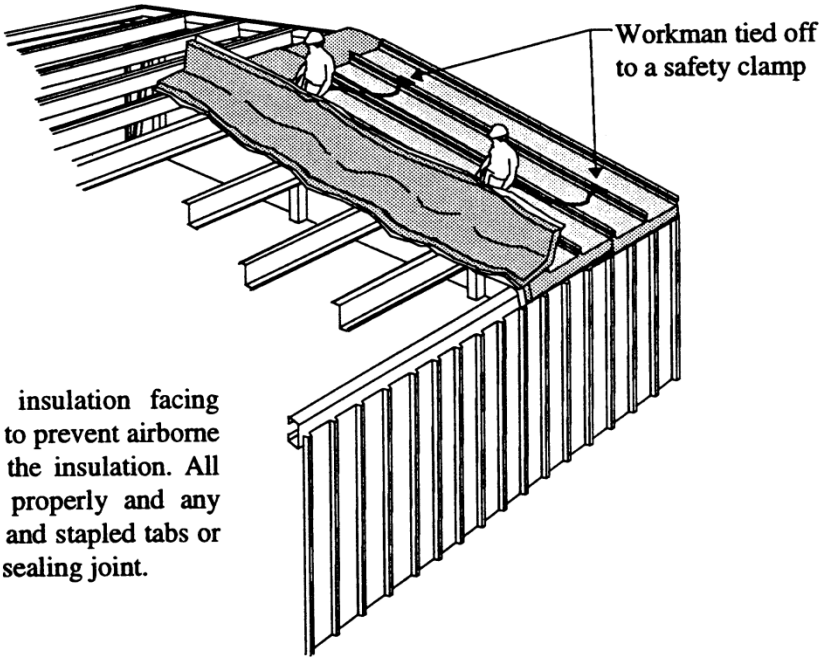
## Unrolling the Next Insulation Roll




Workman tied off to a safety clamp on fully seamed panels unrolls another roll of insulation.

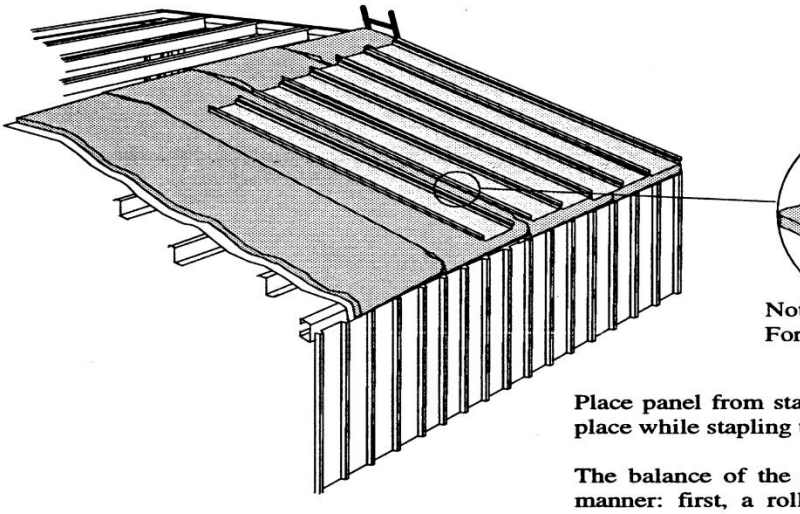
Keeping the insulation joint near the panel edge minimizes the hazard of reaching too far over the edge of the roof to seal the insulation joints.

## Shake Out Insulation into Position

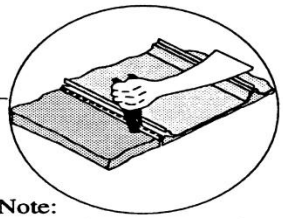



**NOTE**: It is essential that the insulation facing provide a continuous vapor barrier to prevent airborne moisture from condensing within the insulation. All insulation joints must be sealed properly and any damage repaired promptly. Rolled and stapled tabs or self-adhesive tabs may be used for sealing joint.

## Continue Installing Roof Panels



Staple Insulation Tab



Note:
For details see page 26.

**Place panel from stack onto the insulation to hold in place while stapling the joint.**

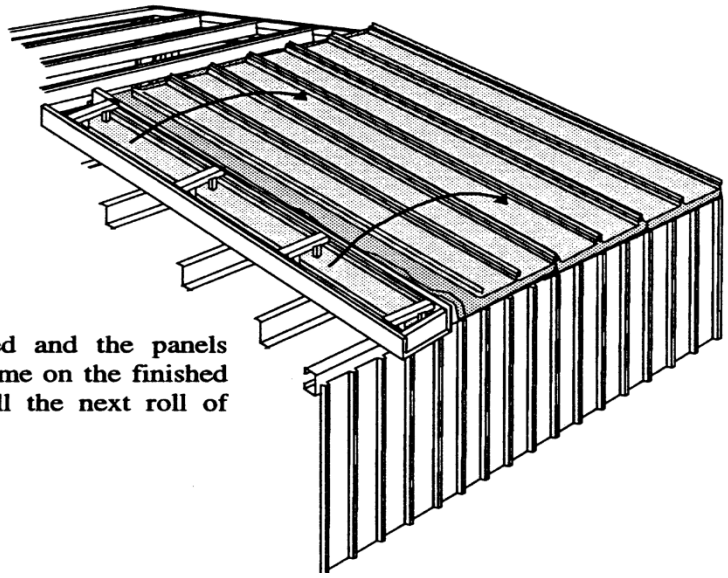
**The balance of the panels are installed in the same manner: first, a roll of insulation; then, the spacer blocks when specifed; the roof panel; sealant; and, finally, the panel clips at each purlin location.**

**The seaming operation must follow panel installation as closely as possible.**

## Work to the Preloaded Crate of Panels

Installed panels must be lock seamed before loading additional panels and parts on the roof. All panels must be seamed together before leaving each day.

The first crate of panels that were hand lined or lifted onto the roof should take the roofing activities up to the crate of panels that were preloaded at the frame line.



**This crate can now be opened and the panels removed and stacked over a frame on the finished roof, back far enough to unroll the next roll of insulation.**

# Roof Runner Seaming Machine Operations

Seaming with the seamer can begin as soon as sufficient rows of panels are in place to permit operation of the seamer without interference with the crew laying the panels.

