R-MER SPAN INSTALLATION GUIDELINES

PLANNING, LAYOUT & INSTALLATION

Preliminary Planning

Materials:
Check material delivery schedule.
Anticipate rate of usage.
Insure adequate supply of basic parts and accessories.

Storage:
Plan storage: Provide abuse and weather protection.

Handling Equipment:
Provide for lifting gear, slings, panel protection.

Specs. & Details:
Get approval on all exceptions, shop drawings & samples. Check field dimensions against plans and lengths to be ordered.

Receiving, Storage, Handling

Inspect:
Check wood battens and shipping crates, look for tie down damage between these items.

Damage claim:
Accept delivery and note damage on the bill of lading receipt. Note on the bill of lading the carrier's and driver's name. Get the driver's signature on the bill of lading. Protect shipment from further damage and file notification.

Unloading and hoisting bundles: - (See TEMPLATE: GINS-10)
Limit overhangs to 15' and limit space between supports to 30'; use slats under slings; avoid extending fork beyond bundle, use stop block; protect bottom panels.

Handling:
For easy of handling and efficiency, nest two panels face to face and carry in a vertical position.

Storage:

FIELD STORAGE OF MATERIAL
R-MER SPAN PANEL

- The panels must be stored in a manner to allow free air movement through the panels. This will allow condensation or water to evaporate. In addition, covering the ground will prevent moisture from rising up and condensing on the panels.
- It is *imperative* to prevent water from collecting on the panels in either large coverage conditions or small puddling conditions.
- The panels should be tarped to prevent standing water, dirt, and construction debris from settling on the panels.
- Two methods of stacking the panels are horizontally (face-to-face with the panel's pan in the horizontal plane) or vertically (face-to-face with the panel's pan in the vertical plane). For either condition, the panels must be braced in such a manner to prevent panel damage. The bracing must provide adequate support to maintain straight and vertical panel stacks.
- The stacked panel must have a high point at one end to provide a positive drain direction. This will prevent a standing water condition.
- The maximum horizontal stack height is 10 levels (one level consists of two nested panels). A single row of the vertical stack method is maximum allowable height.

Installation

Layout:

Establish straight side and crosswise benchmarks. Evaluate substrate to determine suitability for the installation of R-Mer Span panel system.

Verify fasteners:

Use proper size and length for strength requirements. Approximately 5/16" is allowable for maximum fastener head size beneath the R-Mer Span panel.

Train crews:

1. To allow for thermal movement
2. To avoid crimps in ribs
3. To avoid screws into ribs at clips
4. To avoid fasteners into end lap joints of flashing
5. To avoid attaching gable flashing to panel.
6. To seam as the panels are being installed.
7. Tie down last panel edge at night.
8. Tie down all bundles and loose pieces.

Crew training is important even with experienced roofers since common practices are often not adequate for the installation of the R-Mer Span panel system.

Equipment Check List

Unloading or hoisting rig
Spreader bar or strongback
Sling & spreader planks
Under panel protection
Long Tape for layout
Transit or line level
Chalkline, piano wire
Marking pen, crayon
Ladders, roof-protection at top
Electric extension cords
Three-way pigtails
Drill motors
Extra chuck keys
Drill bits - in proper sizes for anchors
Aircraft snips L/R
Screw guns/bits/drive sleeves
Rivet gun/rivets
Explosive fastener tool/loads
Caulking gun/tubes
Vise grip pliers (6" step over style)
Seaming tool
Hand crimp tool
Pan end tool

INSTALLING THE R-MER SPAN PANEL SYSTEM

Layout

Rectangular roofs should be checked for square and straightness. Gable ends may not be straight. A crooked gable will look bad on the finished job. If clips are badly out of line they may wear holes in the roof with thermal movement. Set a true line for the gable clips and flashing with stringline or transit. If the gable trim will not easily cover the variation in the edge of the roof, the building may be straightened, clips shimmed, or a new detail developed with the architect. Wind loads are highest at the edge of the roof. Be sure gable clips are securely anchored to solid material. Do not attach gable clips to extensions or overhangs unless engineered for uplift.

Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashing at eaves and at ridges, and verify clearances for thermal movement. For example, be sure that eave drip angles have room for the roof to shrink when it gets cold. If the structural eave and ridge are uneven, some adjustment of the flashing may be required to keep the eave line and ridge cap straight. Again, if the end conditions do not have sufficient tolerance, the building may need to be straighten.

Measure crosswise to the panels to see how the panel width module works out. To get the proper gable end condition, panels may be spread slightly- up to 1/4" over normal width. This must be a uniform spread - abrupt changes in spacing can cause side pressure on clips that will accelerate wear with thermal movement.

Uneven Surfaces

Inspect visually for dips or undulations in the plane of roof and check problem areas with a panel or with a taut wire. Longer fasteners may be required if clips are shimmed.

Specific conditions to check carefully are where there are transitions in the structure under the roof. One example is where the roof runs from steel purlins to the top of a wall. This can be especially out of line if the purlins are long and sag or rise from either too little or too much camber. See TEMPLATE: GINS-11.

Another condition that can produce a sharp change of direction in the roof panel is where joists on the structural supports for purlins meet a column line or main structural member. This is especially true with wood framing under a plywood deck.

When reroofing over an existing deck, there may be large irregularities caused by settlement as well as smaller undulations in the applied roofing material. If an existing structure is extended, look for sharp changes of direction where the new work joins.

During installation, low spots in an uneven roof will show up because the roof panel will have to be forced down on the clip. When excessive force is needed to bring a rib down to the level of the clip, thermal movement can cause the clip to wear through the seam and low purlins must be straightened or clips shimmed. When structures are not true, it is generally the general contractor's responsibility to correct the problem, but the difficulty must be reported as early as possible.

Another problem is appearance. The installed roof panels will follow the contour of the structure and the strong linear pattern of the vertical ribs may emphasize the appearance of an irregular structure. There are no hard and fast rules for what is "acceptable appearance" on an architectural project and requirements can vary with the viewing position. When in doubt, get the architect's approval before proceeding with the R-Mer Span panel installation over any undulating surface.

From the standpoint of performance of the roof, R-Mer Span can tolerate variations crosswise to the panels but lengthwise the pressure required to make the panels conform to the surface must not restrict thermal movement or be enough to accelerate clip wear.

Installing Panels
Make sure that crews are using fasteners of the required size and length for the strength into the structure. The head size must be large enough to hold the clip but small enough that it does not protrude above the base where it can wear a hole in the roofing.

To avoid possible difficulties due to wind, installation of R-Mer Span panels should proceed in the direction of the prevailing winds unless specified otherwise on the shop drawings.

When opening bundles, be careful that panels don't slide or get blown off the roof. Panels are best lifted in pairs for easier handling.

Important! Specifications for clip type spacing and fasteners must be followed to assure the integrity of the finished installation. They have been determined carefully on the basis of anticipated thermal movement (both expansion and contraction), uplift loads, and overall building structure.

Installing Seam Caps (See TEMPLATE: GINS-06.)
The seam caps are shipped with two rolls of factory applied hot melt sealant. This sealant is located inside the seam caps. These caps are shipped sealant side up and separated with cardboard dividers.

Important! It is imperative that the sealant is not disturbed or misaligned during the installation procedure. When handling these caps, do not allow the caps to nest inside one another and contact the hot melt sealant. It they do touch one another, the sealant may pull away from it's original position and out of the cap. If the sealant is damaged, a properly size butyl tape can be field installed at the missing sealant location. These seam caps can be handled back to back to protect the hot melt sealant.

To install the seam caps, hook one side of the cap over the panel edge and rotate over the opposite panel leg. The cap will snap in place. For easy of installation, start at one end of the panel and work toward the opposite end. See next page for illustrate.

Important! To maintain test results for air and water penetration test the hot melt sealant must be proper installed in the seam cap and not damaged during field installation.

