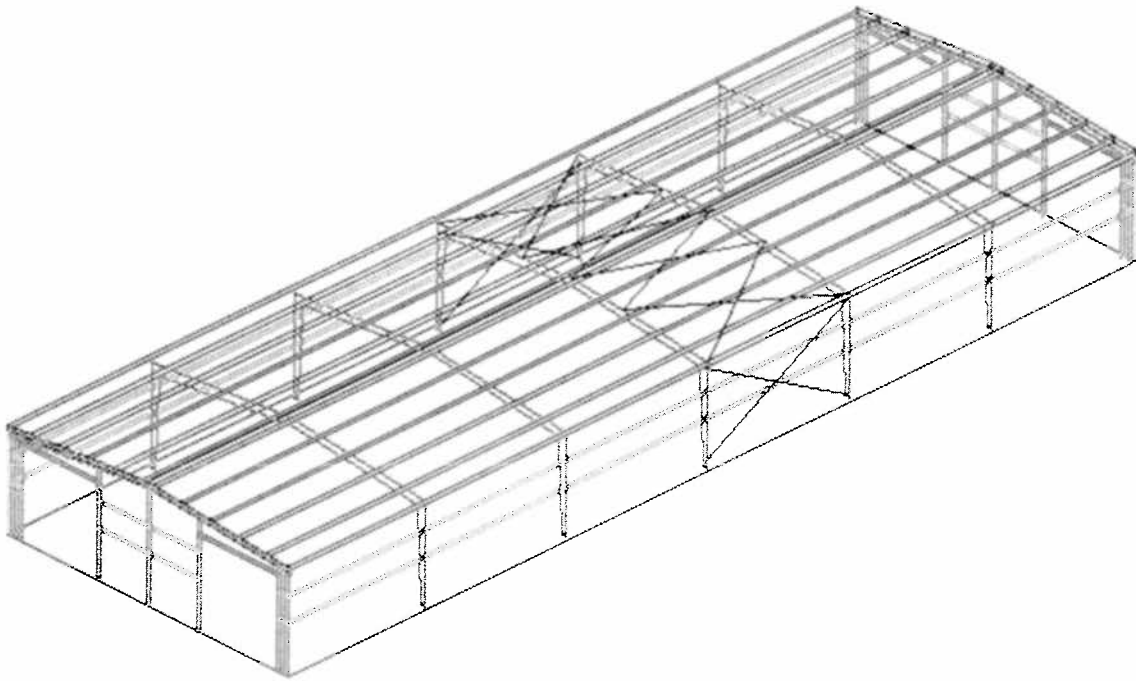




Metal Buildings

STANDARD ERECTION GUIDE



SBI Metal Buildings & Components

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INTRODUCTION

Thank you for purchasing an SBI building. SBI has written this guide in order to help instruct you in acceptable and widely used erection procedures that have been proven to be safe and efficient. This manual is not intended to be a textbook on How To Erect A Building, but a guide for standard procedures.

The practices depicted are for SBI's Standard Building Systems being constructed on a typical site. Construction sites may vary and so any suggested plans must also vary according to the job site.

If you are not an experienced erector we strongly recommend you hire a professional to assist you. An experienced erector, using this manual along with the standard Erection Drawings; will find our buildings assemble quickly and easily; producing a superior structure that will provide years of service.

SBI is a Pre-Engineered Metal Building Manufacturer; therefore SBI will not accept responsibility for poor erection practices, which may result in dangerous, or otherwise unsatisfactory conditions or performance. It is not the responsibility of SBI to provide any field supervision or inspection.

The Metal Building Manufacturers Association (MBMA) produces a text called the Low Rise Systems Building Manual. Section IV "Common Industry Practices" addresses industry wide standard practices and procedures concerning subjects such as design, sales, manufacturing tolerances and erection. For questions not specifically covered in SBI's Standard Policies and Procedures, refer to the "Common Industry Practices", a copy of this section can be found in the appendix. In addition to this manual, the MBMA also has an excellent training tape, available through SBI. Call us for details.

No claims for alleged misfabrications (back charges) will be paid unless these procedures are strictly complied with by the erector.

A word about safety.

There can not be a "successful" building project if someone is seriously injured or killed. Everyday hundreds of skilled people in government, and industry dedicate their time to safety issues that include developing programs, procedures, training, and improved equipment. Without you, the on site supervisor and workmen practicing and following their recommendations, all that effort is worth exactly nothing. The only one that can make a safe working environment is the people on the job. You are responsible for your own safety as well as that of your co-worker. If you observe an unsafe condition on the job site, DO NOT IGNORE IT, REMEDY IT IMMEDIATELY.

At the end of each subject there is a "safety reminder" that is pertinent to that section. If we prevent even one accident by including these tips our mission will be accomplished.

Good Luck! Work Safe!

SBI reserves the right to amend the products or procedures described herein at anytime.

PRE-DELIVERY CHECKLIST

- (1) Check the route to the job site. The roadway must be wide enough and suitably compacted as to accommodate heavy truck traffic.
- (2) Check for size and soil stability of proposed “Lay-Down” area.
- (3) Locate all utilities under ground and overhead. Mark appropriately as to be seen in clear view so that delivery drivers and unloading crews are informed of these hazards.
- (4) Formulate an unloading plan based on site conditions. The plan should consider safety issues, equipment needs and personnel. Make sure your crew will have proper rigging, including spreader bar and straps.
- (5) SBI customers are given a tentative delivery date at the time of the building order or upon receipt of approval drawings. Notice of a firm delivery date will be given one (1) week prior to shipping and confirmed twenty-four (24) hours out. The Erector is responsible for unloading and must have adequate personnel and equipment available on the scheduled delivery date.

Remember:

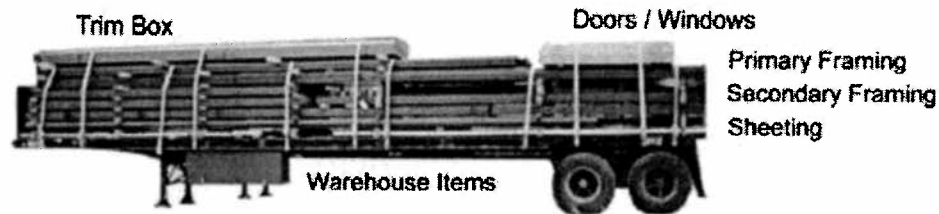
- Always:** (1) Visit job site a minimum of two (2) days prior to delivery.
(2) Inform general contractor or other trades of building delivery time and date.

Never: Wait until the last minute to book equipment.

Safety Reminder: Plan Ahead! Proper tools + experienced personnel = safety.

BUILDING DELIVERY

- (1) A copy of this manual and a complete set of "For Construction Drawings" will be on the delivery truck. If you have ordered insulation from SBI, the phone number of the insulation supplier is on an attached sheet. **You must call this number and schedule insulation delivery within 7 working days before it is needed at job site.**
- (2) The erection crew should assist in spotting the truck. An example of this would be to flag traffic or to direct the driver while backing up.
- (3) The truck must be located on reasonably level ground with ample working space to insure safe and efficient unloading.
- (4) The unloading process begins with the straps or chains that bind the load being removed. The erector should assist the driver with this task. Always check to insure the load has not shifted, putting stress on the binding.



SBI trucks are typically loaded as shown above.

- (5) This load sequence can vary because of multiple load jobs or other conditions. Unloading techniques are similar for the same products regardless of where they occur in the load.
- (6) A thorough inventory and an inspection must be made while unloading. The Material List should be checked off item by item. Any shortages or damages must be reported to the driver at the time of delivery. Call SBI Customer Service **Before** driver leaves job site. In doing this a complete assessment of the situation can be made and proper action can be taken. Concealed damages or shortages of material packaged in cartons or crates must be reported to SBI within fourteen (14) days.

Remember:

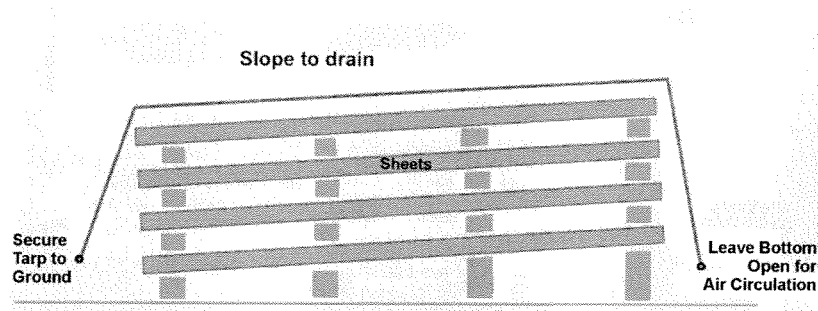
Always: (1) Use an experienced equipment operator.
(2) Have an experienced rigger.

Never: (1) Handle sheeting roughly.
(2) Attempt to unload long sheet bundles or trim boxes without a spreader bar.

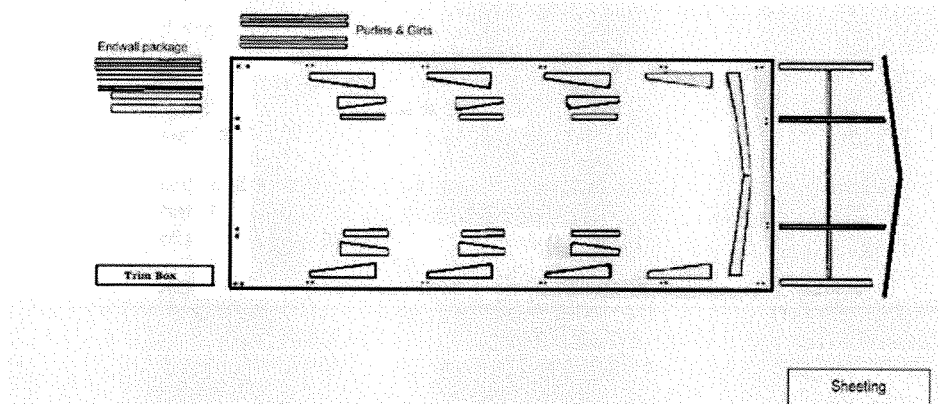
Safety Reminder: Look up! Power lines can kill.

SHAKE OUT – STORAGE

- (1) While unloading, the erection superintendent should direct crews to place materials in reverse order of erection.
Example: Primary framing on slab or very near. Second framing closer to work than sheeting and farthest away would be trim container. This sequence saves labor and lessens chances of material being damaged due to repeated handling.
- (2) Primary and second framing should be stored in a relatively level area. The stacking material on the truck should be reused to keep individual pieces accessible and orderly. Care should be taken to keep mud off of the steel. It is much easier to put a sheet of plastic on the ground to protect the steel than spend hours cleaning after it is erected.
- (3) Warehouse items must be stored in a dry, secured area. If left unprotected on the job, cartons will become wet, ruining its contents. Theft is a problem with screws, bolts, and other items that are easily carried.
- (4) Store sheeting as shown below or another method, which will prevent water infiltration. Failure to do so will cause “white rust” which will ruin the paint finish.



After unloading and shakeout work, your job site should look something like this.



- (1) Frames and Columns on the slab
- (2) Purlins and Girts near the slab
- (3) Trim should be kept in box until needed
- (4) Sheeting should be placed away from primary work area, so as not to be damaged

Remember:

Always: (1): Protect sheeting from water while in bundles.
(2): Insure concrete has had proper curing time before driving on it.

Never: (1): Walk on steel with muddy shoes.
(2): Remove part number tags during storage or unloading.

Safety Reminder: Drugs and alcohol have no place on the job site.

Personnel

A basic erection crew typically has five people. This seems to be the optional number for small and medium size jobs. The crew can be expanded to meet time constraints or for jobs of large scope.

<u>Title</u>	<u>Primary Job Duties</u>
* Lead man, Forman, Superintendent	Read prints, direct activities
Operator	Machine operator
Connector	Fit and bolt up steel
Sheeting Forman	Roof and wall sheeting
Lead man trim	Installs trim

The important lesson in the suggested crew made up above is that the 3 primary activities (steel erection, sheeting, and trim) all have competent, experienced personnel that lead the task.

On a small crew everyone participates in the work sometimes as the leader, other times as a helper. In addition to the instructions in this manual the manufacture of our “warehouse items” furnished detailed instructions guiding you through the proper installation of their products. At least one member of any erection crew should be an expert in the installation of those accessories. It is a pity to see the door not work properly on an otherwise good erection job.

Remember:

Always: Have cross training to avoid problems when key people are not present.

Never: Let inexperienced personnel operate erection equipment.

Safety Reminder: Make certain personnel are physically able to perform work. Overheating or fatigue can cause loss of coordination and balance.

Equipment

All erection equipment should be well maintained and meet all safety regulations. Popular lifting equipment for metal building erectors are hydraulic trucks and shooting boom forklifts. These types of equipment are chosen over large, heavy, conventional cranes because of mobility and initial cost. Extending boom lifts seems to be preferred for unloading and can be used to erect steel. Boom trucks, though lacking some efficiency in unloading, do a superior job erecting steel and are very mobile. Whatever is your choice, the operator must be familiar with the machine and its capabilities. Your erection plan should be tailored depending on your choice of equipment. Whatever the equipment, proper rigging is a must! Cables, Straps, & Spreader Bars should be used where appropriate.

Scaffolding and hydraulic man lifts are real time savers and can be leased on a job to job basis. The same safety rule applies to operating these lifts.

Remember:

Always: (1) Choose correct equipment for the intended task.
(2) Insure the operator is familiar with machine.

Never: Leave key in equipment over night.

Safety Reminder: Never Operate within 10' of power lines.

*The lead man could very well be a woman. References such as “workmen” or “leadman” should be interpreted to reference the individual in the position regardless of gender.

Tools

Below is a suggested list of tools to have on hand before beginning erection. Other tools both in type and quantity may be required depending on the scope of the job and the method of erection. All tools should be commercial quality and OSHA approved. It should be the responsibility of the individual workmen to furnish and maintain personnel protection equipment and specialty tools. Example: Welder should have own hood and gloves. Ironworkers should have Bolt Bags, Safety Harnesses, and Lanyards.

Recommended Tools

Belts w/bolt bags	Push broom
Brush, wire	Brush, paint, miscellaneous
Bucket	"C" clamps (6", 9", and 12")
Cable Clamps	Cable ¼" diameter
Can, oil	Can, gasoline w/safety spout
Caulking gun, open barrel	Channel locks
Chokers (as required)	Chain, 35' long (to lock up with)
Chalk line and chalk	Circuit tester
Cold chisel	Cutting torch with 100' hose, bottle cart, with fire extinguishers
Dolly	Drill, ¼" drive
Drill ½" drive	Drill bits, (1/8")
Come-a-long, 3 ton	Come-a-long, 1 ton
Drift Pin	Extension cord, #12-3, 100' long
Extension cords, #12-3, 25' long	Extension cord, #10-3, 2/4 way box, 250' long
Fire extinguisher, #10	Files, assorted
First aid kit	Flashlight
Generator/Welder	Gloves, pr.
Goggles, safety	Goggles, cutting
Ground fault interrupter	Carpenters claw hammer
Hammer drill 6 bits	Ball peen hammer
Sledge hammer	Rubber hammer
Welders chipping hammer	Headlines (rope), ½"-5/8" diameter, 60' long with hooks
Hard hats	Impact tools ½"
Impact wrench and sockets	Knife, putty
Extension ladders 20' to 40' long	Step ladders 6' to 8' on
Level rod	Load binders
Sponge mop	Padlocks
Pliers	Plumb bob
Pop rivet gun	Power Nibbler
Power shears	Punch, enter
Safety Harness tie-off Rigging	Safety netting
Salt tablets	Saws, carpenter, hand
Saw horses	7 ½" heavy duty skill saw
Saws, hack with blade	Screwdriver, sets, flat and Phillips
Screw Guns	Screwdriver, 10 pc. Set ¼" hex drive
Shovels	Shear, portable panel
Slings, nylon	Activation Snips
Snips, bulldogs	Sponges
Staple gun and staples	Square
Tape measure, 12' to 16' long	Transit
Turnbuckles	Vice grips, sheet metal
Vice grips, standard	Vice grips, welding clamp
Water cooler	Wedge, steel
Wrecking bar	Welding hood with spare lens
Wrenches, 12" adjustable	Wrenches, 15" adjustable
Open-end structural w/drift handle	Box end structural

In addition to this list of tools, certain supplies need to be on a properly equipped job truck. These supplies are not normally furnished by the building manufacturer, but are necessary for a complete erection job.

Drive pins or loads for anchoring base angle	Various size shims for leveling columns
Non shrink grout	½ wedge anchors
Double back tape or glue for insulation	Patch tape for insulation
¾" Flat washer for anchor bolts and miscellaneous use	

Remember:

Always: Keep tools clean and well maintained.

Never: Pull power long distances with light gauge cords. Low voltage/ampere will burn up electric motors.

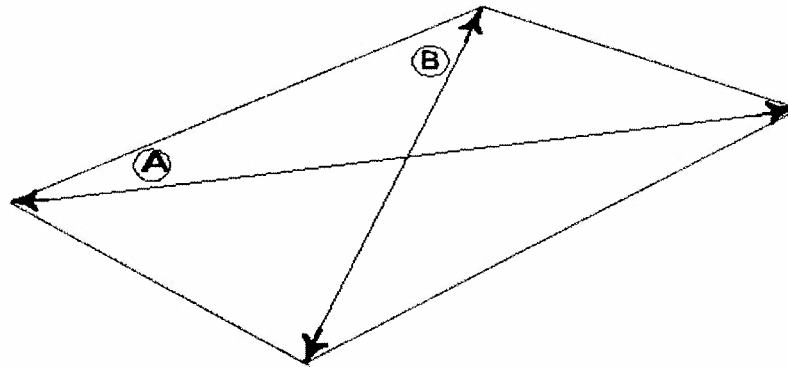
Safety reminder: Make certain electrical pluggins have ground fault protection.