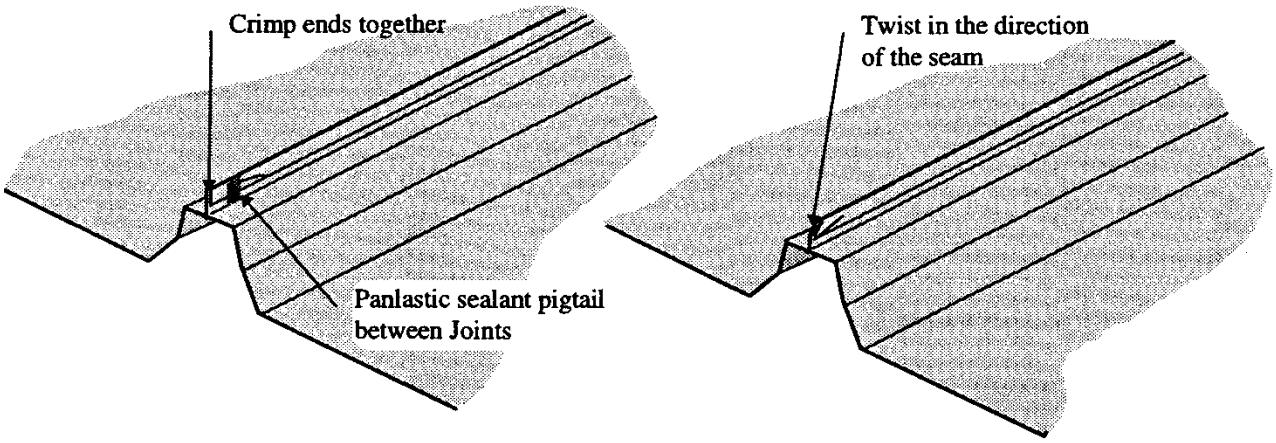
Important: Refer to the operating instructions for the seamer and starting platform shipped with each seamer and starting platform for more specific information on maintenance, other operation tips, etc.

WARNING: Panels not folly seamed can collapse or slide out from under you.

Always use fall protection when installing panels or working near roof edges. Make sure seaming follows laying of panels as closely as possible.

1. Panels and clip tabs must be properly engaged and remain in position during the seaming operation. If necessary, use locking pliers to hold the panels in position.

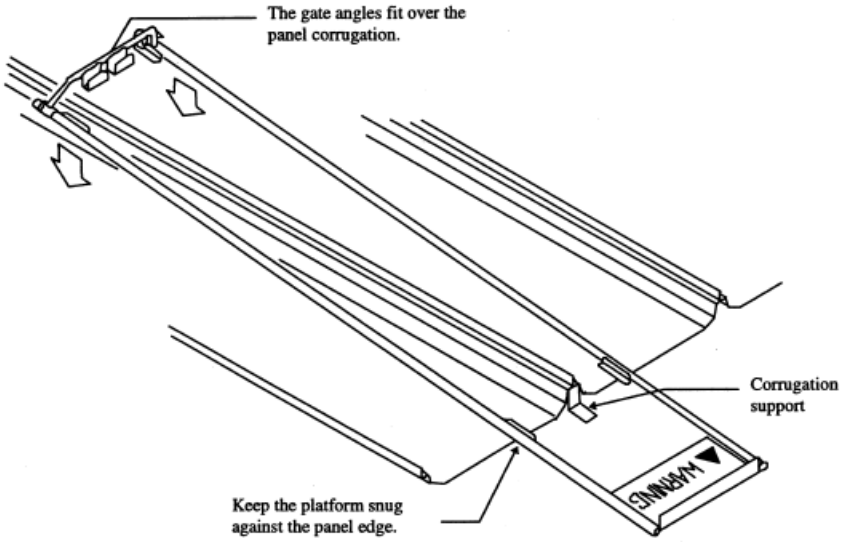
   Before beginning the seaming operation, the ends of the panels must be crimped together, twisting the end slightly in the direction the seam. Check the pigtail of Panlastic sealant in the seam lap.




**Detail - Panel crimp before seaming**

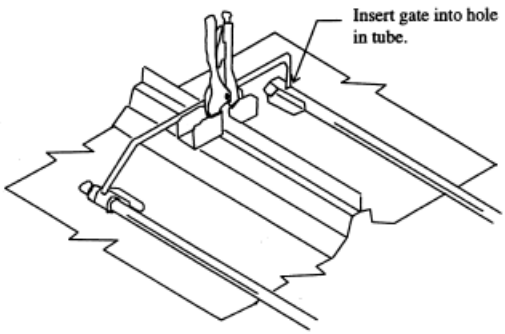
2. The seamer must be parallel to the roof when starting. A starting platform, temporarily installed at the eave, is used to hold the machine in the correct starting position beyond the eave of the building.

   Insert the corrugation support of the starting platform into the panel corrugation at the eave and rotate the Platform down onto the panels.



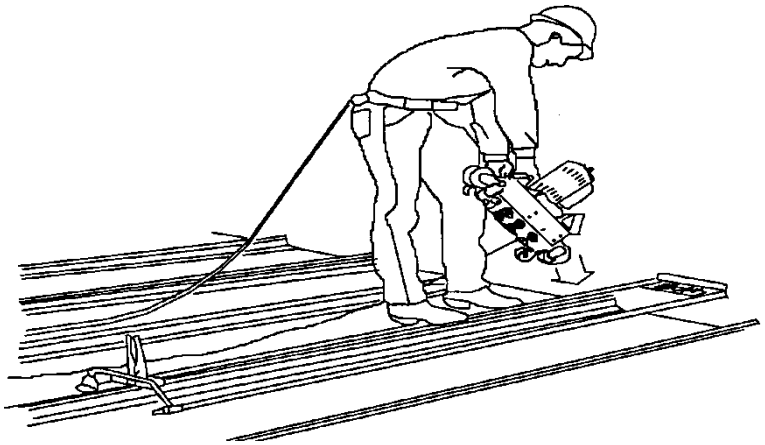

**WARNING: Never step on platform pan. Always use fall protection.**

3. Clamp locking pliers onto panels. Pliers are to be snug against bottom and up slope leg of gate channel.




WARNING: Locking pliers (not supplied) must be in good condition and adjusted to resist a good hard pull (27kg).

4. With the left foot on the panel directly over the eave structural and the right toe only on the platform leg, place the rear nylon wheel of the seamer on the corrugation. Roll the steamer out onto the platform keeping body weight upslope of the left leg.