Fixing - For Thermal Movement
Of particular importance is the correct placement of the clips for "fixing" the panels against thermal movement. To keep panels from working or sliding off the roof, at least one row of clips must be "fixed" to the panels. Normally, panels are fixed at the ridge line. See TEMPLATE: GINS-01.

<u>Exceptions</u>
1. The eave end of the panel is not inhibited from movement such as by turning into a fascia panel or the eave end set in some form of sealant bed around a penetration.
2. The panels do not exceed 50' in length.

To limit the stress created on the panel clips, for panels over 50' in length, the panels should be fixed at their midpoint to allow for thermal movement in both directions unless noted otherwise on the approved shop drawings.

Exceptions

1. Again the anchoring at the midpoint of the panel length is only if the eave is able to move freely.
2. Where roof shape or large opening prevent such a straight line attachment at the midpoint of the roof, the panels must be fixed at some point away from their center.

On steep roofs or long lengths it may be necessary to fix panels at two or more adjacent rows of clips to provide the required holding power. Ideally, panels should be fixed to the structure along a straight line perpendicular to the length to prevent panels from moving relative to each other. Typically, hip roofs are fixed along the hip condition. See TEMPLATE: GINS-01.

A special problem occurs where a single roof plane contains separated segments such as shown in the detail of a "C" shaped building. Where the distance between fixed ends is 15 ft. or less, the entire zone between them can be considered fixed. For larger distances, it is desirable that there be a separation between the roof panels to allow longitudinal slippage. This can be conveniently handled with a building expansion joint. See TEMPLATE: GINS-03.

Methods of Fixing the Panel to the Substrate

There are several ways to "fix" the panel to the clip.

Rivets between Clip and Panel (METHOD #1)

This is the standard method for fixing the panel. One 1/8" stainless steel rivet is secured through the anchor reveal of the panel leg and the extending arms of the clip. This procedure is repeated at each side of the panel. Thus, the panel is anchored on both sides at the clips. This secures the panel at the anchor reveal on each side of the panel to the substrate. Be certain to capture all drilling debris during this operation. If drill debris is allowed to land on the panel surface, this debris will rust and discolor the panel's finish. It has been documented that hot drilling debris will embed itself in the paint finish, and create the illusion that the panel itself is rusting. This condition or rusting will become evident almost immediately. These filings must not be allow to fall to the panel surface. See TEMPLATE: GINS-05.

Bolt and Nut (METHOD #2)

This is more positive way to fix the panel at a clip. It requires drilling or punching a hole through the clip and the vertical leg of the panel. To prevent leakage, a neoprene faced washer needs to be place on both sides of the bolt. Always use stainless steel nuts, bolts and washers to prevent rust. ***Important!*** *Be certain to capture all drilling debris during this operation*. If drill debris is allowed to land on the panel surface, this debris will rust and discolor the panel's finish. It has been documented that hot drilling debris will embed itself in the paint finish, and create the illusion that the panel itself is rusting. This condition or rusting will become evident almost immediately. These filings must not be allow to fall to the panel surface. This method is often utilized for conditions where heavy sliding snow loads are anticipated. See next page for illustrate.

Screw into Structure (METHOD #3)
This is the most positive way to secure a roof against movement because it is not limited by the strength of the clip. To eliminate leaks, this method is usually employed where the fastener is not exposed. When the roof is fixed at the ridge, screws may be installed behind the foam closure. Be careful to minimizes and remove the debris from the drilling operation from the panel surface. If drill debris is allowed to land on the panel surface, this debris will rust and discolor the panel's finish. Because the fastener is located behind the head closure and conceal from view, the control of drilling debris is slightly less critical. ***Important!*** *In all cases, avoid depressing the roof at the fastener by inserting a spacer equal to the clip base height, and always use fasteners with neoprene faced washers to avoid leaks.* Never use nails to secure R-Mer Span panels. See TEMPLATE: GINS-05.