Concrete & Anchor Bolt Check

Insure the slab is square by one of the following methods, before primary steel hanging begins. The slab and anchor bolts should be checked.

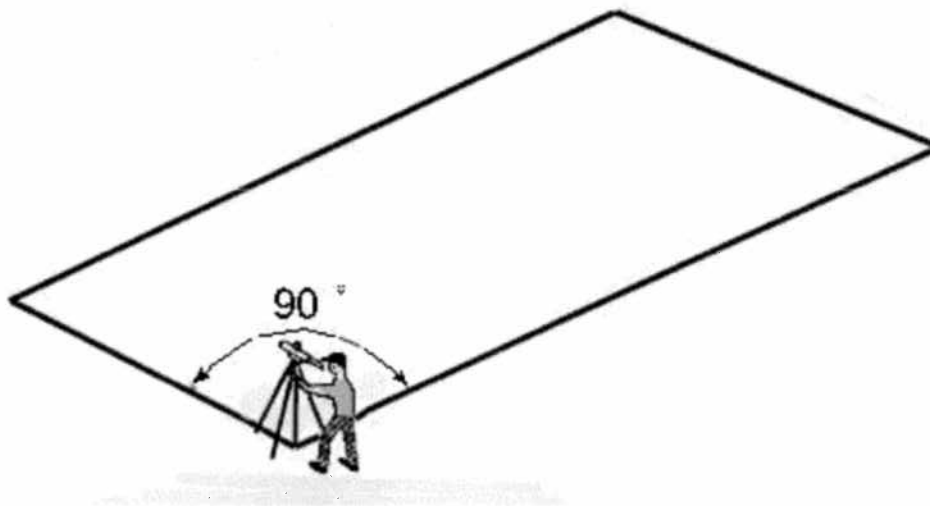
DIAGONAL METHOD

On small buildings the diagonal method can be done quickly and easily. Simply pull a tape from corner to corner. Dimension A and B should be the same.

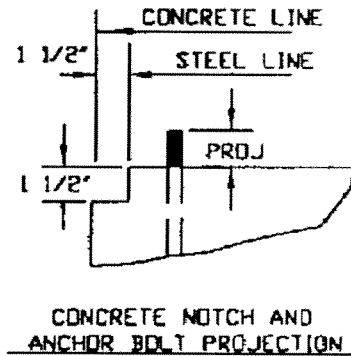


TRANSIT METHOD

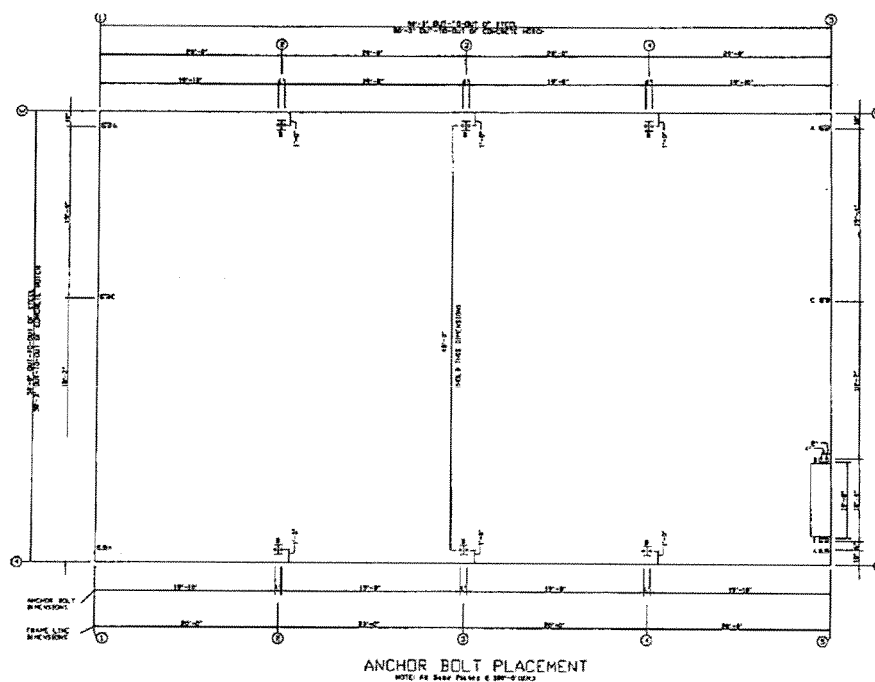
Set up the transit instrument at a corner. Back sight the longest point on the site wall and set the scale to 0 degrees. Turn 90 degree (270 degree). Vertical crosshair should be on the edge of concrete at the farthest point.




Check anchor bolts for proper project (2 1/2") standard.

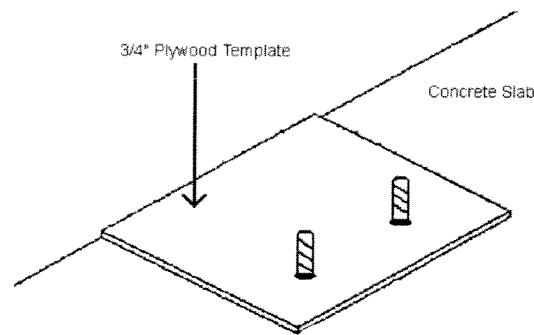


(2) Check Anchor bolts settings using SBI's drawings to confirm accuracy.



	PRICE: 56' x 80' x 12'	EX. TAG: 500 S 800 S 120	EST NUMBER:
		SEASON: J.S. 800 S	
		DATE: 2/24/99	DEANING NUMBER:
		REMARKS: NONE	
ORDER: ANCHOR BOX 2 PLAN			

- (2) Check anchor bolts with template replicating base plate column pattern. Templates should slide on and off easily. If anchor bolts are not plumb, small adjustments can be made by starting nut (to keep from damaging threads) and tapping with 2 lb. hammer until bolt is plumb and template fits.



- (3) Check threads for damage and clean with wire brush. Sometimes it is necessary to repair threads with a rethreading die.

Remember:

Always: Place nuts and washers next to anchor bolts before hoisting columns.

Never: Start to set columns without checking anchor bolt placement.

Safety Reminder: Make sure concrete forming lumber is not left lying around work space with nails exposed.

PRIMARY FRAMING

Column

Rafter

Purlin

Temporary Bracing

Plumbing Methods

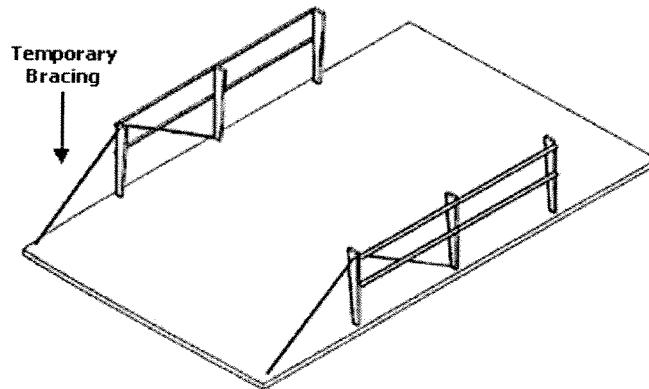
Erection of Primary Framing

Erection of primary framing is typically started by standing side wall columns on the brace bay. On small buildings this can be done by hand. Larger building columns require hoisting equipment. If columns are set using equipment care should be taken to rig the column so that it hangs vertical when picked up.

After standing columns, attach wall girts and install temporary bracing cable or ropes. It is important to note that even though the work is started in the brace bay the wind cables furnished with the metal building can not be installed until the rafters are set. Therefore, the erector must furnish temporary cable bracing in order to proceed safely. The type and quantity of the temporary brace is to be determined by the erector.

Anchor bolt nuts should have washers and be snug but not over tightened causing columns to pull out of plumb. It is important to plumb columns using the temporary bracing before proceeding to set rafters. A building that is started plumb will bolt up easily and virtually plumb itself. *Never proceed with erection of framing thinking you will “pull it” plumb later. This will make bolt up difficult and the more steel that is put up the harder it will be to plumb.*

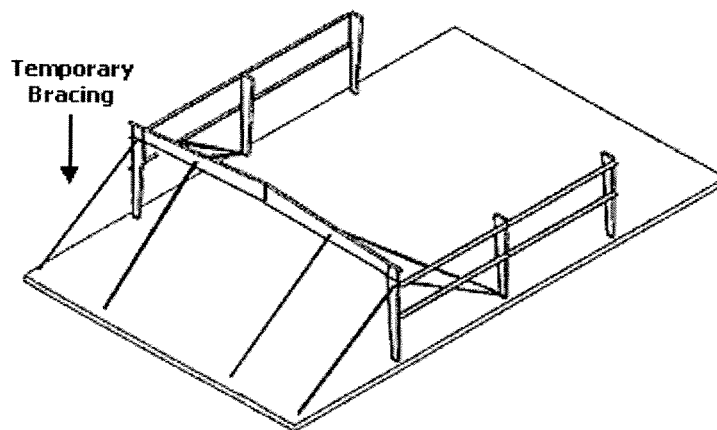
The peak connection of the rafter section, can usually be bolted together before be hoisting. As many connections as possible



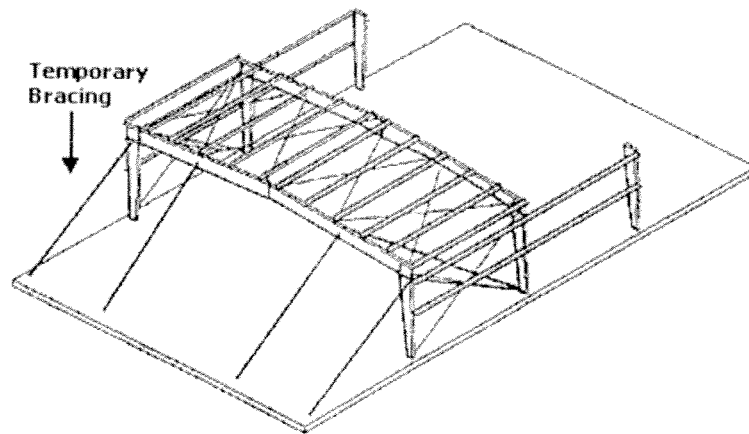
should be made on the ground, for safety and efficiency reasons. Flange braces can be loosely bolted to rafter, saving time.

The next step is to set rafter beams. The method for hoisting and rigging rafter sections depends on the width of the building and the erection equipment available.

Hoist rafter in place and make up haunch connections using the high strength bolts provided by SBI (See “Turn of the Nut method” in bolting section). Do not release hoisting lines until temporary cabling is installed. Frames will distort and try to lay over, without the proper temporary bracing as shown.



Locate Purlins and Eve Struts for the bay that you are working before setting rafter. Raise 2nd rafter and install purlins adjacent to temporary bracing before releasing lifting lines. Proceed by installing all purlins, girts, and wind braces in this Bay. (See Illustration.)



At this stage, leave purlin bolts finger tight because they must be removed to make up laps for adjoining purlins.. Even though you have installed wind cables furnished by SBI, do not remove temporary bracing. It is necessary to plumb building and add strength.

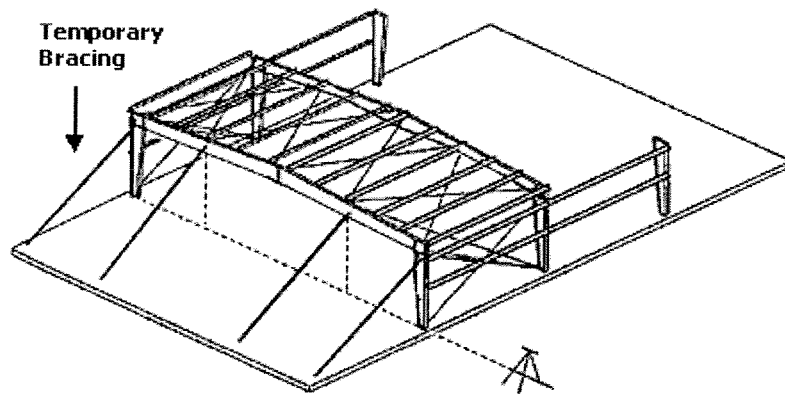
PLUMBING METHODS

CAULK LINE METHOD

1. Plumb brace bay by snapping a line using chalk box a given distance (usually 6"-12") from the centerline of the column to the same distance of the opposite sidewall column.
2. Drop a plumb bob at locations of temporary bracing.
3. Measuring the same distances from the center line of the rafter and pull frame into alignment using temporary cables and turn buckles or come-alongs.

TRANSIT METHOD

1. Measure given distance from the center line of the Rigid frame Columns.
2. Mark the line on the Slab. Project this line outside of the building (as below in illustration).
3. Set up transit along this line.
4. Backsite the mark on the far side of the building for reference line.
5. Tilt transit and site the frame at cable intersections.
6. Pull frame using temporary cables until the correct measurement is read.



Repeat the erection sequence until all red iron is erected including all flange braces, end walls, and framed openings.

Always: Have ample supply of temporary cabling on hand and check bracing each day before leaving job site.

Never: Leave steel tied off to hydraulic cranes or fork lifts for bracing. Hydraulics will “leak off” and could pull building down over night.

Safety Reminder: Don’t leave ratchets or wrenches laying on beams. They will fall injuring someone on the ground.

BRACING

Wind Cables

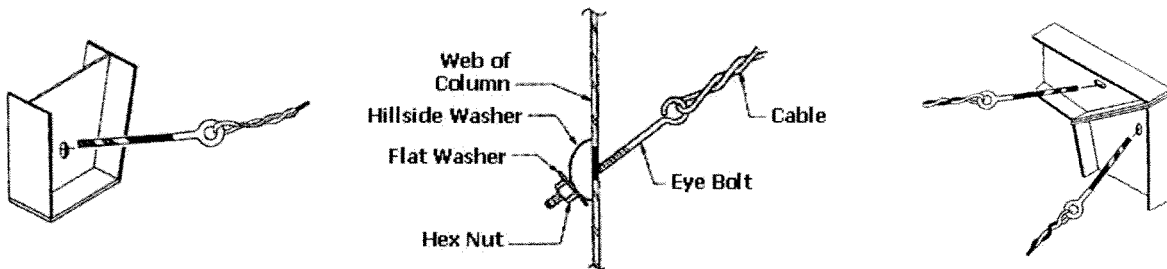
Sag Angle

MOST COMMON BRACING CONDITIONS:

SBI Metal Buildings are braced to meet the Longitudinal Loads called for by the Design Code stated on the Letter of Certification. On small buildings, this is typically accomplished by the diaphragm action of the Wall sheeting; however, on larger buildings, Brace cables, Strapping, Angle bracing, Wind Bents, or a combination of these methods may be used.

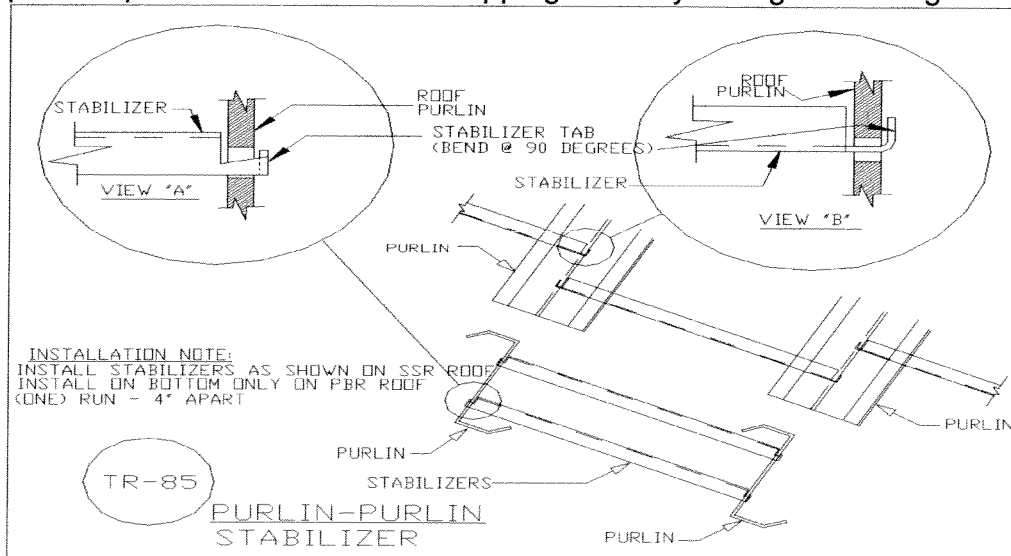
Detailed information as to the location and type of bracing is found in the Erection Drawings. It is imperative that all bracing called for, be installed correctly.

WIND CABLE - Your SBI building comes with pre-assembled and marked cables for Roof and Wall bracing.



1. Check Plans for locations
2. Should minor length adjustments be necessary, the twist connector can be removed and reinstalled. Never relocate cables or cut new slots in Columns, without consulting SBI.

SAG BRACING or STRAPPING - Strapping is used to hold the purlins in position and to prevent purlin roll. Install the strapping before you begin sheeting the roof.



1. Check Roof Plans for locations
2. Secure in place by bending tabs over as shown above and in detail drawings.
3. During installation of sag angle, be sure that purlins maintain being plumbed and aligned across entire building. Improper installation or length of angle can multiply and will push the eave strut or peak purlin out of plumb.

NOTE: "PBR" panels only require one run of sag angle in bottom set of slots, "Standing Seam" panels require double alternate let to right at each adjacent purlin space.