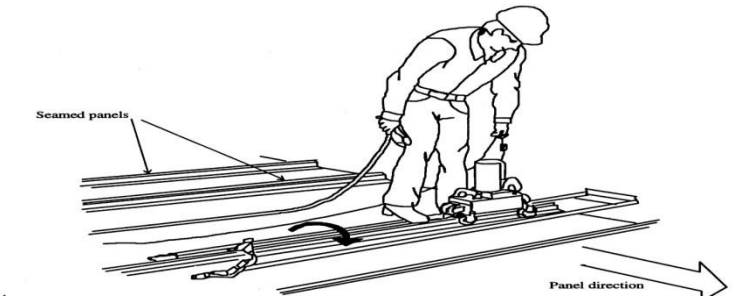


WARNING: Never straddle the platform or counterbalance the seamer with your weight.

5. Place the seamer on the starting platform, centring the front guide wheel on the corrugation. Start the motor and pull the machine onto the panel; when the front forming wheels engage, the seamer will self-propel.

WARNING: Double check the secureness of locking pliers.

6. When the seamer is fully on the panels, quickly remove the locking pliers and swing the starting platform gate aside so that the seamer can pass through. This allows seaming to continue without unplugging power cord. After passing the end of the platform, move the platform the panel flat- fully on the roof- for additional stability.




WARNING: Never tie power cords together or to the seamer.

**Caution:** Keep the path of the seamer clear at all times and power cords free of entanglement. A non-locking plug is supplied so that it will unplug itself should the power cord become entangled. Do not defeat this safety feature by tying the power cord to the motor lead or to the seamer. Additionally, towing of power cord(s) can cause improper seams.

7. The operator's working position is slightly ahead and to the right of the seamer - he should keep his eye on the front guide wheel and if it stops turning, the seamer could ride up off the seam. Hand pressure on the front handle will usually correct this; if not, shut off motor and determine the problem before proceeding.

   At all panel end laps, press down on the machine as required to keep it from raising up from the seam as it goes over the panel strap.

WARNING: Do not “ride” the seamer or block vents on the motor in any way.

8. As the seamer runs off the panels at the ridge, hold it by the front handle to keep it parallel with the roof. When the seaming is complete, the seamer will no longer self-propel and the rear of the seamer will be supported by the rear guide wheel.

   Turn off and lift seamer by the handles and set it back on the roof, turning it 90 degrees to prevent it from rolling. Roll the seamer back to the eave to repeat the process.

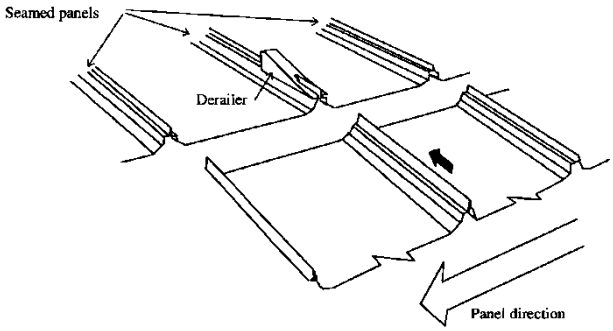
   **Important:** On building with single slope roofs, it may be necessary to move the starting platform to the upslope end of panels to "catch" the seamer in a manner similar to starting.

## Derailer

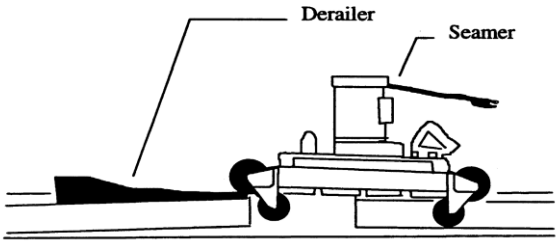
A derailer is to be used when seaming with panels already installed on the opposite side of the roof and the roof slope is less than 6°.

Position the derailer over the existing seam at the end of the panel opposite the one to be seamed. As the machine completes the seam, the front wheels ride up on the derailer to disengage the forming wheels. The machine is then removed and returned to the eave for starting the next seam.

The seamer can be removed without the use of the derailer by lifting the front of the machine over the opposite slope panels. But if the machine comes up too soon, the end of the seam will be too high for proper fit of ridge cover parts. The seam height should not exceed 20mm



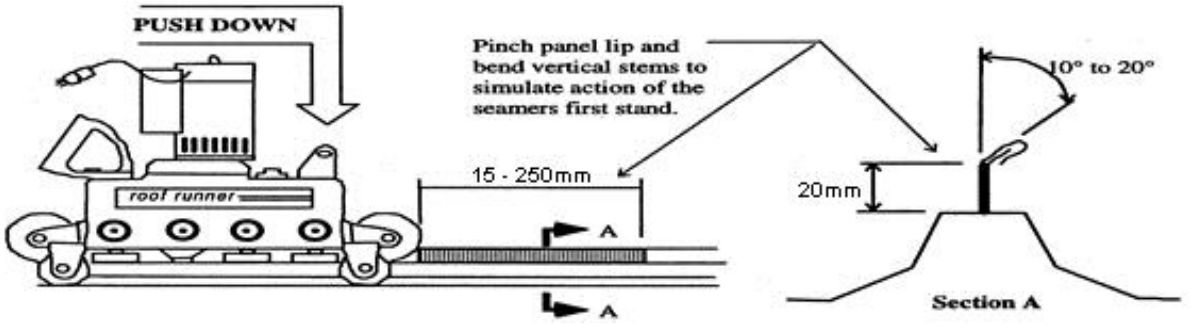

**Detail - Derailer Installation at Ridge**



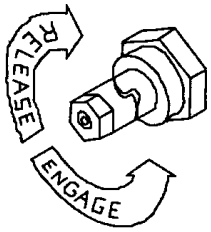

**Detail - Derailer Installation at Ridge**

## Tips for Trouble Free Operation

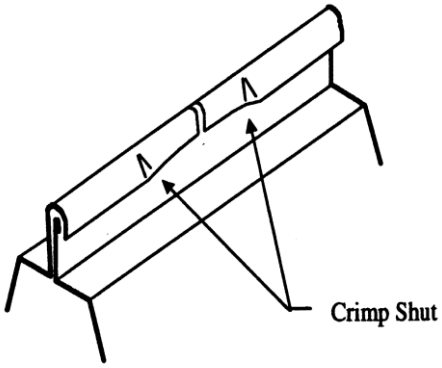
1. Safe and correct seaming requires all machine operators to be familiar with the machine and its features. Be sure they are aware of the proper material flow through the feed wheels so that they can spot a malfunction quickly and can correct its cause immediately. Improper seams longer than 1500mm are difficult to repair as they involve the panel clips and tabs.
2. Always use a starting platform.
3. Make sure the feed wheels are kept clean, especially on painted material! (See Maintenance Section in materials accompanying the seamer.)
4. Many seaming problems are the result of misaligned purlins and/or frames. A sudden change in direction 6mm in 1500mm can cause an incorrect seam. A good rule to follow is to string line" the purlin holes in each bay before panelling.
5. Be sure the panels are properly engaged prior to seaming. Use locking pliers to hold them in position as required. Should an incomplete seam occur, stop the seamer immediately! An incomplete seam can usually be restarted by bending the panel stems several inches ahead of the seamer, in the direction of seaming.