Installation Sequence
There are two basic ways to start the R-Mer Span panel system. Starting at the gable or jamb conditions and work across the roof deck or starting at the center of the roof and work outwards across the roof deck. *Review the layout section of this Installation guide to evaluate the substrate conditions and how to determine a true starting point.*

Starting at the Gable or Jamb Conditions (See TEMPLATE: GINS-08 & GINS-09.)
To install the first panel, start with gable clips. Determine the roof's true gable starting point and chalk a layout line between the top and bottom points. Install the gable clips. The gable clips also serve as attachment for gable or jamb flashings. Flashings should not be fastened to the panels because of thermal movement of the panels relative to the roof.

Starting at the Center of the Roof (See TEMPLATE: GINS-08 & GINS-09.)
To install the first panel, determine the roof's true center starting point at the top and bottom. Chalk a layout line between these two points to provide clip location. Install standard clips.

Job sequence
1) Pan end panel pan as they are removed from the crating.

2) Set panels for the Gable or Jamb starting method.
Rotate first panel under gable clip. Use step-over vise clamps with disc contact points to temporarily secure panels to clips. Set standard clips along length of panel. The use of hand spring clamps to temporary secure clips to panel will prevent the clip from becoming misaligned while the screws are being driven into the substrate and simplify clip installation. Remove clamps and slide next panel onto clips just installed. Replace a few hand clamps on second panel to temporarily secure panel. Be certain to protect the panel's finish from the clamps contact points. A strip or small piece of duct tape over the clamps' contact point will protect the panel's finish. Check benchmarks every 10 or 20 feet.

3) Secure panels at fix point.

4) Install Caps.

5) Seam Caps.

6) Install flashing for penetrations as adjoining panels are installed.

7) Install ridge closure and trim as panel are being installed to minimize foot traffic on panels.

8) Install eave drip angle.

When installing on open purlins
The panels along with the clip provides a working platform. In addition, the panel edges help align the clips.

Job sequence
1) Pan end ridge end of panel.

2) Set panels - Align with Gable Clip or previous panel. Check benchmarks every 10 or 20 feet.

3) Fix panels at fix point.

4) Insert clips into rib of panel and secure to structure.

5) Install cap.

6) Seam cap.

7) Install flashing for penetrations as adjoining panels are installed.

8) Install eave drip angle and ridge closure.

Avoid heavy traffic in any local area. Use walkboards where necessary to protect panels. Avoid walking on panels before they are seamed. Take special care on painted panels, since they are especially susceptible to abuse.
Secure the edge of the last panel installed each evening. Do not leave panels unseamed overnight. As a minimum, panels should be secured at each clip by a clamp or vise grip overnight. Seaming as the panels are installed distributes the walking loads on the roof and also simplifies securing the job overnight.

Hand Crimping
The hand crimping tool is use to crimp the seam cap around the top of two adjacent panels. This tool is typically used for two primary reasons. One, the crimper is use to close the seam cap in tight locations or where the seam can not physically reach. Two, the crimper provides a means of starting the seamer. The seam cap can be crimped and then the seamer can engage the panel seam. See TEMPLATE: GINS-07.

Removing Damaged Caps and/or Panels (See TEMPLATE: GINS-05.)

Occasionally, a cap or panel may be damaged after a job has been installed. The following procedure should be used to remove the damaged area:

1) Remove ridge cap and ridge closure if any cap is to be removed. In addition, the eave drip angle will need to be removed if any panels are to be replaced.

2) With a screwdriver and pliers, pry either the eave or ridge end of the cap up until it is past the first clip.

3) Pull up on the cap rotating the length of cap pulled up 90^0 to the left and to the right as you walk along the panels straddling the cap being removed.

4) After the cap is removed, locate the positions of the panel clips. Starting at one end of the panel, insert a screwdriver between the clip and damaged panel. Pry the panel apart so that it disengages from the clip. Proceed in this same fashion toward the other end. Note that as the clip locations are closer together, several clip locations in succession may have to be pryed apart simultaneously in order to allow the panel from becoming disengaged from the clip.