BOLTS & SCREWS

High Strength Bolt Connections

TURN of the NUT METHOD

Makeup Bolt Connections

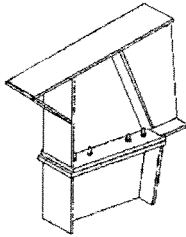
Sheet Fasteners

BOLTS

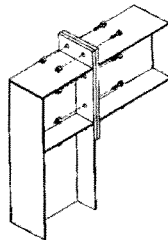
Your SBI Building comes with the following Bolt types:

1. **High Strength** – These bolts are marked A325 and/or A490, and are used to makeup Primary Frame Connections, Endwall column to rafter connections, and other designated locations. High Strength bolts will come in various sizes and lengths, depending on the application. These bolts are used for structural joints subject to tension loads and should be installed using the “Turn of the Nut” Method. (See following section illustrating various connections and explaining the “Turn of the Nut” Method.)
2. **Makeup Bolts** – These bolts are used to make connections in Secondary Framing Members such as Eave Struts, Purlins, Wall Girts, and Diagonal Bracing. These bolts are typically ½” and have a simple triangle mark on the head.
3. **Button Head** – These bolts have a flat head and are used on Door Jambs and other locations where it would be undesirable to have a thick bolt head projection.

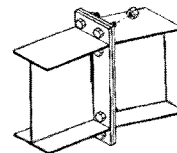
COMMON CONNECTIONS Requiring High Strength Bolts



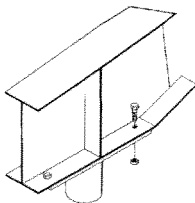
Column to Rafter (Horizontal)



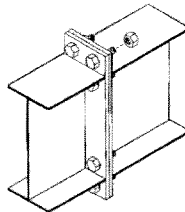
Column to Rafter (Vertical)



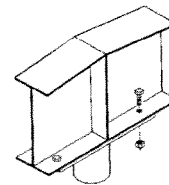
Rafter to Ridge



Rafter to Ridge (with Column)



Rafter Splice



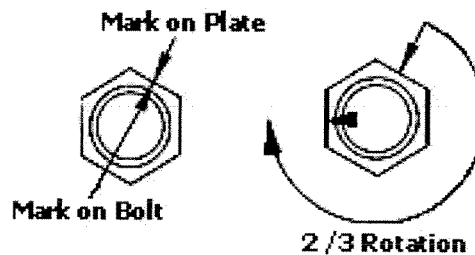
Internal Column

TURN of THE NUT

Bolt installation Method

For connections subject to tension loads use the following procedures

1. Install High Strength bolts in connection
2. If the connection is not flush, begin tightening bolts from closed end to open end. Altering tightening sequence from side to side.
3. Typically this tightening sequence, along with precise positioning of the structural member, will cause the connection to become flush. If not, shimming may be necessary. (See Appendix “Common Industry Practices)
4. Repeat the sequence above until all bolts are snug.
5. Mark the nut as shown and tighten according to the table below.



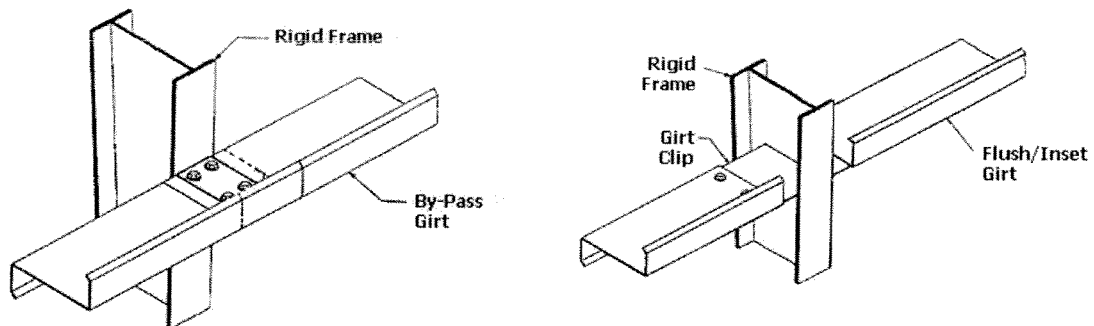
Nut Rotation (a) from Snug Tight Condition

Bolt Length Measure from underside of head to extreme end point.	Disposition of Outer Faces of Bolted Parts		
	<i>Both Faces Normal to Bolt Axis</i>	<i>One Face Normal – Other Face Sloped</i>	<i>Both Faces Sloped</i>
< or = to 4 diameters	1 / 3 turn	1 / 2 turn	2 / 3 turn
> 4 or = to 8 diameters	1 / 2 turn	2 / 3 turn	5 / 6 turn
> 8 or = to 12 diameters (b)	2 / 3 turn	5 / 6 turn	1 turn
<p>(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by ½ turn and less, the tolerance should be plus or minus 30°; for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45°.</p> <p>(b) No research work had been performed by the Council to establish the “Turn of the Nut” procedure when bolt lengths exceed 12 diameters. Therefore, the required rotation must be determine by actual tests in a suitable tension device simulating the actual conditions</p>			

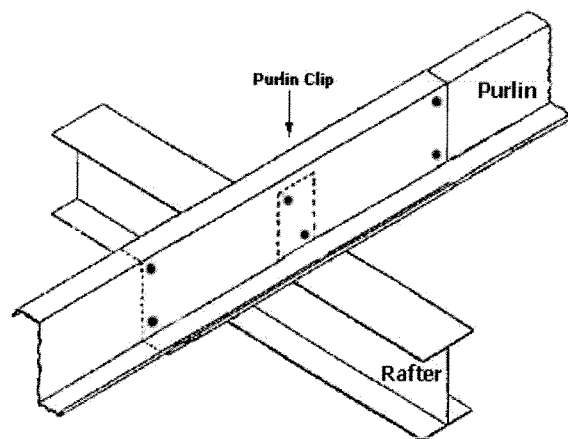
(Table reprinted from the AISC Manual of Steel Construction)

COMMON CONNECTIONS Requiring Makeup Bolts

Girt Conditions



Purlin Condition



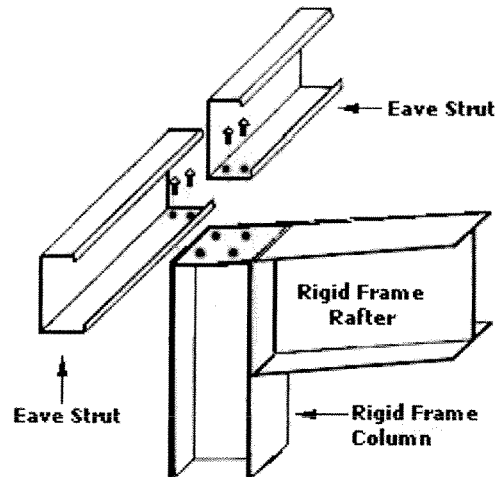
NOTES:

1. Triangular punch-out (Δ) designates wide flange, on unsymmetrical flange purlins.
2. For ease of erection, unsymmetrical flange purlins only, should be flipped every alternating bay, when bolting to a clip.
3. When bolting to a flange, the wide or punched flange will be down.

These connections are tightened to a "Snug" condition, defined as:
"The degree of tightness attained by a few impacts of an Impact Wrench or the full effort of a man using an ordinary Spud Wrench."

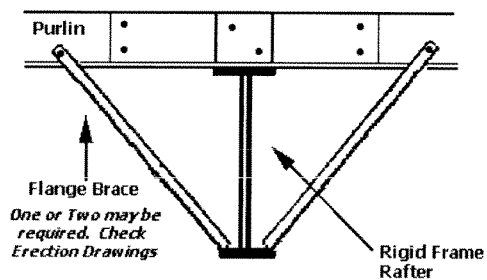
COMMON CONNECTIONS Requiring Makeup Bolts

Eave Strut Condition

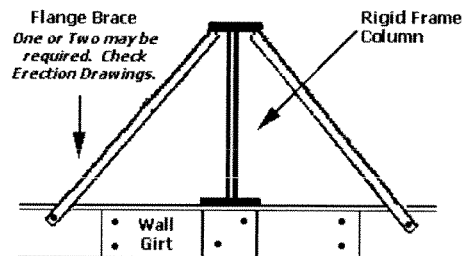


Flange Brace Condition

Roof Condition



Wall Condition



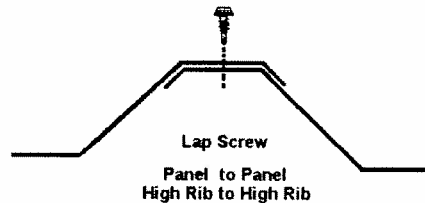
These connections are tightened to a “Snug” condition, defined as:
“The degree of tightness attained by a few impacts of an Impact Wrench or the full effort of a man using an ordinary Spud Wrench.”

Fasteners and Applications

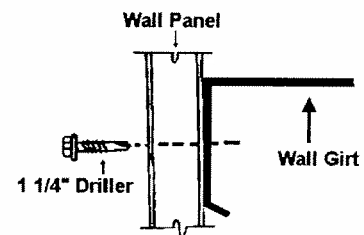
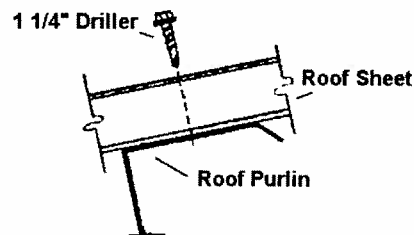
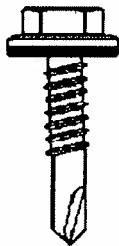
SBI's screws are self-drilling, so you are not required to pre-drill holes. However, many erectors feel this saves time in the long run and helps to keep the screw line perfectly straight. If you do elect to pre-drill, make certain the ends of the sheets are flush and measurements are correct. A mistake can ruin a complete bundle of sheeting.

Regardless of whether you pre-drill roof sheets or wall sheets, make certain the screws will "Hit" a structural member. "Misses" are unsightly and will invariably cause a leak.

Lap Screw 7/8"
Self Drilling #14



Driller Screw 1 1/4"
Self Drilling #12



See details Z1, Z2, Z3 – on Erection Drawings for the proper screw patterns for the various applications. The screw count on your job is based on the layouts.



It is imperative that the screws be installed using the proper methods. The washer must be compressed, but not overly tightened, "spinning" the washer. The only way to ensure proper compression of the washer is to use a (1700 – 2000 RPM) screw gun with a depth sensitive nose cone. The nose cone when adjusted properly will prevent over driving the screw.

When installing Lap screws the screw gun operator must hesitate momentarily after the screw penetrates the Top Sheet. This will allow the screw to penetrate the Bottom Sheet and thread up simultaneously. If constant pressure is applied on the screw gun, along with maximum RPM, the Bottom Sheet is often pushed away by the screw point before it is penetrated. This will produce the unsatisfactory condition shown below.



Always: Use good sockets. Worn sockets make the screws wobble and harder to drive.

Never: Leave shavings of metal particles on the roof as they will perpetuate rust.

Safety Reminder: Check power cords daily for cuts and bare spots in insulation

SHEETING

Panel Types

Insulation

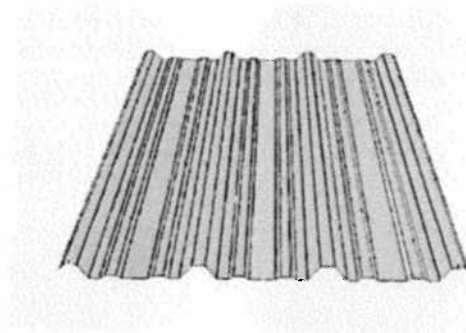
Walls

Roof

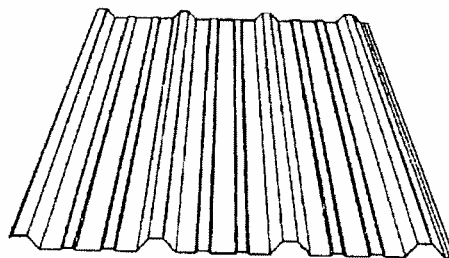
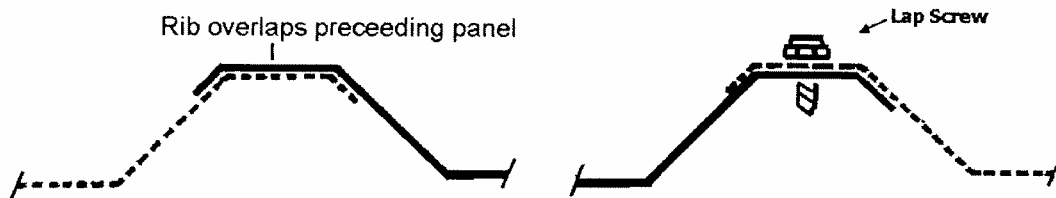
Ridge

Eave

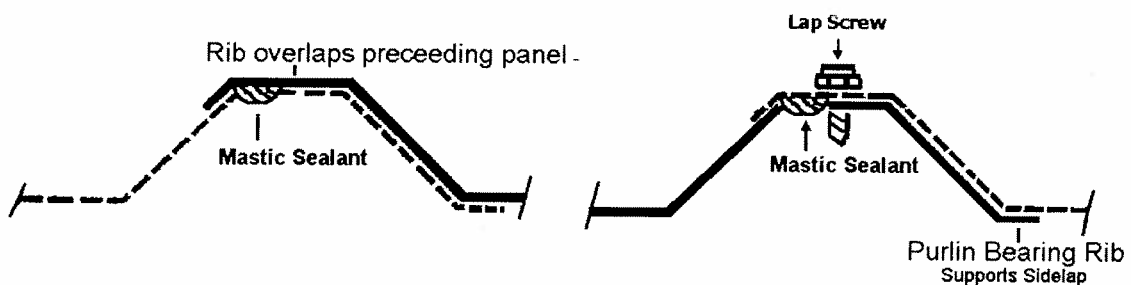
SBI Standard Sheeting



"R" Panel
Wall Panel and/or Colored Roof Panel



"PBR" Panel
Galvalume Roof Panel



**SBI manufactures other panel profiles, for Architectural Panel Roofs, Soffits, and Liner Panel Packages. If these panels apply to your project, please refer to the appropriate Detail in the Erection Drawings.*

Always: Lift sheets from the stack. Do not drag or slide, this will scratch the sheeting's finish.

Never: Leave the Jobsite without tying rope around broken bundles, high winds could blow the sheets.

Safety Reminder: Always wear gloves when handling the sheeting.

Getting Started

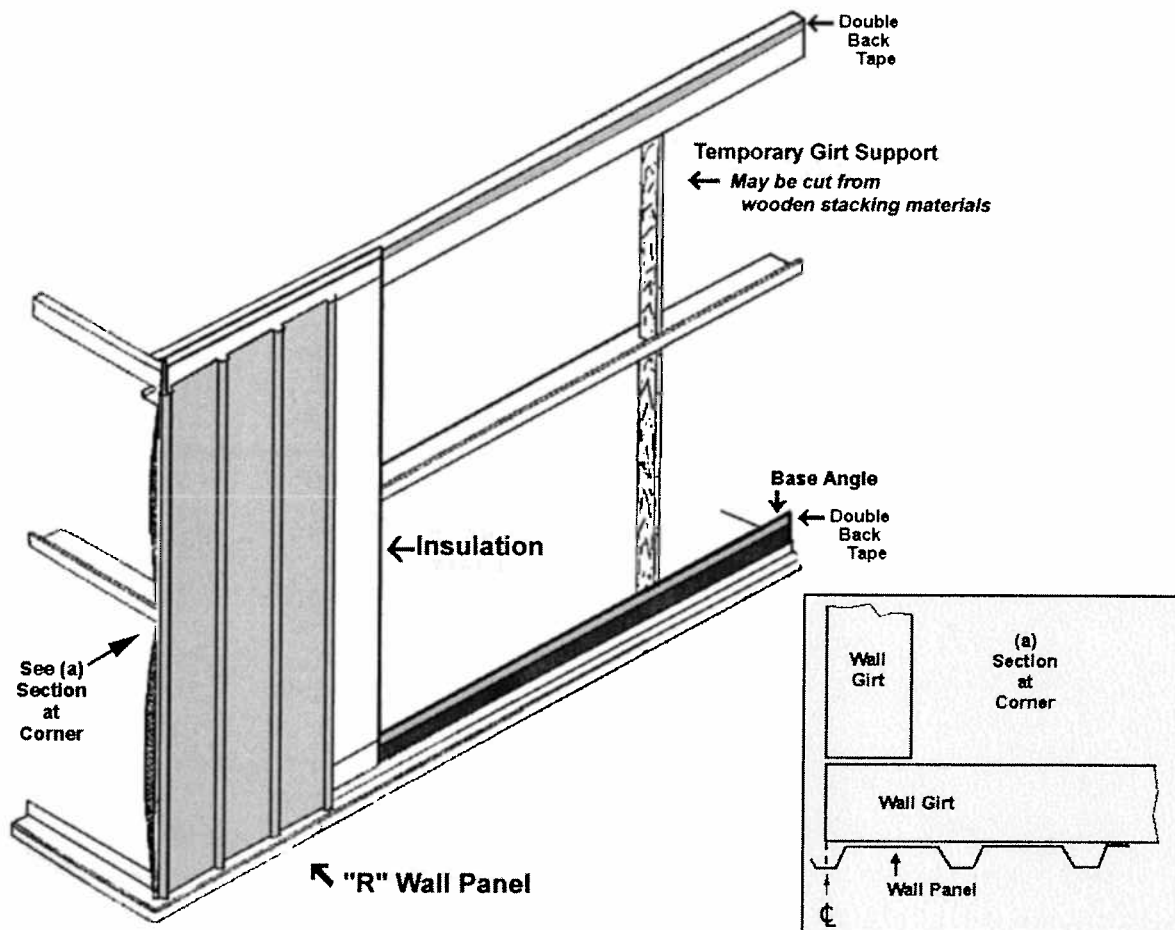
We will describe the process of wall sheeting and the installation of the fiberglass insulation as a single function, because they are performed simultaneously.