6. Watch to see that the large front and rear guide wheels are bearing on the corrugation. The wheels should tum throughout the seaming operation (at clips and end splices they may stop momentarily but should resume turning again immediately.)
7. Cam releases are provided for the purpose of disengaging the machine from the panel. They should be used only when absolutely necessary. A large adjustable wrench or 30 MM socket is required and the process should be done slowly and with great care as there are several cast pieces involved that are under heavy spring pressure. These pieces will break if not extremely careful.



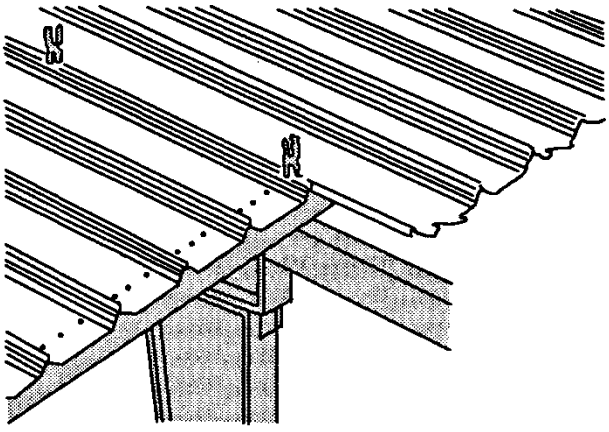

8. Panel and splices require special attention - improperly placed or excess mastic will be picked up by the machine making the seaming process more difficult. The upper panels must fit into the lower panel notches to minimize the material thickness to be seamed. Be sure to crimp the panel lips shut at the joint to prevent the possibility of upslope end jamming in the machine.




9. Avoid roof traffic distortion to the panels being seamed. Keep roof traffic away from the seamer.

Important: Operator should stay in a position that minimizes traffic distortion. The best position is 1200 to 1500mm ahead, to the right of the seamer on a fully seamed panel. From this position, the operator can:

- Keep panels engaged
- Watch seam and seamer
- Stop machine as necessary
- Hold down front of machine across laps
- Work from safest position on a stable panel



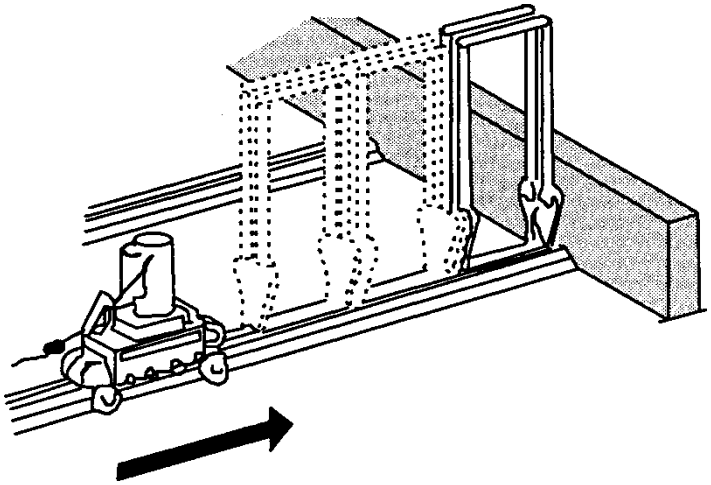
## Inside Corner at Overhang

When an inside corner condition exists on the building, the roof panels at the inside comer cannot be seamed until the gable trim has been installed on the roof projection. If the seaming is to be delayed for some period of time, the un-seamed panels must be anchored.

Locking pliers or clamps can be used along the lap. Electrical conduit flange clamps, preferably with a galvanized coating, used on 5′ centres, is an ideal inexpensive tool to hold any un-seamed MR-24™ roof system panel to the panel or trim clip in place of locking pliers.

## Use of Hand Seamer

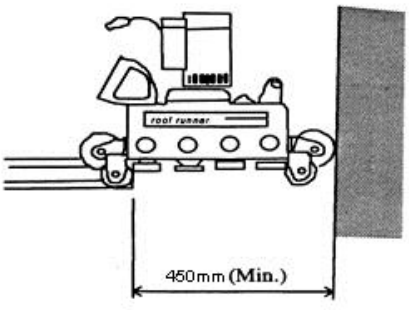
In areas where there is not ample clearance for use of a seamer, the hand seamer may be used. However, the hand seamer is **not** for general use.



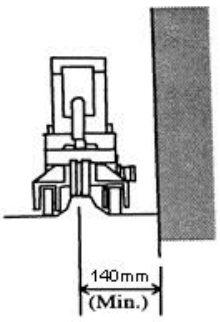
1. Before completing the seam with the seamer, hand seam the panel to provide the necessary 450mm of clearance to finish and enable the removal of the seamer. (Seamer starts at low eave.)
2. The hand seamer will seam a nominal 150mm of seam per placement (tool is nominal 150mm in length). Most applications require three placements to get the necessary clearance. (450mm Nominal).
3. Using the band seamer, follow the steps above. Important: Do each step the full 45.7cm, three placements, before proceeding to the next step. Start hand seam from end of panel.
4. After hand seaming is completed finish the seaming operation with the seamer. Then following the information in the "cam opening detail", open the cams on the seamer and remove the machine.

## Clearances

The seamer requires 450mm minimum clearance starting. or removal at a vertical obstruction or an overhead obstruction and 140mm minimum clearance for a vertical obstruction parallel to the roof.