5) Remove the damaged panel and reinstall new panel in the reverse method as described above.

6) Install new cap and seam. Reattach eave drip angle and ridge closure and ridge cap.

Clip Fastening to Substrate

Fastening R-Mer Span Anchor Clips to Wood
Nails should not be used for fastening clips since they do not provided pull-out resistance. Self-tapping sheet metal screws with type A or AB points are preferred over wood screws since they are fully threaded and designed for application by power tools. Self-drilling screws such as the "TEK" type should never be used in wood! Only self-drilling screws specifically designed for wood should be used, as self-drilling screws for metal create too large of a hole in wood with the tip of the screw and do not have sufficient holding power. When power screwdrivers are used, they must be properly matched to the fastener to prevent overdriving. The recommendations of the equipment manufacturer should always be followed. In addition, an extension may be needed to enable the tool to get close enough to the vertical leg of the clip.

Fastening R-Mer Span Anchor Clips to Steel
Screws in tapped holes or explosive driven drive pins in heavy structural steel exceed the requirements of most R-Mer Span clips. Care must be exercised, however, in the selection of fasteners for light gauge steel or steel decking. The fastener manufacture should be able to demonstrate that its fasteners will provide an adequate factor of safety. Note that most manufactures publish ultimate pullout values which must be reduced for safe design loads.

Self drilling fasteners have tips designed for specific steel thickness and should be used only within the allowable ranges. Screws will not develop their rated strength if used in material thinner than for which they were designed.

Steel decks designed for uniform loads must be checked for the concentrated or straight line load of the R-Mer Span anchors.

Fastening R-Mer Span Anchor Clips to Concrete

Make sure the concrete will provide a good base for the clips and that anchors will not produce any spalling. Explosive or powder-actuated fasteners can be used for attaching clips to concrete, but in order to assume a true surface, it is better to use an intermediate steel member or track that can be shimmed.

With lightweight insulating concrete and poured decks, fasteners must be attached to the structural support underneath, since this type of concrete does not have adequate strength for holding the fasteners.

FLASHING DETAILS

Closure Assembly for R-Mer Span Roof Ridge

This ridge/head assembly is a combination of a factory fabricated metal closure formed in a 'c' shape to retain a 1" wide factory notched polylefin closure. This assembly is attached on both sides to the panel seam. See TEMPLATE: GINS-13 & GINS-14.

Closure Assembly for R-Mer Span Roof Hip

Notch out closure channel so that it fits over cap and retains the foam closure between the panels. Cut the foam strip a minimum of 1 1/4" longer than the diagonal distance to seam centerlines. Insert foam into closure channel between notched out portions. Secure the "roof hip closure" to caps. See TEMPLATE: GINS-12 & GINS-13.

Panel End Lap

R-Mer Span panels may be field lapped when length of panels make it impractical to ship in continuous lengths because of restrictions due to job location or small quantity required. Whereas an end lap can be accomplished quite easily with 24 ga. steel and .032 aluminum. See TEMPLATE: GINS-16.

Diagonal Flashing (Hip)

When there is unbalanced thermal movement on opposite sides of a diagonal flashing member, the assembly must provide for longitudinal slippage as well as flexing crosswise to the roof. This condition occurs on diagonal cut gables or ridges where there is roofing on only one side of the joint. It may occur at valleys or hips where the slope length or pitch is not the same on both sides. In these cases an interlocking slip joint, such as shown below will keep the sections together yet allow both kinds of motion.

Sealants
The R-Mer Span system is designed and manufactured to give 20 plus years of service. *Do not use a 5-year sealant with a 20-year roof system.*

For exposed conditions, use only good quality sealants that will cure to a rubber-like consistency. Do not use oil base or asphalt type caulking or mastic. For concealed applications a non-hardening sealant may be used. In any case, the sealant must have good adhesion, retain its properties at temperature extremes, and resist deterioration from water, heat and sunlight. A major factor in the successful application of sealants is surface preparation. Make certain that the surface is prepared in accordance with the manufacturer's recommendations.