Before wall sheeting is begun Structural framing must be plumb and square with all framed openings and doors in place. It is a good idea to have openings trimmed prior to the sheeting operation. This saves delays and allows sheeting crews to keep moving. We recommend that the wall sheeting be installed before roof sheeting.

There are many kinds of insulation for metal buildings but by far and away the most typical is fiberglass with vinyl backing. This is what we will be using in our examples. An insulation layout is provided with the erection drawings if you purchased your insulation from SBI. The rolls of insulation will have tags labeling it "Roof", SW, EW. Generally, the roof rolls are cut to length. But it will be necessary to cut wall insulation to the length shown on drawings. Precutting insulation prior to wall sheeting will save time.

The sheeting operation starts by installing the "starter" roll of insulation. This is a 4' wide roll of insulation so it places the lap in the insulation 1' ahead of sheet lap.

Double back tape is run on the eve strut and base angle to hold insulation in place until sheet is located and screwed down. The vinyl side always goes toward the interior and care should be taken to make sure there are not excessive wrinkles or large torn places. Small tears can be easily repaired with patch tape.



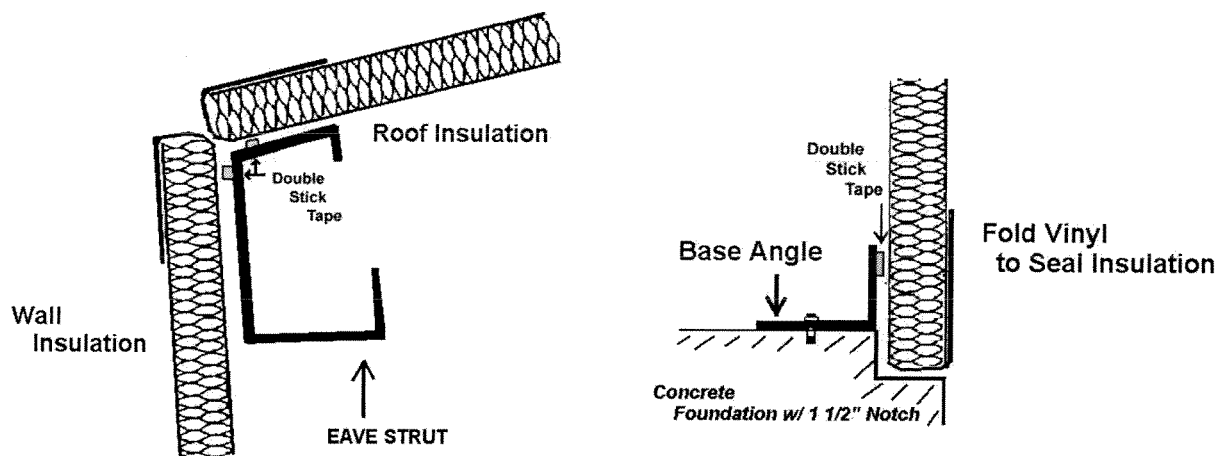
Start wall sheet as shown above. Panel should be plumbed with an accurate level, not less than 4' in length. When the first sheet is properly located and screwed into place, the next step is to install the 6' wide piece, that you have pre-cut to length. Please note the details of the Insulation installation, on the following page.

Insulation Details

Sealing Insulation Piece to avoid “Wicking” – (Drawing Moisture)

STEPS:

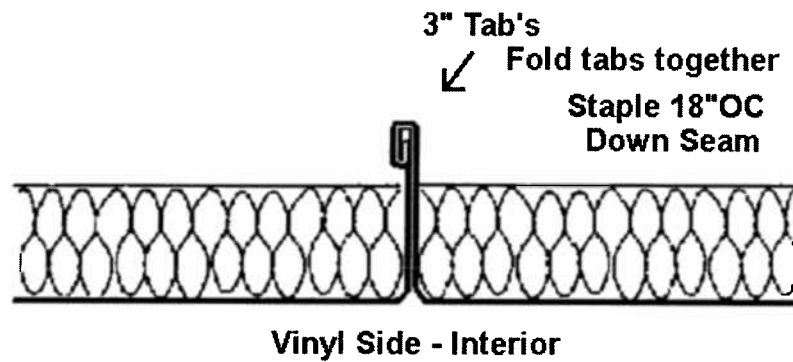
1. *Cut and remove a strip of the Fiberglass leaving a 4” to 7” Vinyl Tab. (Be careful not to slice the vinyl.) Do this at the Top and Bottom of the Insulation piece.*
2. *Spray the tab with spray adhesive or use a strip of Double Stick Tape to hold until the sheet is in place.*
3. *Fold the Vinyl Tab, you have created, over the raw edge and secure, as shown below.*



The Top and Bottom detail will remain constant regardless of how you ordered side tabs. If side tabs are ordered with offset option, use Detail “B”.

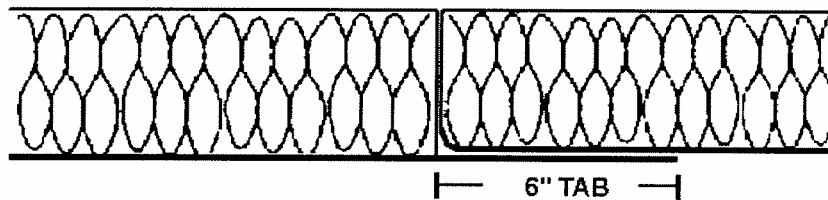
Insulation Side Lap

DETAIL "A" (SBI's Standard)



INSULATION DETAIL - with 3" Tabs

DETAIL "B" (Offset – 6" Tab Method)

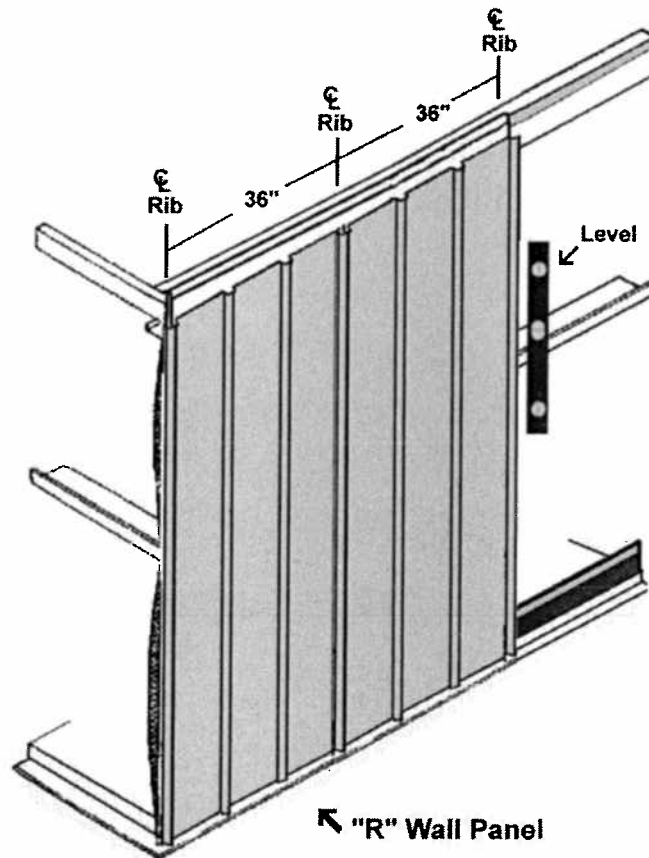


Vinyl Side - Interior

INSULATION DETAIL - with Offset tab

After completing installation of one 6' wide piece of insulation, install two (2) wall sheets. (See Screw Pattern Detail – in Erection Drawings) Then add another 6' piece of insulation and repeat installation of two (2) wall sheets.

With sheeting it is very important to insure that the sheets are plumb and on module. Laps must be made up correctly or sheeting will become out of plumb, running ahead at the top or the bottom. Check sheets often.



If wall sheeting begins to “Gain” or “Lose” small adjustments can be made by shrinking or stretching sheeting.

To Shrink a Sheet: Hold the center of the sheet out and place a screw nearest to the leading edge.

To Stretch a Sheet: Apply pressure to the High Rib; this will cause the sheet to spread.

These methods are effective to straighten sheeting, but only a small amount of adjustment can be made on any one sheet (1/8" max.). If sheeting is out of plumb, more than an 1/8 inch, it will be necessary to adjust more than one sheet. Any attempt to adjust one sheet more than an 1/8 inch may cause oil canning or other undesirable conditions.

Always: Start sheeting wall in the direction that will close Laps, as viewed from high traffic areas.

Never: Stack insulation directly on the slab or ground. Place on boards or pallets.

Safety Reminder: Always wear Hard Hats when others are working overhead.

Roof Sheeting

Before beginning to sheet the roof:

- ✓ Check the Eave Struts and Purlins for straightness. Use temporary bracing or block as required.
- ✓ Install Sag strapping as shown in the Erection drawings.
- ✓ Run Eave Trim and Double Stick Tape, as shown.

Safety Suggestions for Roof Sheeting

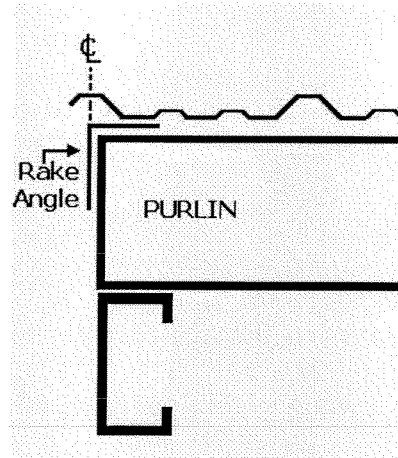
- ☐ Have a safety meeting before starting on the roof. Use approved fall protection, to include but not limited to:
 - Safety lines with Harnesses
 - Nets
 - Barricades
 - Walk boards
- ☐ Do not wear Hard soled boots or other slippery footwear.
- ☐ Never step on an unsecured panel. Panels must be attached to purlins
- ☐ Never step on the High Ribs
- ☐ Walk on or near purlin runs, when walking parallel to the ridge. Use walkboards when walking perpendicular to the ridge.

Roof Sheeting Installation

The installation of roof panels begins with the placement of a 4' wide "starter" roll of insulation. Where jobsite condition allows, always begin roof sheeting into the prevailing wind direction, closing sheet laps to the up wind side.

SBI's standard Galvalume roof panels have a "Purlin Bearing Rib" (PBR) leg on one side. This is always the leading edge when sheeting. It is very important to start the first panel square and with proper overhang.

Start First Panel, with Center Line of small Rib on Steel Line.



Proper Overhang Conditions:



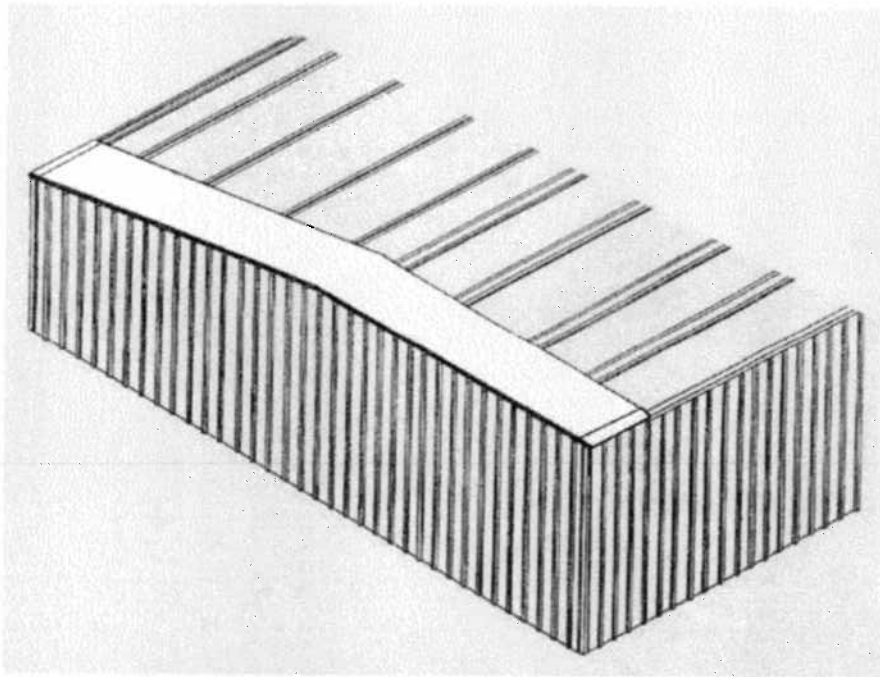
See Erection drawings for your buildings proper overhang and screw patterns.

It is simple to keep the roof in an alignment, if it is started properly. If the roof is not started square it will be difficult to put on and will end up being "saw toothed" on the edge.

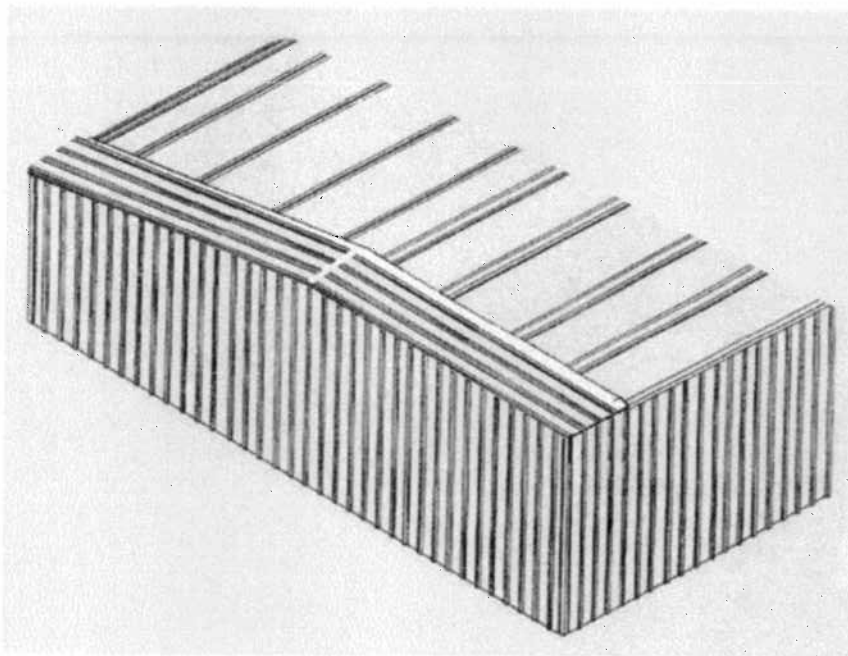
SBI building's longest "PBR" roofing sheet is 41' long. If your building is 80' wide or less (*on a gabled building*), no butt lap will be necessary.

The sequence below shows that SBI recommends both sides of the ridge be run simultaneously. This allows the insulation to be run from eave to eave and still be covered. Using this method also keeps the ridge cap caught up to insure proper alignment from one side of the ridge to the other.