**PERPENDICULAR CLEARANCE**
Wall or structural in place before
MR-24 roof system panel installation




**PARALLEL CLEARANCE**
Wall or structural in place before
MR-24 roof system panel installation

## Panel End Laps

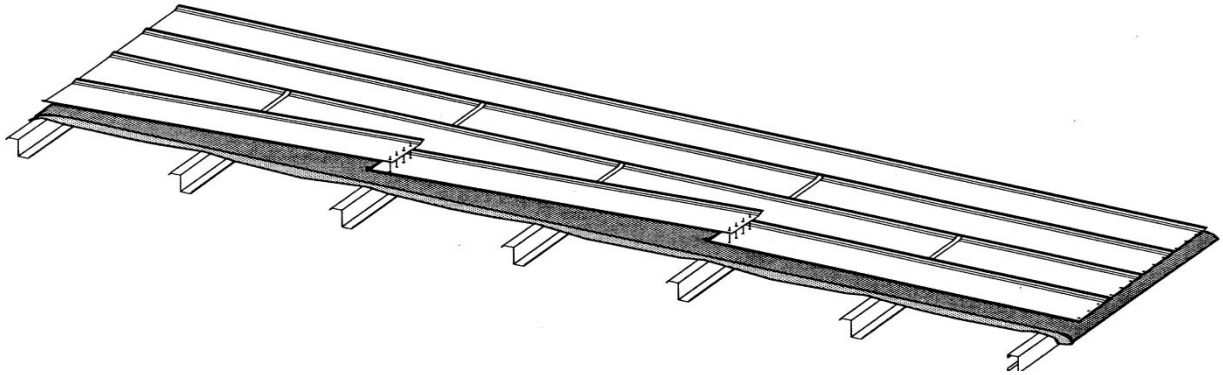
When multiple panels are required to span from eave to ridge, end laps of adjacent rows of panels are staggered to provide continuity of the corrugation through the length of the panel run, and to prevent a build-up of material thickness at the laps.

The panels are factory notched and punched for the required end-to-end panel laps.

The alternating panel lengths required to stagger the panel end laps are packaged together so they can, with few exceptions, be used in the sequence they come out of the crates.

Panel end lap splices are positioned over the roof structurals and are made by clamping the panels together between a splice plate and a panel strap.

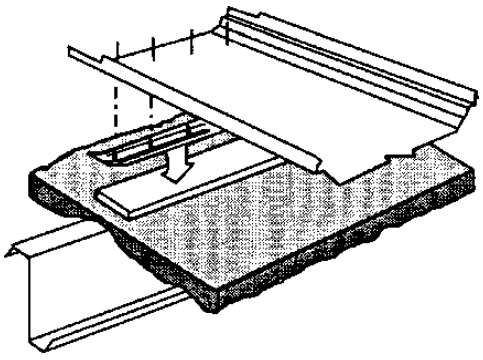
The procedure for a multiple row of panels begins with the eave panel, installed in the same manner as was shown previously for a single panel, eave to ridge. The top panel clip should not be installed until the panel splice is made.



### Step 1

After the eave panel is fastened, lift the upper right hand comer and insert the splice plate projection studs through the factory punched holes in the panel flat.

Some erectors find it advantageous to temporarily attach the plate to the panel before positioning in place. Use two flange nuts, loosely applied, to hold the plate until the panel is installed. Remove the nuts before applying sealants.

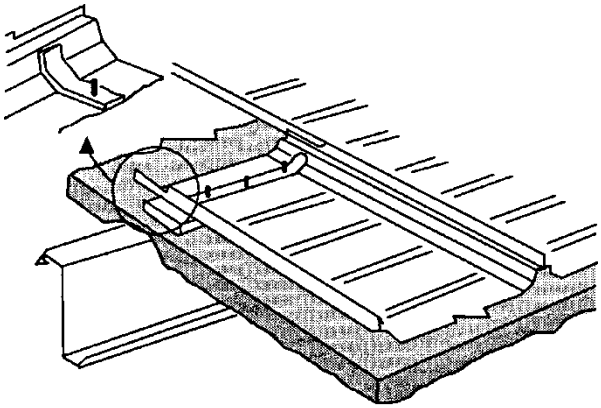


## Step 2

Apply a pre-cut 3 x 25mm ribbon type Panlastic sealant, centred over the studs across the flat of the panel and up to the flat of the corrugation.

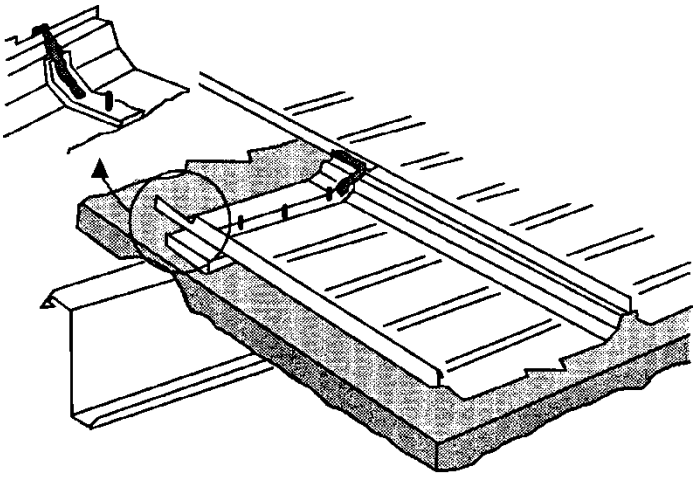
If panels have become dirty or have mill oil on its surface, clean before applying the ribbon of sealant.

Once applied, you must push the ribbon of sealant over the projection studs and work it into the panel comers. The studs should project through the slits in the paper backing.



## Step3

Remove the paper backing and overlay the Panlastic ribbon sealant with a 9mm diameter bead of cartridge type Panlastic sealant from the base of the corrugation to the top of the standing legs. Do not use the cartridge type Panlastic sealant in the flat of the panel. Note that the Panlastic sealant on the right hand side of the panel is extended to the end of the panel along the edge of the notch.

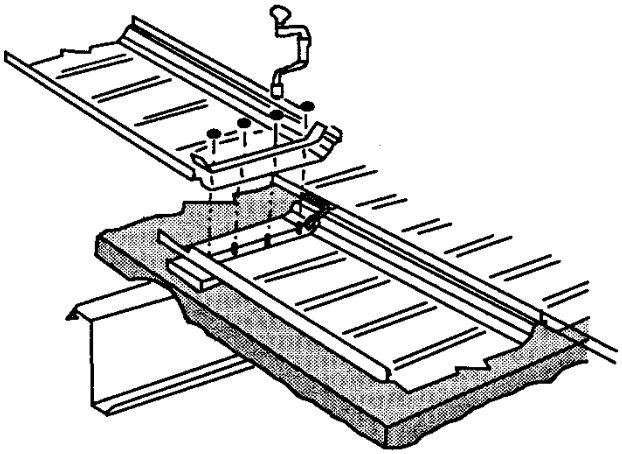


## Step 4

Place the splice or ridge panel in position over the eave or splice panel to engage the projection studs in the splice plate.