Sealant will function best if installed between parts when they are assembled rather than being forced into the completed joint.

Except in heavy freeze areas where ice may spread joints apart, it is best to apply sealant away from the open face of joints so that the metal will shield the seal and protect it from direct exposure to water or sunlight.

Flashing Bends
Aluminum and steel sheet must be fabricated with a large bend radius to avoid cracking the metal and/or the paint. Illustrated below are samples of R-Mer Span flashing sheet formed to different bend radii. At the zero T bend, the metal and paint are clearly fractured. To avoid metal and paint fractures a minimum inside bend of 2T is suggested.

To get a larger bend radius on a sharp steel die it may be necessary to add a bent strip of the desired thickness to the nose of the male die. This can be held in place with masking tape.

Pan End Tool is used to form a raised end at ridges, walls, etc. to back up the foam head closure. This tool allows the installer to turn the ridge end of a panel up approximately 2" (the vertical height of the straight portion of the panel leg). This provides a extra source of water security on all roofs with particularly low pitches. The Pan End Tool is available for all standard panel profile widths and is an integral part of the R-Mer Span panel system. See TEMPLATE: GINS-15.

Hand Crimping Tool is used where there is not enough clearance for the seamer. This tool allows the installer to get to areas to seam the cap where it is not possible or practical to do so with the standard seaming tool. See TEMPLATE: GINS-07.

Seamer Tool Operation
The seamer tool normally is started and fed onto the end of the panel in the closed position. It does not need to be opened and clamped on unless clearances at the panel end are restricted. When the seamer tool must be clamped on, it is desirable to first use the Hand Crimping Tool to close the seam over about a 6" length. Forcing the machine closed over a cap portion unseamed will cause excess wear on the tie rods and gear teeth. See TEMPLATE: GINS-07.

The top must be removed to place the tool, which weighs 70 lbs. in the box, but OSHA requires the top handle to be in place whenever the tool is in operation. Always use a three-wire grounded electrical supply of 110 volts and maintain adequate voltage at the machine by properly sized service lines. (Machines wired for 220 volts are available on special order.) In extreme cases, a voltage control device may be required to keep the power up. It the machine slows down or stalls, it is a good indication of low voltage.

Shafts are mounted in pre-lubricated ball bearings that need no maintenance unless the machine has been submerged or filled with dirt. External guide bearings and tie rods should be kept lubricated with light machine oil. The seamer tool should be stored in a dry area when not in use. Water will cause electrical shortages in the motor and will cause all steel parts to form rust which in turn may damage the cap during seaming.

Checking Forming Roll Positions

If the forming rolls have been removed for any reason they should be checked to insure they are installed right side up and right size front to back. Rolls are marked (F) for front and (R) for rear.

Tie rods normally need no adjustment, but with wear of the closing cam the locknut may need to be reset so the machine closes firmly. The meeting halves of the machine must be clean. If the cam handle does not close firmly, the machine may come open during use. This is particularly hazardous on a steep roof or on walls. If the machine is loose, adjust the tie rod nuts and locknuts so that there is a small but noticeable resistance to closing the cam handle.

Side guide rolls prevent the machine from tipping sideways.

Main Checkout Points

Electrical:
Grounded plug with good wire insulation; cord end connections tight; drill motor brushes at least 5/16" long; off-on switch and forward-reverse switch working.

Rolls and guides:
Front and rear forming rolls in right position and right side up; guide bearing free turning and in alignment.

Closing:
Meeting faces clean; handle closes firmly.

Tighten any screws which are loose. Repair or replace items as necessary. Custom parts or major repairs may be obtained from The Garland Company. Commercial items may be procured locally.

Follow normal safety practice in checking to be sure that the machine is properly grounded and that the supply cord is not cut or frayed. When the brushes inside the drill motor measure less than 5/16" long, they should be replaced. Short brushes can result in a burned armature.