Place 4' Insulation Starter Roll

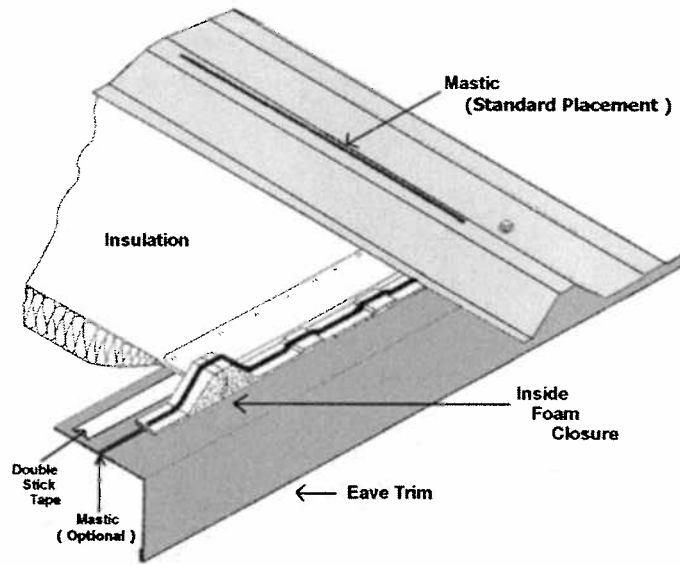


Place and Align 1st Run of Roof Sheets

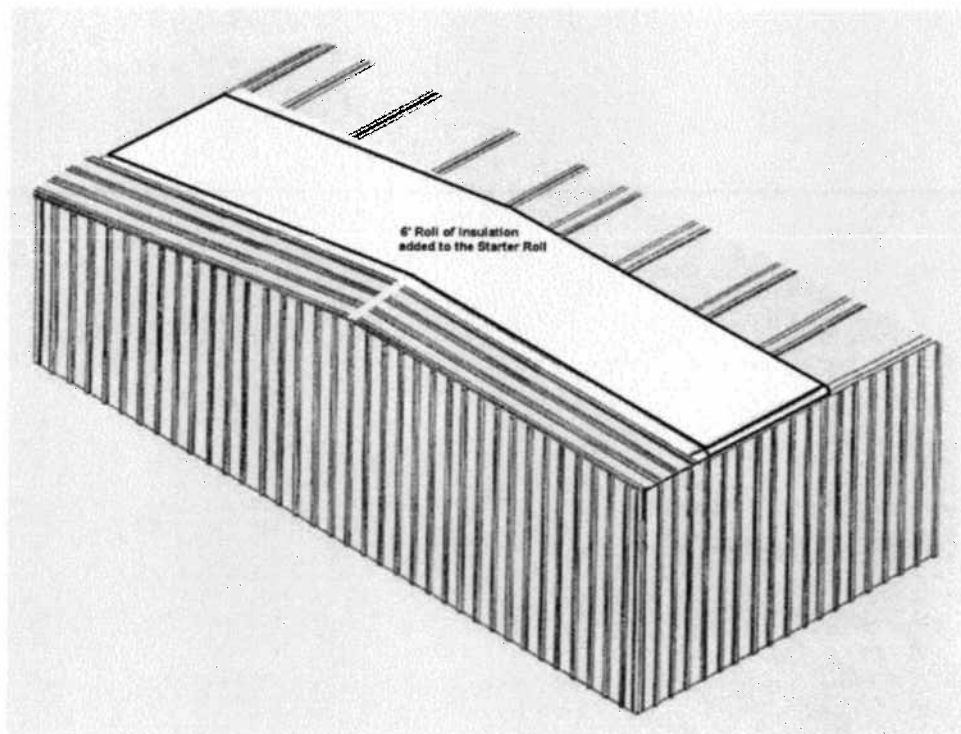


Eave Detail

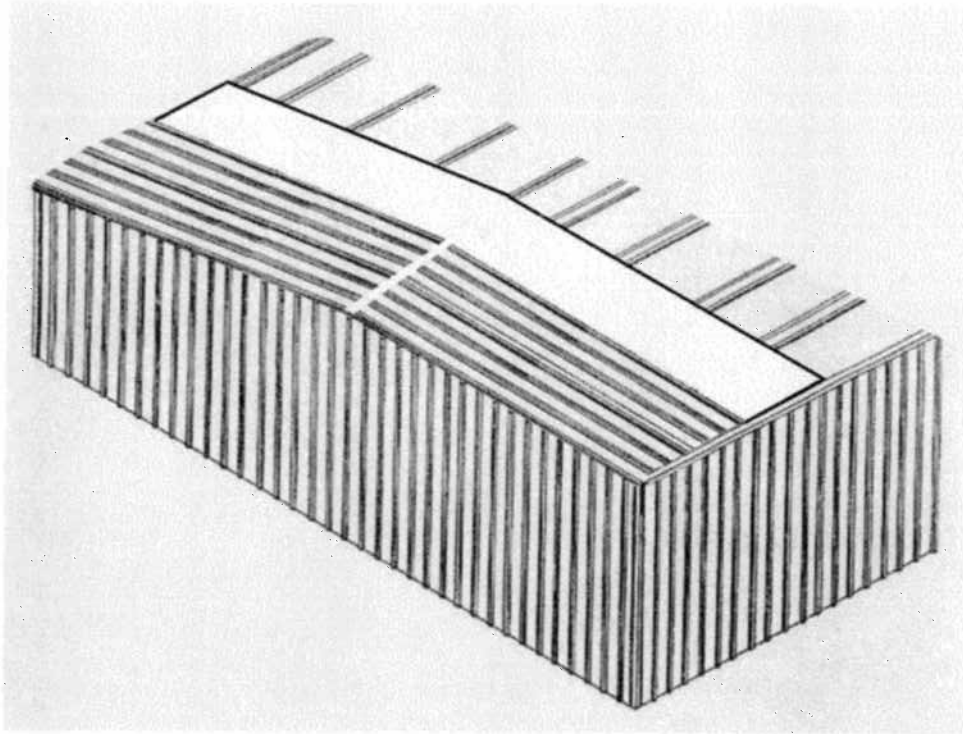
Apply Mastic as shown, before adding next roof sheet.



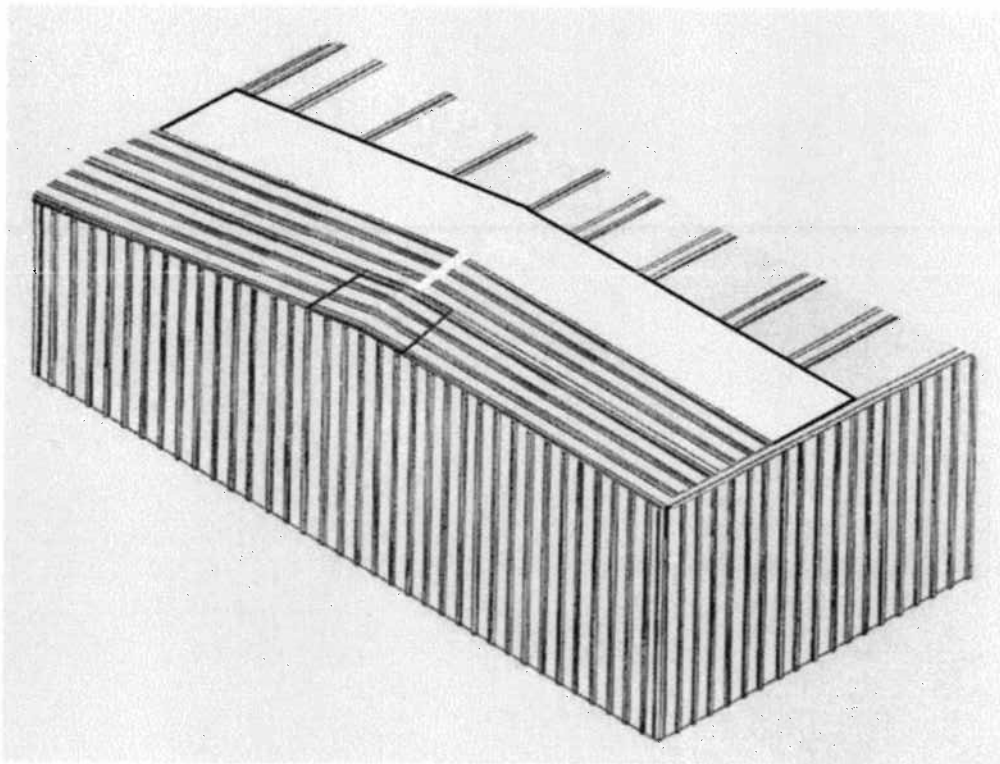
Install 6' roll of Insulation
(Refer to Detail on page 30)



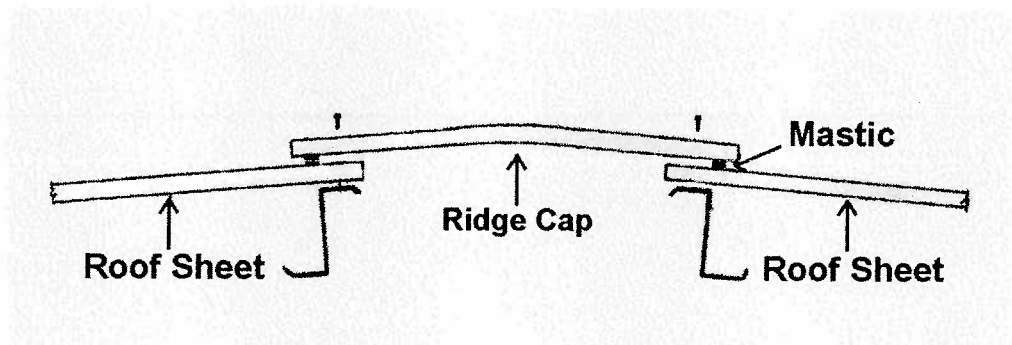
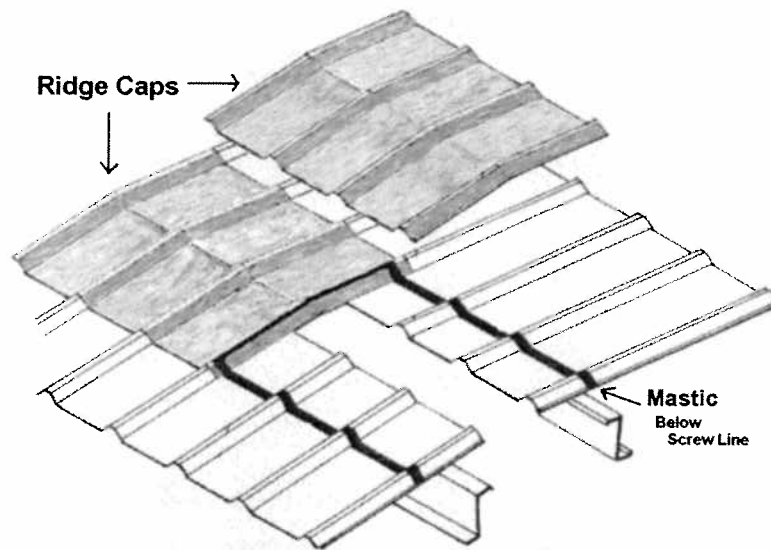
Install 2nd Run of sheets



Place one Ridge Cap, as shown.



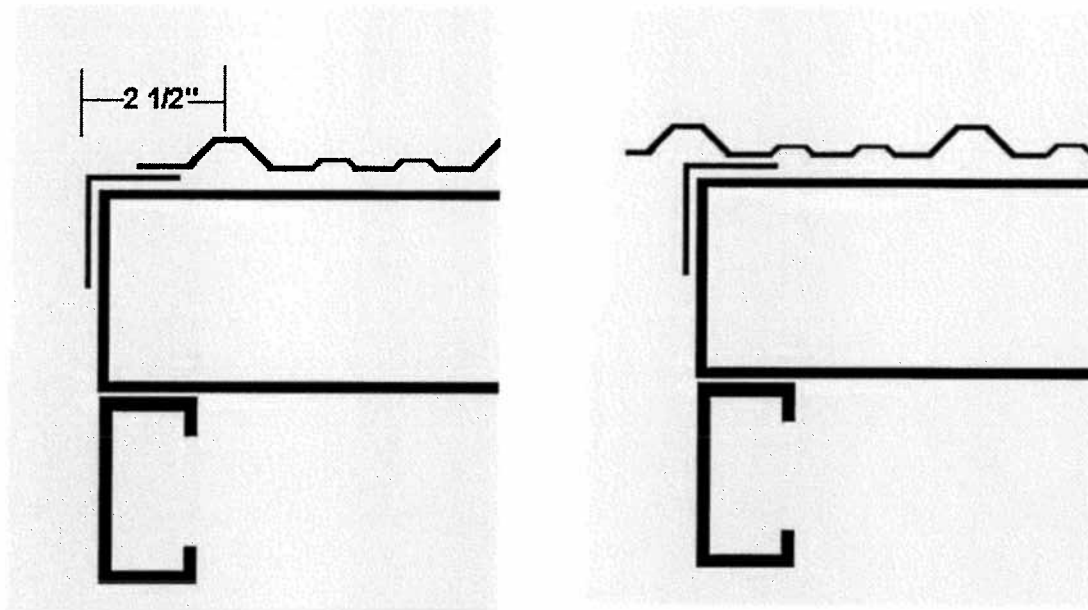
Ridge Cap Detail



Finishing “On Module”

The sequence of placing the insulation run and 2 sheets is repeated until the end of the building. While the roofing is being installed, it is important to check regularly to make sure the roofing remains square. Use the method to keep the roof on module as described on page 34.

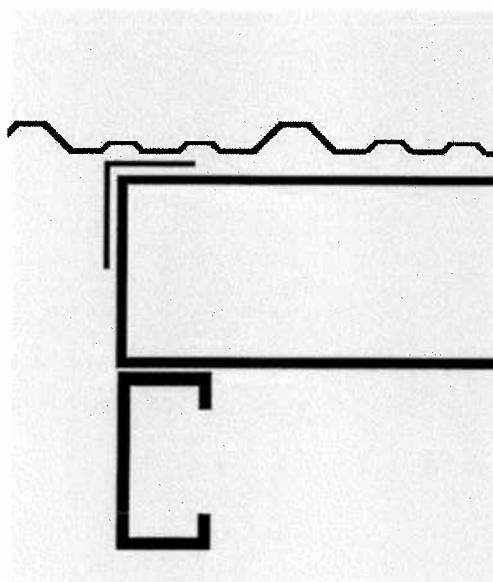
When the last sheet is reached, install as shown below:



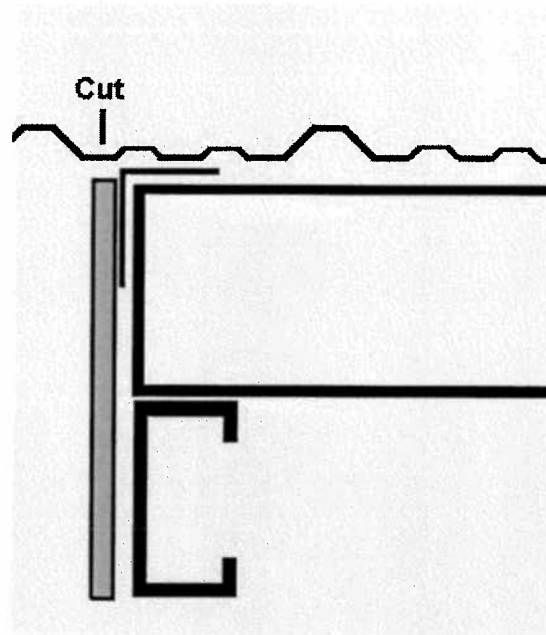
If the center of rib finishes between 0" and 2 1/2" from the edge of rake angle you have finished on module and the rake trim can be installed using procedures described in the trim section of this manual.

Finishing “Off Module”

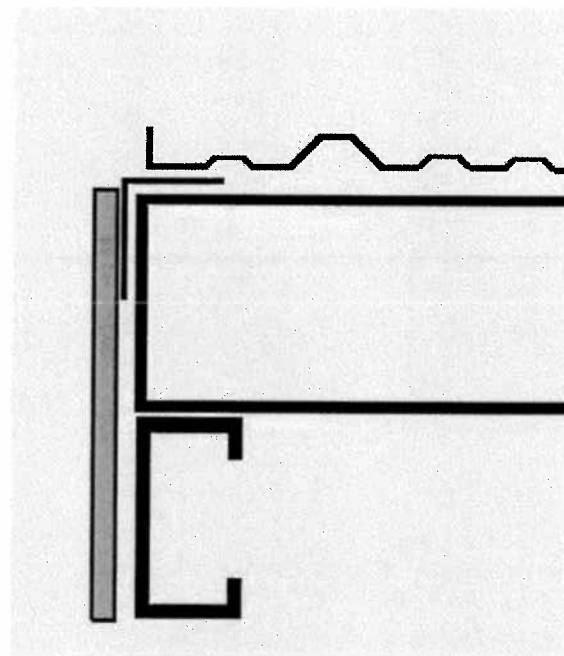
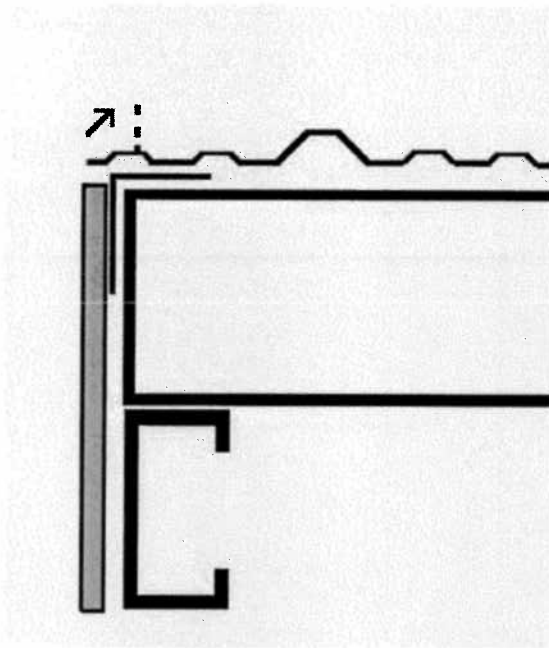
Below is an example of finishing “Off Module” or “In the Flat” .



The last sheet should be field cut 1" outside of the building line.



The outside 1" of the sheet is then bent upward, using duck-billed pliers or a similar tool. This prevents water from entering the building should the Rake Flashing ever leak.



Always: Sweep roof before leaving a job. While sweeping, look for and correct mistakes, such as screw misses or improperly driven screws.

Never: Leave metal shavings on the roof. The shavings will scratch the sheeting and begin to rust within days.

Safety Reminder: Keep an eye on the weather. High winds can blow sheeting causing a hazard to the roofers, as well as the workers on the ground.

TRIM

Standard

Open Bay

Soffit

Liner

Trim and Flashing

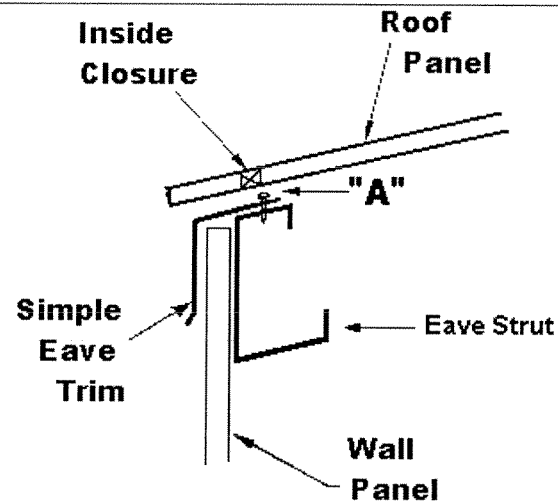
It is extremely important to install the trim correctly and in the proper sequence. Two critical elements of a buildings performance (or lack of) are appearance and weather tightness. These qualities are directly related to the skill level of the installer and the care taken when trimming out a building.