Position the panel strap over the stud, install the flange nuts, and tighten down to pull the strap tight to the panel surface.

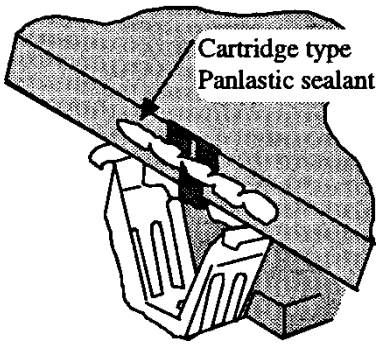
**IMPORTANT:** Flange nuts should always be installed with band tools. Power tools can break the stud or the stud weld. If this should happen, you must replace the splice plate. Always complete the splice before installing and seaming adjacent panels.

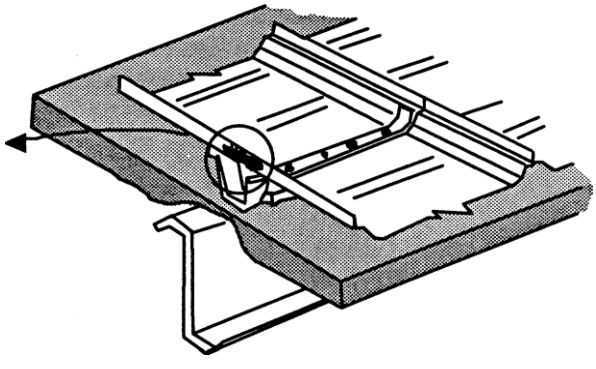


## Step 5

When the lap is completed, apply a 9mm diameter bead of cartridge type Panlastic sealant along the edge of the panel lap at the splice. This is necessary before installing adjacent panels.

The application of sealants, particularly at panel end lap splices, is critical. You must use the proper sealant in the proper volume and at the right place. Excess or misplaced sealant may be picked up by the seamer and cause seaming difficulties.



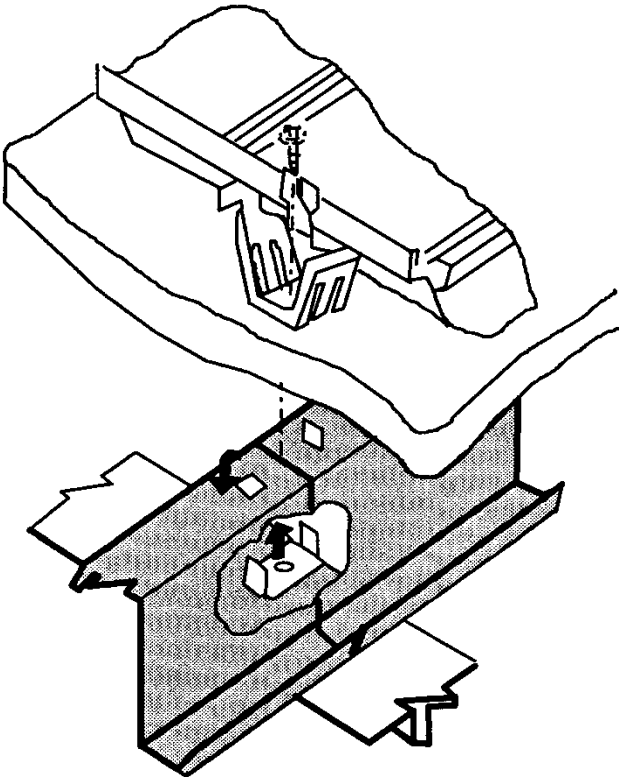
## Step 6

Continue these procedures for the remainder of the panelling being sure to check the panel layout drawings for the proper panel stagger.

The seaming operation must follow panel installation as closely as possible.

## Panel Clip Adaptor

Install the adapter from beneath the structurals, holding with the locking pliers, and bend the projecting ears over from the top with a hammer. If the joint gap is less than 6mm between structurals, drill to accommodate the fastener's contact with the adapter plate.



## Gable Trim Installation

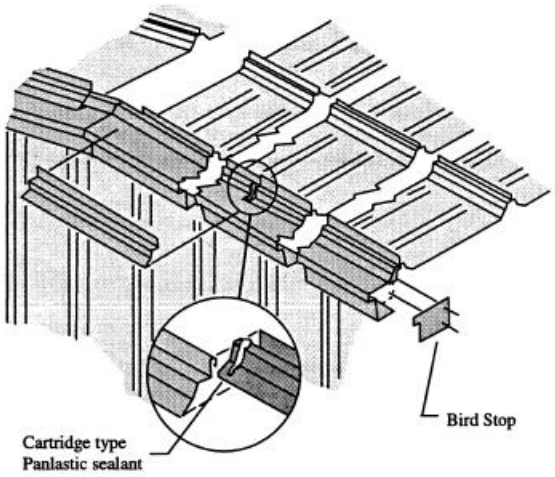
Gable trim is furnished in 6000mm lengths and is designed for joining to the roof panels with the seamer in the same manner as a panel-to-panel joint. Like the panels, the gable trim is installed from eave to ridge.

Start at the eave and position the trim flush with the end of the roof panel. The standing edge of the trim must engage the trim clip tabs and the edge of the roof panel.

Apply an 80mm bead of cartridge Panlastic sealant to the other end of the trim and overlap the next rim section 50mm. The remainder of the trim sections are installed the same way. Cut off the last section of gable trim so that it will be flush with the end of the panel at the ridge.

A trim closure is required in the end of the last section of gable trim as part of the ridge cover installation. It should be installed before installing the gable trim. Push the bottom of the trim to engage the clips on the cap flashing. Complete the trim splices by drilling holes at the splices and installing blind rivets. Hold the trim in position with locking pliers or other clamping devices.

The gable trim is now seamed to the roof panels. The seaming operation is the same as for seaming roof panels except grater care will have to be taken to assure a good start since the starting platform is more difficult to use at this location.