The following pages along with the erection drawings will show the Standard types of Trim and where they should be located.

If your building has roof or wall panels other than SBI's Standard, supplemental details covering your specific type of trim, will be attached to the erection drawings

SIMPLE EAVE TRIM

Fasten Eave Trim to the Eave Strut - 3' 0" on Center with Self-Drilling screws ("A").

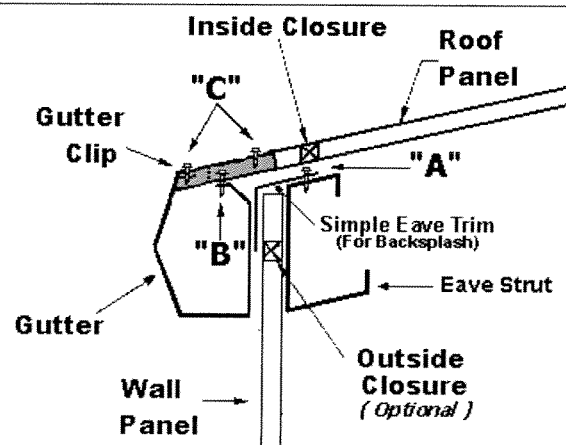


STANDARD GUTTER TRIM

Fasten back splash Trim to Eave Strut – 3'0" on Center with Self-Drilling screws ("A").

Fasten Gutter to the bottom of the Roof Sheet – 1'0" on Center with Lap screws ("B").

Gutter Clips attach to the High Rib of the Roof panel and Lip of the Gutter – 3'0" on Center with Lap screws ("C").



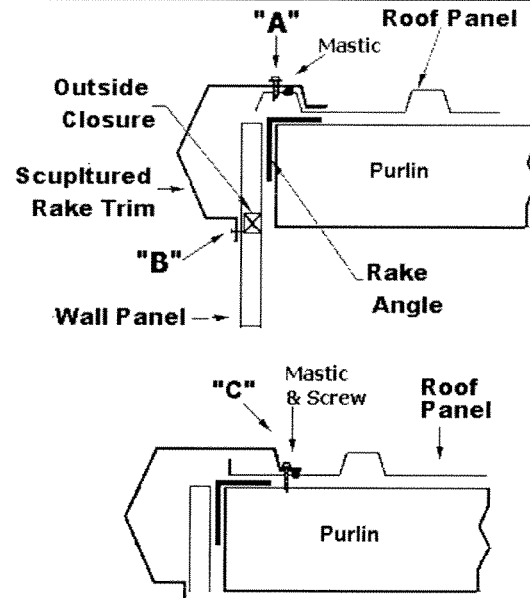
RAKE (GABLE) TRIM

Apply Mastic to the outer edge of the High Rib of the Roof panel.

Fasten Rake Trim to High Rib of Roof panel – 2'0" on Center with Lap screws. Align screw behind the Mastic. ("A").

Fasten bottom of Rake Trim to High Rib of the Wall panel – 1'0" on Center with Lap Screws. ("B").

If Roof Sheeting ends in the flat, use Alternate Mastic and Screw location ("C").

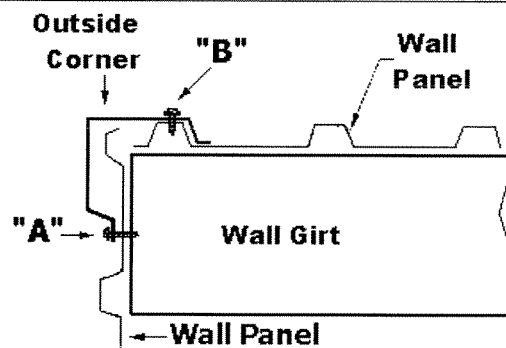


OUTSIDE CORNER TRIM

Fasten Outside Corner with the same screw pattern as the Wall Sheets.

Self-drilling screws into girts. ("A").

Lap screws between girts. ("B").

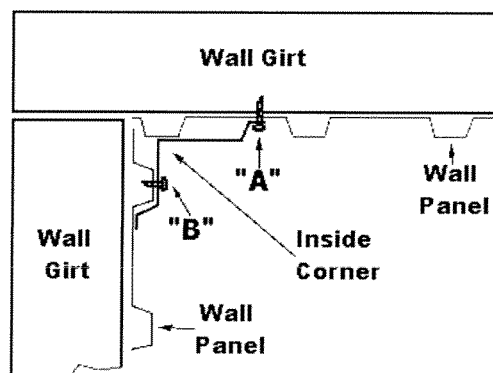


INSIDE CORNER TRIM

Fasten Inside Corner with the same screw pattern as the Wall Sheets.

Self-drilling screws into girts ("A").

Lap screws between girts ("B").

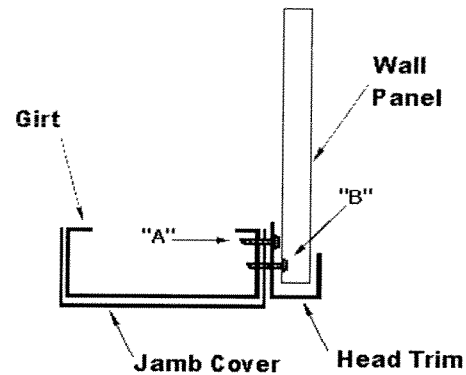


HEAD TRIM

Overhead Door Jamb Cover Trim, flush with door header.

Head Trim, recessed 1/2" above door header, attach on top Jamb Cover to Door Jamb with Self-drilling screws ("A").

Attach Wall Panel on top of Head Trim and Jamb Cover to Door Jamb with Self-drilling screws ("B").

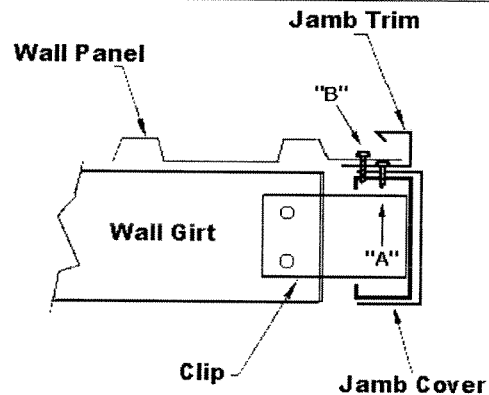


JAMB TRIM

Overhead Door Jamb Cover Trim, flush with door jambs.

Jamb Trim, recessed 1/2", attach on top of Jamb Cover to Door Jamb with Self-drilling screws ("A").

Attach Wall Panel on top of Jamb Trim and Jamb Cover to Door Jamb with Self-drilling screws ("B").

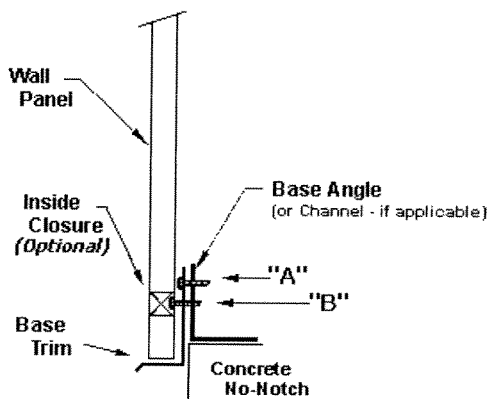


BASE TRIM

The bottom flat of the Base Trim should be 1' 1/2" below the concrete slab.

Attach the Base Trim to the Base Angle with Self-drilling screws ("A").

Attach Wall panel (with typical wall screw pattern) on top of Base Trim to Base Angle with Self-drilling screws ("B").

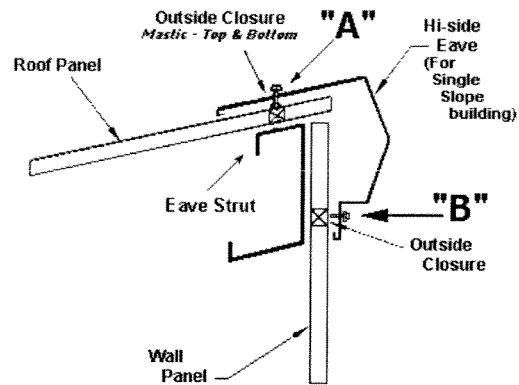


HI-SIDE EAVE TRIM

Use Mastic on top & bottom of outside closure.

Fasten Hi-Eave Trim - 1'0" on Center to High Rib with Lap screws ("A").

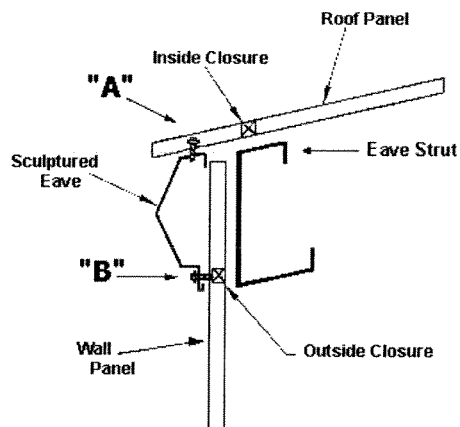
Fasten bottom of Hi-Eave Trim to Wall sheet - 1'0" on Center to High Rib with Lap screws ("B").



SCULPTURED EAVE TRIM

Fasten Eave Trim through the bottom of the Roof panel- 1'0" on Center with Lap screws ("A").

Fasten bottom of Eave Trim to Wall sheet - 1'0" on Center to High Rib with Lap screws ("B").



OPEN BAY Conditions

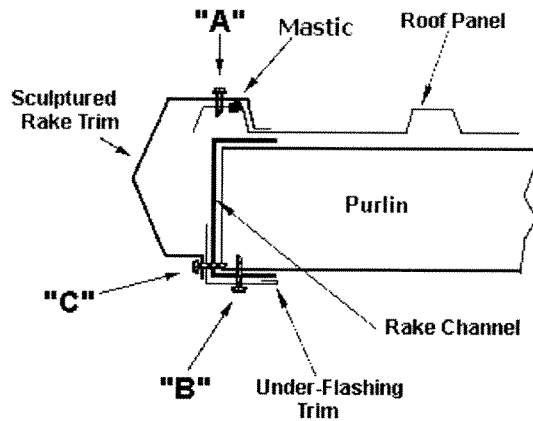
RAKE TRIM – Open Bay

Apply Mastic to the outer edge of the High Rib of the Roof panel.

Fasten the Rake Trim to the High Rib of the Roof panel – 2'0" on Center with Lap screws. Align the screw behind the Mastic. ("A").

Fasten the Under-Flashing to the bottom of the Purlin – 2'0" on Center with Self-drilling screws. ("B").

Fasten the bottom of the Rake Trim to the Rake Channel – 2'0" on Center with Self-drilling screw ("C").



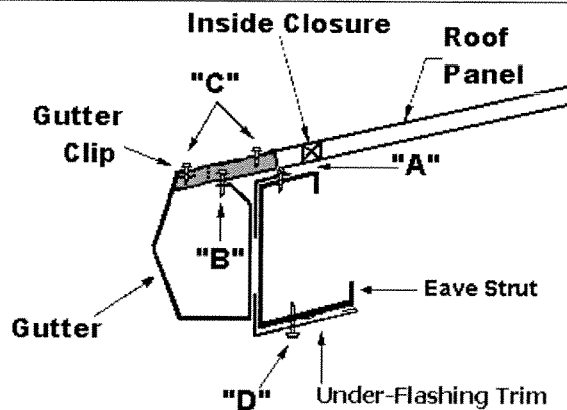
GUTTER – Open Bay

Fasten back splash Trim to Eave Strut – 3'0" on Center with Self-Drilling screws. ("A").

Fasten Gutter to the bottom of the Roof Sheet – 1'0" on Center with Lap screws. ("B").

Gutter Clips attach to the High Rib of the Roof panel and Lip of the Gutter – 3'0" on Center with Lap screws. ("C").

Fasten Under-Flashing Trim to bottom of the Eave Strut – 2'0" on Center with Self-drilling screws. ("D").

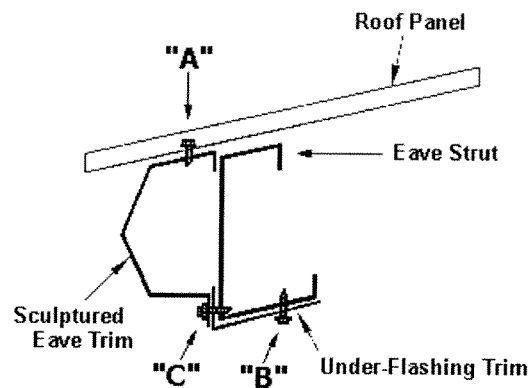


SCULPTURED EAVE - Open Bay

Fasten Eave Trim through the bottom of the Roof panel – 1'0" on Center with Lap screws. ("A").

Fasten Under-Flashing Trim to the bottom of the Eave Strut – 2'0" on Center with Self-drilling screws. ("B").

Fasten bottom of the Eave Trim to the Eave Strut – 2'0" on Center with Self-drilling screws. ("C").

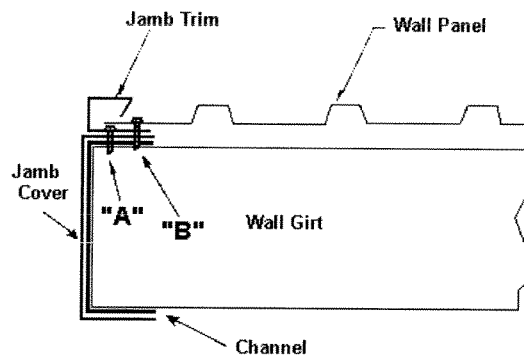


CORNER TRIM – Open Bay

Jamb Cover Trim, flush with Wall Girt.

Attach Jamb Trim on top of Jamb Cover to Wall Girt with Self-drilling screws ("A").

Attach Wall Panel on top of Jamb Trim and Jamb Cover to Wall Girt with Self-drilling screws ("B").



SOFFIT Conditions

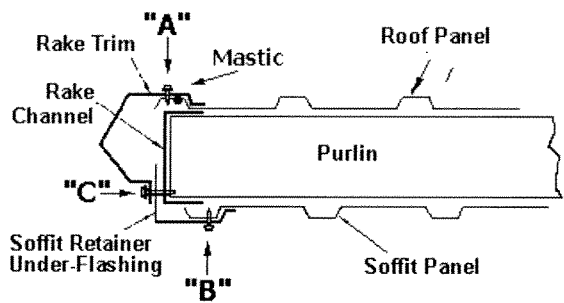
GABLE SOFFIT

Apply Mastic to the outer edge of the High Rib of the Roof panel.

Fasten the Rake Trim to the High Rib of the Roof panel – 2’0” on Center with Lap screws. Align the screw behind the Mastic. (“A”).

Fasten the Under-Flashing to the bottom of the Purlin – 2’0” on Center with Self-drilling screws. (“B”).

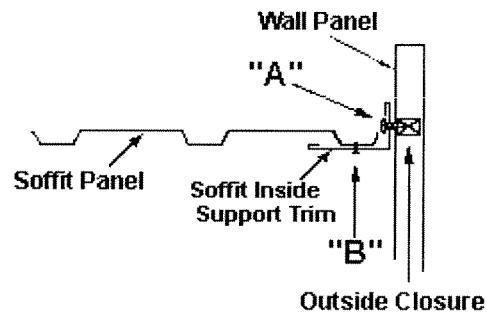
Fasten the bottom of the Rake Trim to the Rake Channel – 2’0” on Center with Self-drilling screws. (“C”).



Inside Detail

Attach Soffit Inside Support Trim to High Rib of the Wall Panel 1’0” on Center with Lap screws (“A”).

Pop rivet bottom of Inside Support Trim to High Rib of the Soffit panel 1’0” on Center with Pop Rivets (“B”).

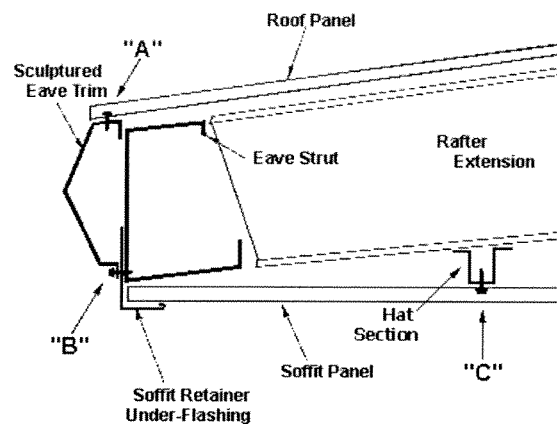


EAVE TRIM – With Flat Soffit

Fasten Eave Trim through the bottom of the Roof panel- 1'0" on Center with Lap screws ("A").

Fasten bottom of Eave Trim on top of Soffit Retainer Under Flashing to the Eave Strut - 1'0" on Center with Driller screws ("B").

Attach the Soffit panel to the Hat Section – 1'0" on Center, through the Flat of the Soffit Panel, with Driller Screws ("C").

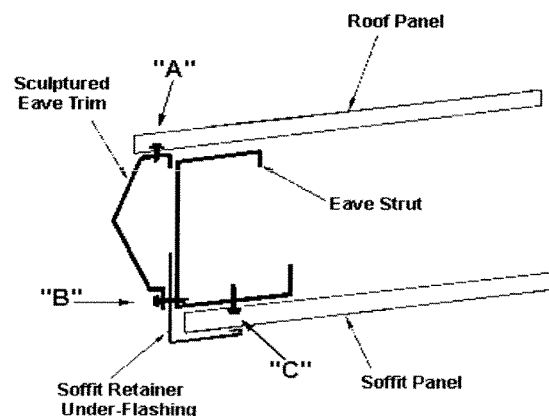


EAVE TRIM – With Sloped Soffit

Fasten Eave Trim through the bottom of the Roof panel- 1'0" on Center with Lap screws ("A").

Fasten bottom of Eave Trim on top of Soffit Retainer Under Flashing to the Eave Strut - 1'0" on Center with Driller screws ("B").

Attach the Soffit panel to the bottom of the Eave Strut – 1'0" on Center, through the Flat of the Soffit Panel, with Driller Screws ("C").

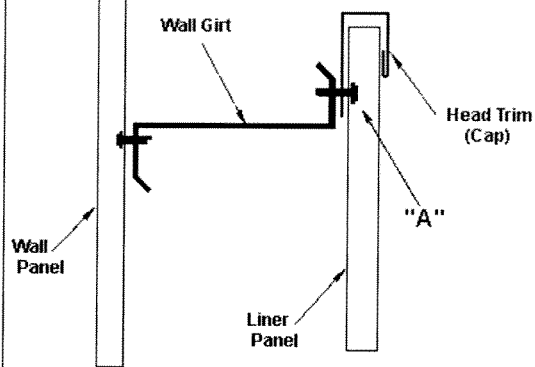


LINER PANEL Conditions

Liner Panel - Below Roof Line

Place Head Trim over the top of the Liner panels at the top.

Attach Both Head/Cap Trim and Liner panel sheet to Girt through the Flat of the Liner panel – 1'0" on Center with Driller screws ("A").



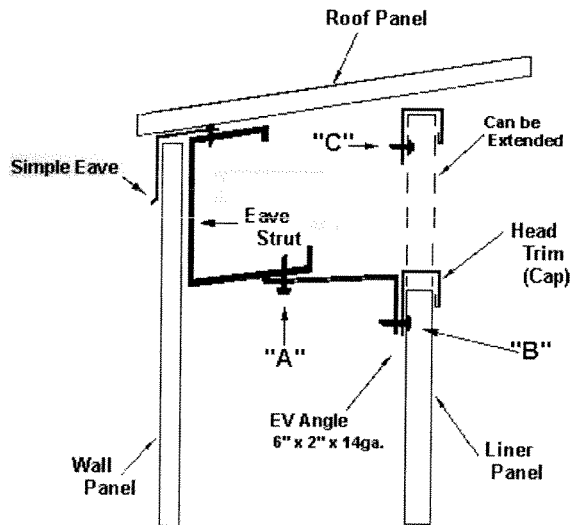
Liner Panel - To Eave

Attach EV Angle to Eave Strut – 1'0" on Center with Driller screws ("A").

Place Head Trim over the top of the Liner panels at the top.

Attach Both Head/Cap Trim and Liner panel sheet to EV Angle through the Flat of the Liner panel – 1'0" on Center with Driller screws ("B").

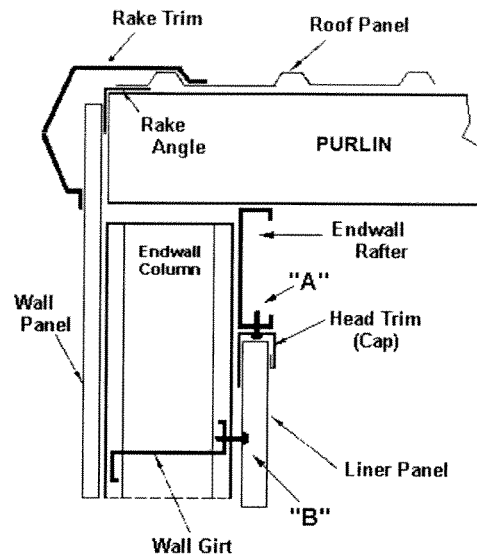
If Liner panel is extended above a Girt or Angle, attach Head/Cap Trim – 1'0" on Center with Lap screws through the Flat of the Liner panel ("C").



Liner Panel - at Gable

Attach Head/Cap Trim to the Endwall Rafter – 1'0" on Center with Driller screws ("A").

Slide Liner panel sheet up underneath the Head Trim. Attach the Liner panel sheet to the Wall Girt – 1'0" on Center with Driller screws, through the Flat of the panel ("B").



ACCESSORIES

SBI supplies a wide range of accessories for metal buildings. Typically these accessories are not manufactured by SBI. It is a good practice to check packing setups, which usually have installation instructions provided by the manufacturer.

Just in case these instructions are lost or destroyed. We have included installation details for some of the most common accessory items.

Dektites

Walkdoor

Window

Ridgevent

DEKTITES (PIPE FLASHING)



STEP 1:
Cut pliable Dektite at appropriate pipe diameter marking on the sleeve.



STEP 2:
Slide Dektite down over pipe.



STEP 3:
Press pipe flashing base into contours of the roof panel configuration.



STEP 4:
Apply silicone (neutral cure recommended) on underside of the flexible aluminum base.



STEP 5:
Fasten pipe flashing to the surface with self-drilling, Lap screws (7/8").



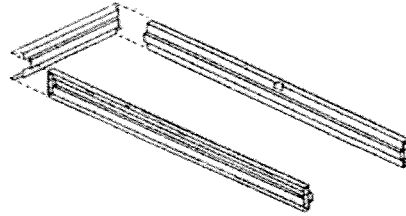
STEP 6:
Finished Dektite should look like this.

DOOR INSTALLATION

1.

Place the Head Section and Jamb Sections on a flat surface (floor) with Door side up.

Install bolts and nuts to connect the Head section to the Jamb sections.

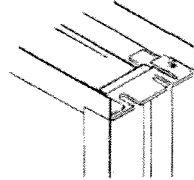


2.

Be sure that Head section is tight to Jamb sections, so that the proper Door Opening is obtained.

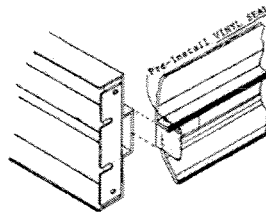
Example:

3'0" Door = 36" Opening



3.

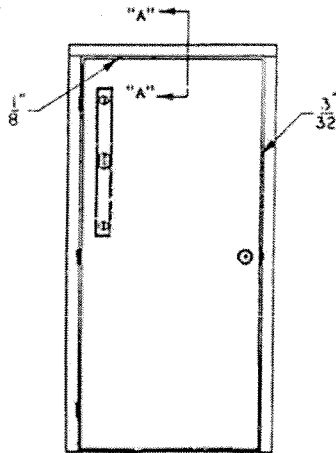
Install Pre-notched Threshold, utilizing the Spring Clips, which are already installed on the Threshold.



4.

Install Door in the Frame, check for 1/8" clearance at Head and 3/32" clearance at Strike Jamb.

Tilt up the entire assembly and secure Hinge- Jamb side anchor to the floor. Plumb Hinge- Jamb side.

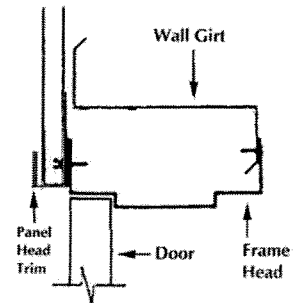


5.

Anchor Head and Strike Jamb to the building structure, the floor, and the entire frame to panel skins.

Install optional Threshold anchor if desired.

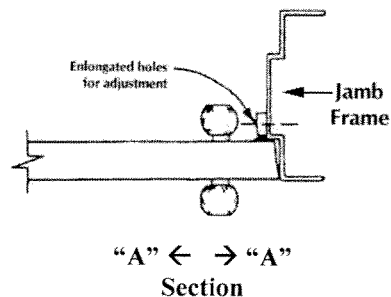
Next install the Lockset.



Weather stripping (Optional):

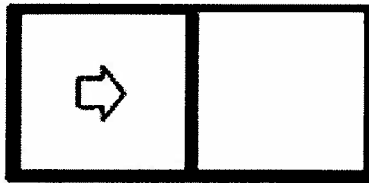
Head member first. Adjust so that the vinyl just contacts the Door when closed and latched.

Do not force vinyl against the door, as this will interfere with the latching and will not improve the seal.

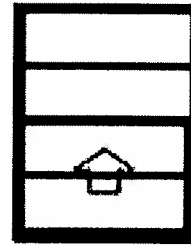


WINDOWS INSTALLATION

The following information applies to both Standard Window Types.

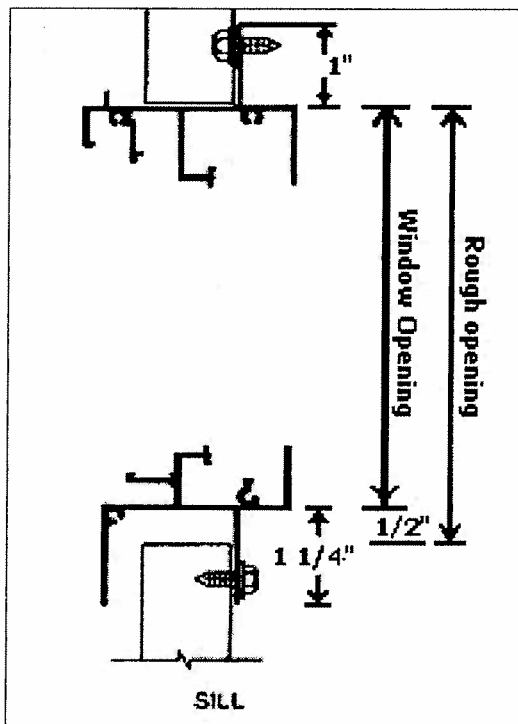


HORIZONTAL SLIDE



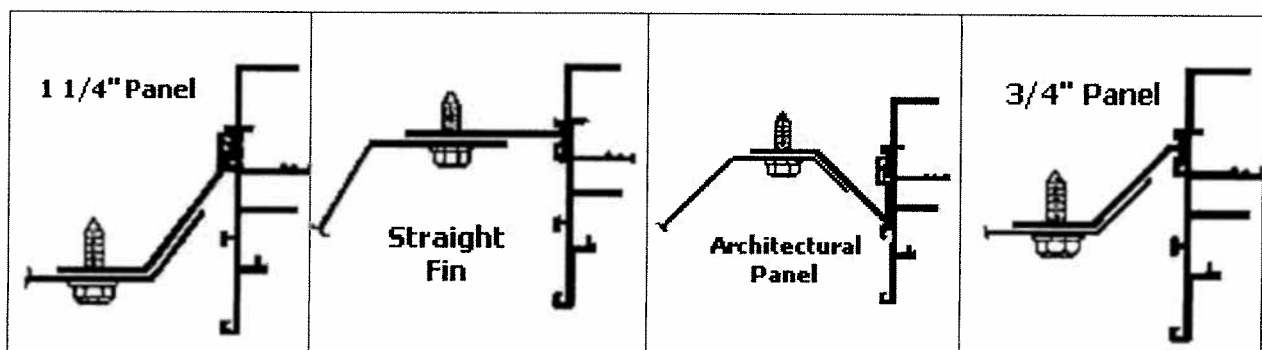
SINGLE HUNG

Select location for window and cut panel or panels to the required rough opening size. Install vertical jamb supports *–if required.*

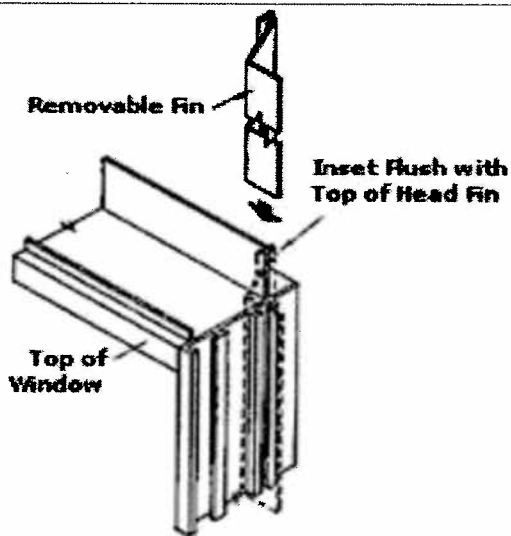


Window Width	Rough Opening Width
2' 0"	1' 10"
3' 0"	2' 10"
4' 0"	3' 10"
5' 0"	4' 10"
6' 0"	5' 10"

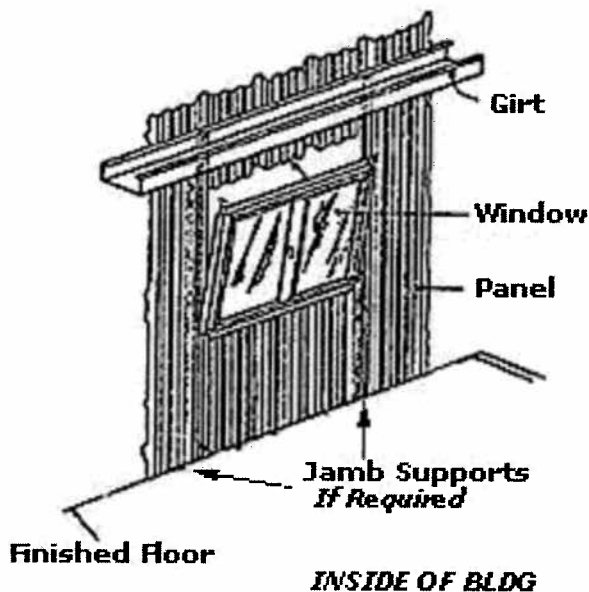
Window Height	Rough Opening Height
2' 0"	2' 1/2"
3' 0"	3' 1/2"
4' 0"	4' 1/2"
5' 0"	5' 1/2"
6' 0"	6' 1/2"



Choose the appropriate Jamb Fin for each side of the Window. Fin type depends upon Panel position after rough opening is cut.

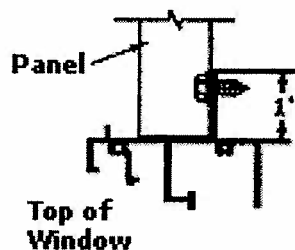


Insert jamb fin adapters by sliding in from the top of the window until flush with top of the head fin.



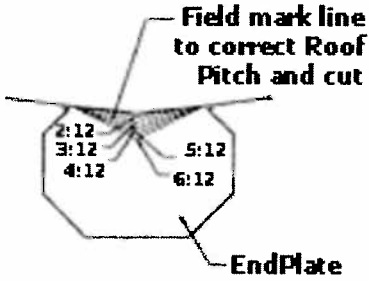
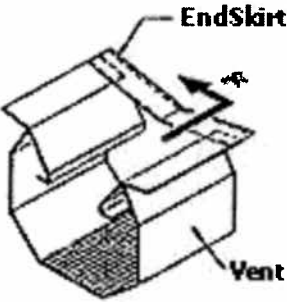
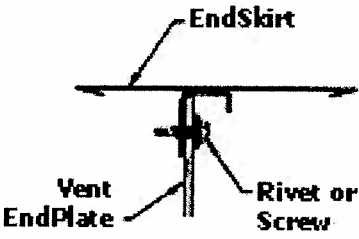
Install window from the inside, by setting sill over the bottom panel and tilting into a vertical position.

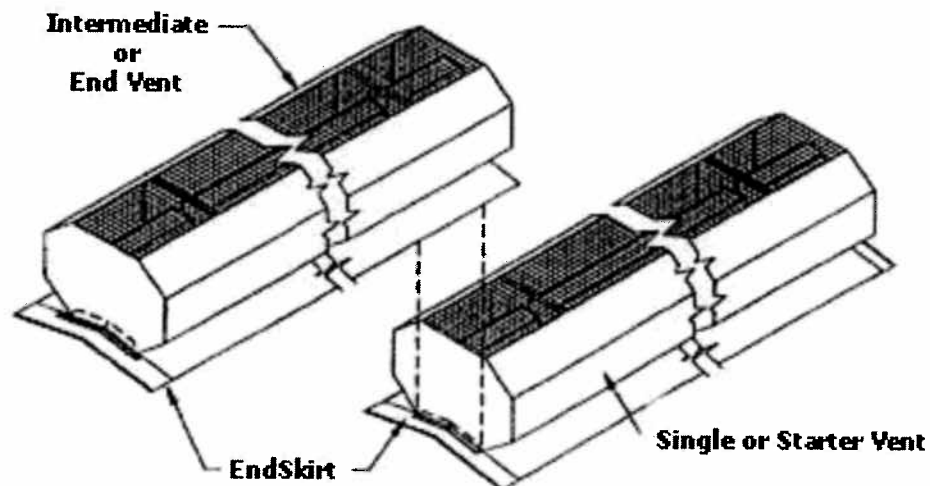
Raise the window up 1/4" or until the top of the window head contacts the top panel.