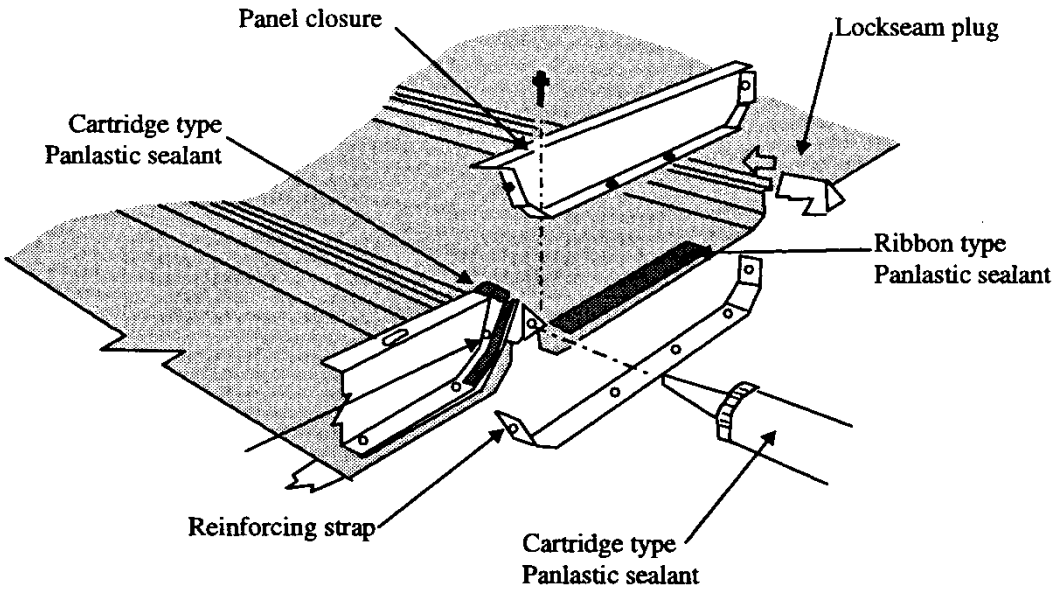
## Panel End Closure Installation

First, a weather tight closure is installed between the roof panel and the ridge cover. To install the panel end closure, start with a lock seam plug, sliding it securely over the end of the standing lock seam and engaging the tab on the bottom of the plug under the panel.

Next apply a ribbon of 30 X 25mm ribbon Panlastic sealant across the roof panel and over the plug. Centre the Panlastic sealant over the holes in the panel, and work into comers of the corrugation. Be sure the Panlastic sealant covers the openings on the sides of the plug.

Then, remove the paper backing from the sealant, position the panel closure over the sealant and align with the holes in the panel. Secure in place with Scrubolt fasteners through the closure, panel and reinforcing strap.

Fill the lockseam plugs with cartridge type Panlastic sealant until the sealant appears at the opposite end of the plug. Then apply a 9mm bead of cartridge Panlastic sealant along the top edge of the closure where it laps the plug, overlapping the 25mm ribbon of Panlastic sealant This must be applied before the adjoining panel closure is installed.

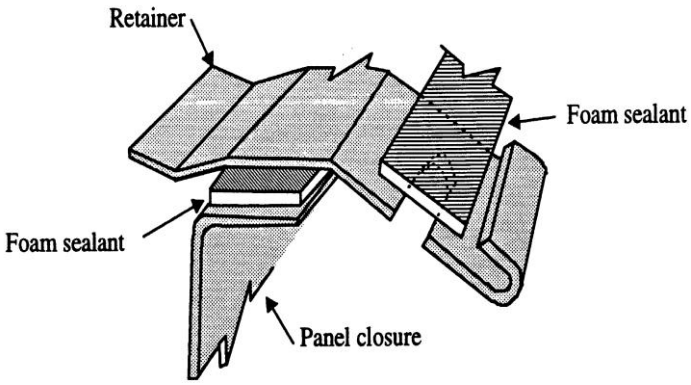


## Retainer Installation

Then apply 5mm x 19mm foam sealant along the tops of the panel closures on both sides of the ridge for the entire length of the roof.

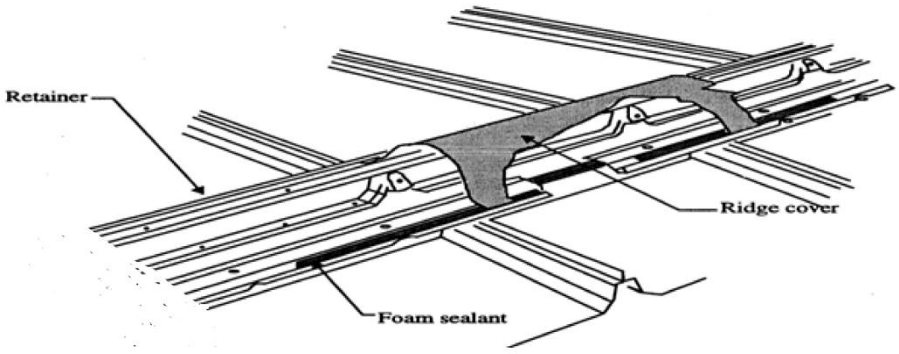
The paper backing is removed from the foam sealant as the ridge cover retainers are installed. Next, place the ten foot long retainer section, aligning the holes in the retainer with the slots in the panel closures. Fasten these retainers with Lock-Rivet fasteners.

Then apply the 5mm x 19mm foam sealant, centred on the slots in the retainers, along the entire length. This forms the seal between the retainer and the ridge cover.




## Ridge Cover Installation

Before starting the ridge cover installation, be sure the insulation from opposite slopes of the roof are overlapping and fill the space between panels. Starting two feet in from one end of the building, install the first ridge cover section. Note that the ridge cover is factory punched with boles in one end, slots in the other.

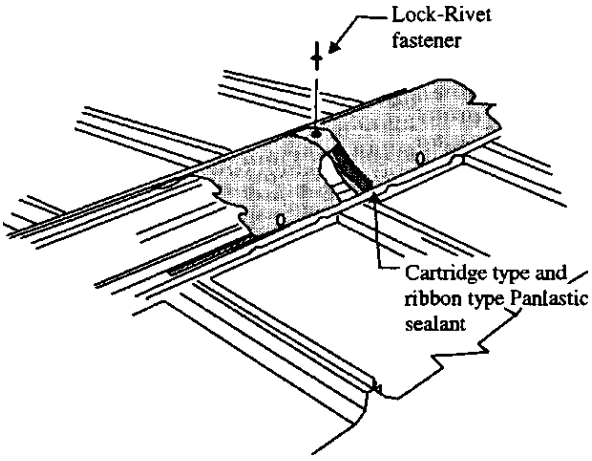


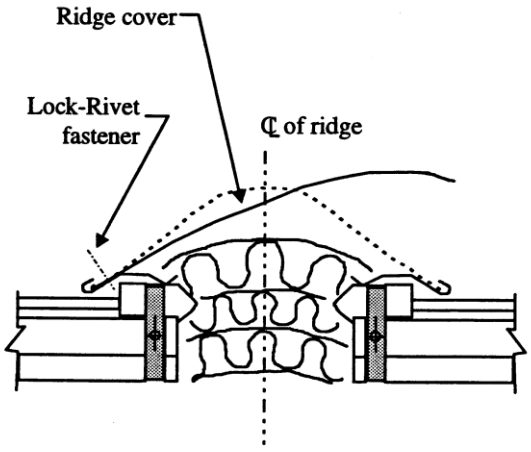

## Ridge Cover Splice

Orient the ridge cover so that at ridge cover end splices the slots are on the underside of the lap. Insert one edge of the ridge cover into the retainer sections and secure with Lock-Rivet

fasteners. Then, starting at the end, flex the ridge cover section to insert the other edge into the retainer on the opposite side. Before installing the adjoining ridge cover section, apply a ribbon of 3 x 25mm roll Panlastic sealant, centred over the slots in the ridge cover.

Remove the paper and apply a 8mm diameter bead of cartridge Panlastic sealant at the inside edge of the ribbon sealant Each ridge cover section is installed in the same manner, fastening the sections together at end laps with Lock-Rivet fasteners.

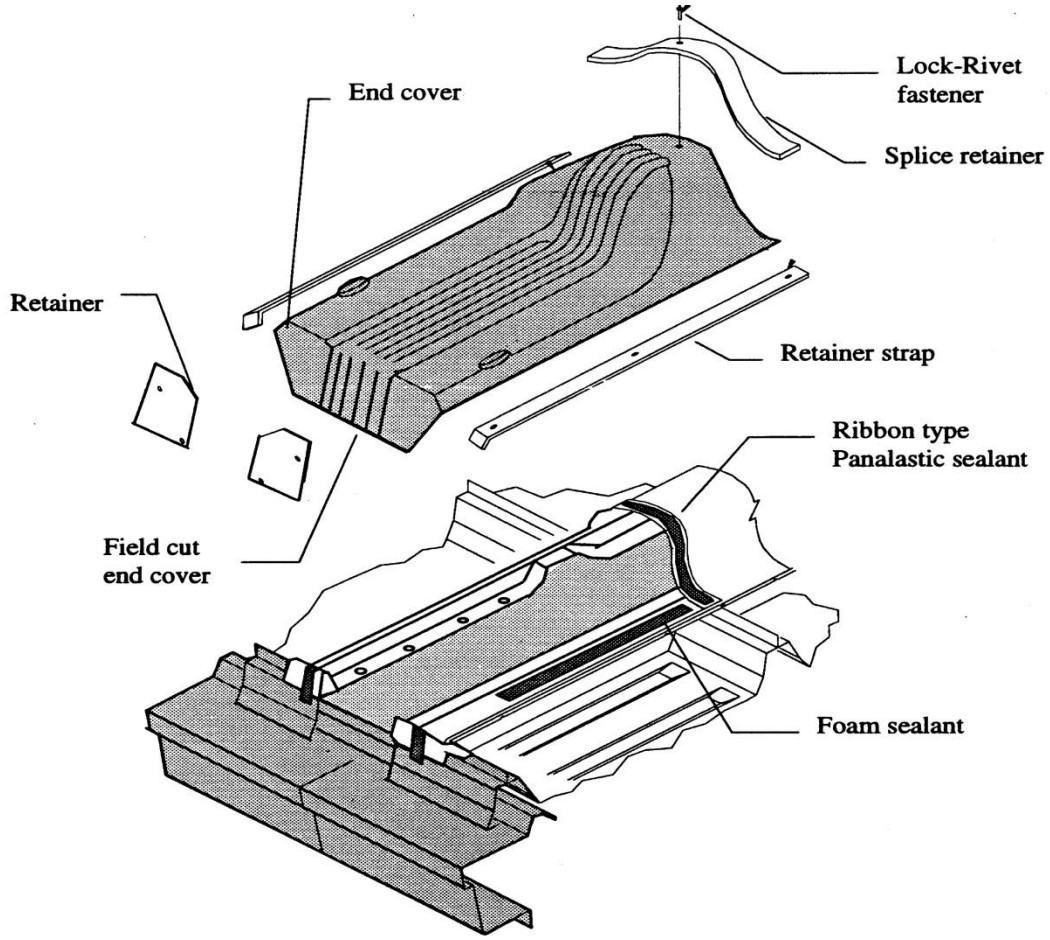


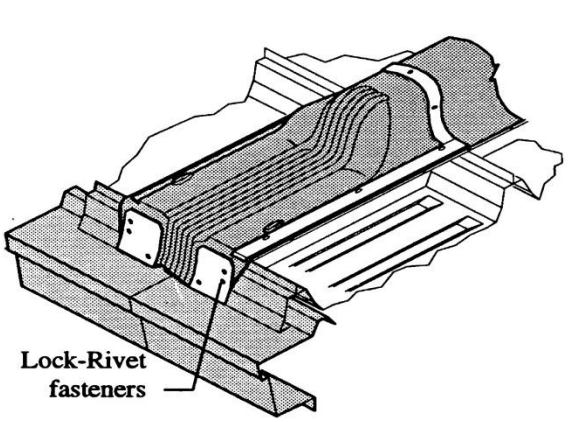




Section

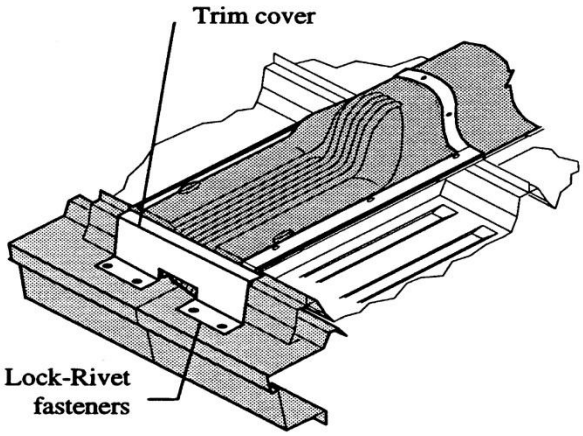
## End Cover Installation

See drawing #1081243 for installation information.




End Cover Assembly




Trim Cover Installation