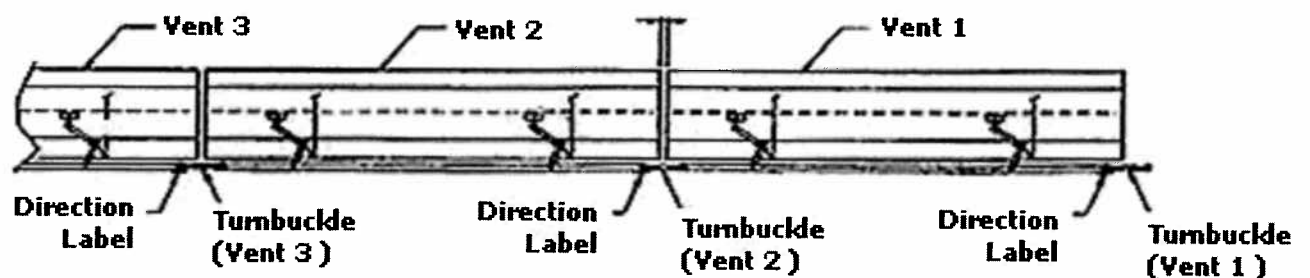
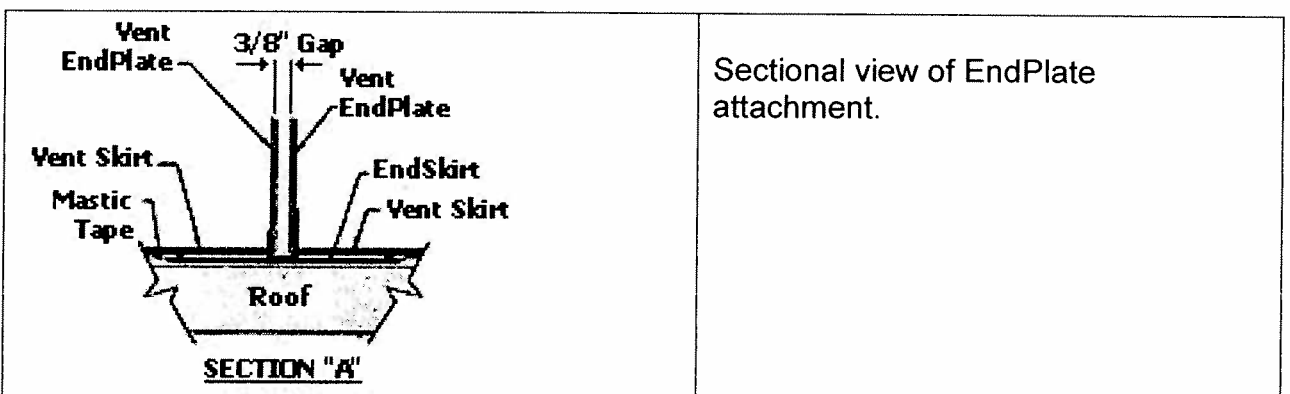
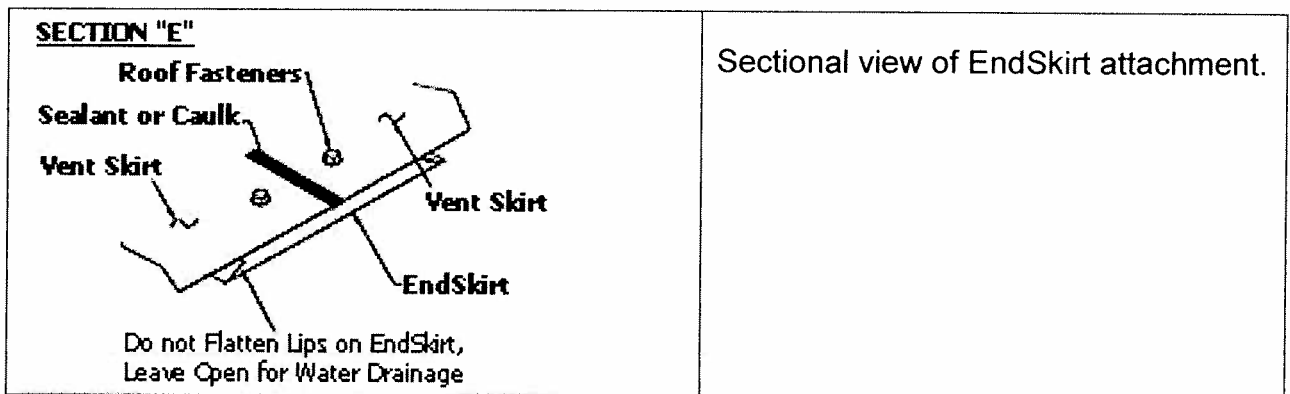
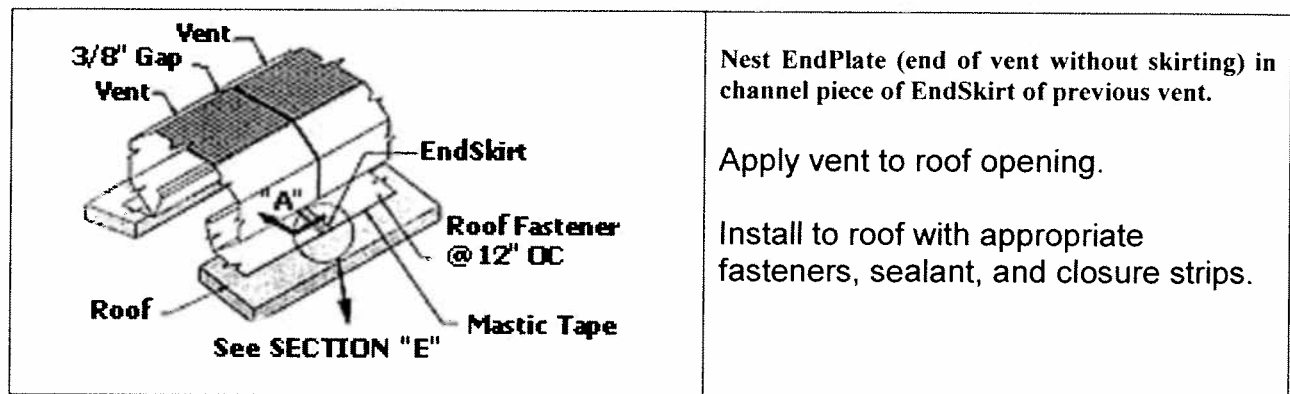


Attach Top of Window and Sides with self-tapping screws through the panel into window fins.

RidgeVents

	<p>Vents are shipped ready to install on a roof pitch of 1 on 12.</p> <p>For greater roof pitches, turn ventilator upside down and cut the EndPlate on a line from lower corners (near Vent Skirt) to EndPlate centers.</p>
	<p>Each vent comes complete with two (2) EndSkirts. Bend EndSkirts to match roof slope.</p> <p>“Starter or Single Vent” - Attach EndSkirt to both ends of vent.</p> <p>“Intermediate or End Vent” - Attach EndSkirt to opposite end of previous vent.</p>
 <p>SECTION "X" Install on one vent EndPlate</p>	<p>Example of how to attach EndSkirt to EndPlate of Vent.</p>





Direction of Pull to close Dampers →

APPENDIX

MBMA

Metal Building Systems Manual

IV. COMMON INDUSTRY PRACTICES

SECTION 1 - Introduction

1.1 Introduction

Throughout the history of the Metal Building Industry, certain practices relating to the design, manufacture, sale and erection of Metal Building Systems have become traditional. The following sections contain a summary of those practices and the responsibilities of the parties involved in each step of the process.

This set of Common Industry Practices is not intended as a standard or as a specific guideline for the design, manufacture, sale or erection of any particular Metal Building System. Rather, it is intended to serve as a general checklist to assist the parties in preparing specific Order or Contract Documents governing the transaction in question. If the parties so desire, these Common Industry Practices can be incorporated by reference, in whole or in part, into the Order or Contract Documents for the sale of a Metal Building System. Wherever there is a conflict between the Order or Contract Documents and these Practices, however, the Order or Contract Documents shall prevail.

For a specific construction project, certain parties may perform more than one function. For example, the Builder may commonly perform the functions of the Contractor and General Contractor.

In a typical sale of a Metal Building System there are at least two independent written agreements the Contract Documents and the Order Documents.

1.2 Definitions

Manufacturer - The party that designs and fabricates the materials included in the Metal Building System in accordance with the Order Documents as provided herein. If the Manufacturer sells the Metal Building System directly to the End Customer, the Manufacturer also has the responsibilities of Builder as described below.

Contractor - The party that has responsibility for providing the materials and erection of the Metal Building System as specified by the Contract Documents.

General Contractor - The party that has the overall responsibility for providing all materials and work for the Construction Project (including the Metal Building System) as specified by the Contract Documents.

Erector - The party that erects the Metal Building System. Either the Builder, Contractor, General Contractor or another party pursuant to an agreement with the Builder, Contractor, General Contractor or End Customer may act as Erector.

Builder - The party that orders and purchases the Metal Building System from the Manufacturer for resale. The Builder is an independent contractor and is not an agent for the Manufacturer. For purposes of this definition, Builder means any Buyer of a Metal Building System other than the End Customer. In those situations where the Builder also meets the definition of End Customer, the relationship to the Manufacturer remains that of a Builder, not an End Customer.

For any specific Construction Project, the Builder may act as a Material Supplier, Contractor, Erector and/or General Contractor. The Builder may or may not provide professional design services. In any event, Builder is responsible for preparing the Order Documents and receipt of materials as provided herein.

If the Builder acts only as a Material Supplier, the Builder has no responsibility for erection of the Metal Building System. In this event, the Builder is responsible for conveying to Contractor or End Customer the engineering data, plans and other information that are provided by the Manufacturer.

End Customer - The party who will be the initial owner of the Construction Project for the purpose of occupying the building or leasing or reselling the completed structure for purposes of occupancy by others. As used herein, the term includes any agent of the End Customer including any Design Professional or General Contractor retained by the End Customer. In those situations where the Builder also meets the definition of End Customer, the relationship to the Manufacturer remains that of a Builder, not an End Customer. For a specific Construction Project, the End Customer may act as the General Contractor.

If the End Customer acts as the General Contractor, it may purchase materials only from the Builder or may purchase the Metal Building System from a Contractor.

If the End Customer purchases materials only from the Builder, the End Customer also has the responsibility for erection of the Metal Building System as provided herein.

Design Professional - An architect or engineer retained by the End Customer or General Contractor or the Builder to assist in the preparation of design specifications for the Construction Project including the Metal Building System and its erection, and where appropriate, to assist in supervising the construction process for compliance with the Contract Documents.

For a specific Construction Project, the responsibilities and rights of the Design Professional and the End Customer (or General Contractor or Builder) are defined in a separate agreement for professional services between the parties.

Order Documents - The documents normally required by the Manufacturer in the ordinary course of entering and processing an order by which the Builder orders the Metal Building System from Manufacturer. The Order Documents consist of the Purchase Order, the Manufacturers' written acceptance and any other writings, drawings, specifications or other documents required by the Manufacturer in the ordinary course of entering and processing an order. Unless specifically agreed in writing by the Manufacturer, specifications and drawings prepared by Builder, End Customer or its Design Professional are not part of the Order Documents.

Contract Documents - The documents that define the material and work to be provided by the Contractor or the General Contractor (or Builder, if acting in these capacities) for a Construction Project. The Contract Documents consist of written agreement defining the scope of work, contract price, schedule and other relevant terms of the agreement. Typically, they include the Design Professional's drawings and specifications (if any), and may include the erection instructions and drawings of the Manufacturer and drawings of any other subcontractor and any general or special terms and conditions referenced and bound with the Contract Documents.

Construction Project - Includes all material and work necessary for the construction of a finished structure for occupancy by the End Customer, such as site preparation, foundations, mechanical, electrical work, etc. The Metal Building System and the erection of the Metal Building System are both elements of the Construction Project.

Section 2

SALE OF A METAL BUILDING SYSTEM

2.1 General

All materials included in the Metal Building System are in accordance with the Manufacturer's usual details and standards unless otherwise specified on the Order Documents.

2.1.1 Generally Included Parts

The parts included in the sale of a Metal Building System are established solely by the Order Documents between the Manufacturer and the Builder. A typical sale may include the following parts:

1. The end and interior frames of the Metal Building System including columns, rafters, and flange bracing.
2. Horizontal load bracing, purlins, girts, eave members, end wall columns, base angles, and other structural framing required to support the roof and wall coverings of the Metal Building System.
3. Nuts and bolts for steel to steel connections of the structural framing of the Metal Building System.
4. Exterior metal roof and wall covering of the Metal Building System including trim, fasteners, sealants and closures.

4.1.1 Accessories

The following items are commonly available from the Manufacturer and may be included in the Metal Building System, but will be provided only when expressly specified by the Builder in the Order Documents:

1. The personnel doors, windows, slide doors, hangar doors, translucent panels and ventilators that are installed in the exterior metal walls and roofs of the Metal Building System. These items will include the necessary hardware, framing, trim and fasteners to be installed per the Manufacturer's standards.
2. Framed openings for doors (such as overhead, roll-up, slide, hangar, etc.).
3. Glass and glazing when included in the Manufacturer's standards.
4. Fascias, canopies and overhangs connected to the Metal Building System.
5. Eave gutters, valley gutters, and the external downspouts to the bottom of the Metal Building System wall.
6. Crane runway beams, supports and crane bracing.
7. Mezzanine or floor framing, joists and steel deck.

4.1.2 Other Materials

The following items are not commonly available from the Manufacturer:

1. Materials for foundations or concrete or masonry walls such as reinforcing steel, concrete and masonry material, anchor bolts, embedments, anchor bolt templates, leveling plates, tie rod or any other materials required to set or connect to masonry or concrete.
2. Interior downspouts, underground drains and connections.
3. Insulation and insulation accessories.
4. Fire protection materials and systems.
5. Interior framing and finishing materials.
6. Cranes, crane rails, crane runway stops and material handling systems.
7. Electrical equipment, apparatus and wiring.
8. Mechanical equipment such as fans and air conditioning and ventilation units.
9. Miscellaneous iron or steel including, but not limited to, stairs, ladders, railings, platforms, conveyors, hangers, etc.
10. Overhead, roll-up, or other industrial type doors.
11. Flashing or counter flashing material used for tie-in to materials not included in the Metal Building System.

2.2 Changes in Order Documents or Contract Documents

- Changes in the Order Documents must be in writing and must be agreed to by the Builder and the Manufacturer (including any adjustment to the contract amount and schedule) prior to the Manufacturer proceeding with such changes or additions.
- Changes in the Contract Documents by the End Customer must be in writing and must be agreed to by the Builder (including any adjustment in the contract amount and schedule).
- Changes in the Contract Documents have no effect on the Order Documents. If the Contract Documents are changed in such a way as to require a change in the Order Documents, the Builder must obtain a change in the Order Documents in accordance with the provisions of this subsection.

Section 3

DESIGN OF A METAL BUILDING SYSTEM

3.1 Design Responsibility

It is the responsibility of the Manufacturer, through the Manufacturer's Engineer, to design the Metal Building System to meet the specifications including the design criteria and design loads incorporated by the Builder into the Order Documents. The Manufacturer is not responsible for making an independent determination of any local codes or any other requirements not part of the Order Documents.

The Manufacturer is responsible only for the structural design of the Metal Building System it sells to the Builder. The Manufacturer or the Manufacturer's Engineer is not the Design Professional or Engineer of Record for the Construction Project. The Manufacturer is not responsible for the design of any components or materials not sold

by it or their interface and connection with the Metal Building System unless such design responsibility is specifically required by the Order Documents.

Therefore, it is highly recommended that the End Customer hire a Design Professional or Engineer of Record (EOR) who would be responsible for specifying the design criteria for the Metal Building system to be used by the Builder and Manufacturer including all applicable design loads. The EOR is also typically responsible for the design of any components or materials not sold by the Manufacturer and the interface and connection with the Metal Building system. The EOR can also provide valuable inspection services to the End Customer to ensure that the project is constructed according to the Manufacturer's erection drawings.

While not recommended practice, if the End Customer does not retain a Design Professional or EOR, it is the responsibility of the End Customer to specify the design criteria to be used for the Metal Building system including all applicable design loads.

It is the responsibility of the Builder to interpret all aspects of the End Customer's specifications and incorporate the appropriate specifications, design criteria, and design loads into the Order Documents submitted to the Manufacturer.

When specified by the Order Documents, the Manufacturer is responsible for supplying adequate evidence of compliance with the specifications, design criteria, and design loads, and other specified information necessary for the Builder or Design Professional to incorporate the Metal Building System into the Construction Project.

In the event of discrepancy between the plans and specifications for the Metal Building System, the plans govern. In the event of discrepancy between scaled dimensions and numerical dimensions on the plans, included as part of the Order Documents, the numerical dimensions govern.

3.2 End Customer Responsibility

3.2.1 General

The End Customer is responsible for identifying all applicable building codes, zoning codes, or other regulations applicable to the Construction Project, including the Metal Building System.

It is the responsibility of the End Customer to prepare complete specifications including the applicable design criteria, codes, standards, and regulations, and all the design loads or other requirements which affect the design or erection of the Metal Building System.

The following information must be supplied to the Builder by the End Customer or the Design Professional. This information must, in turn, be supplied to the manufacturer by the Builder:

1. The building geometric requirements such as length, width, height, roof shape and slope, and clearance requirements, both vertical and horizontal.
2. The applicable code or standard that describes the application of design loads to the Metal Building System.
3. The applicable design loads including Live, Snow, Wind, Seismic, Collateral and Auxiliary loads, including information concerning Collateral and Auxiliary loads required by the Manufacturer to enter the order. Unless design loads or conditions are specifically set out in the Order Documents, the Manufacturer assumes that no such loads or conditions exist.
4. All coefficients or factors (for example; Exposure, Importance, Building Use, etc.) necessary to adjust general or commonly used values in the specified design standard or code for the local site conditions and specified conditions of use.
5. Site and construction conditions that affect design criteria such as conditions causing snow drifting, including location of adjacent structures.
6. Open wall conditions.
7. All information necessary to ensure that the Metal Building System can be designed to comply with the specified code or standards and is compatible with other materials used on the Construction Project.

8. All serviceability criteria limiting vertical or horizontal deflection of components or gross building drift that are necessary to ensure that the stiffness of the Metal Building Systems is suitable for its specific conditions of use and compatible with materials not included in the Metal Building System.
9. In the design of the Metal Building System, the owner is responsible for providing clearances and adjustments of material furnished by other trades to accommodate all of the tolerances of the Metal Building System.

3.2.2 Foundation Design

The Manufacturer is not responsible for the design, materials and workmanship of the foundation. Anchor bolt plans prepared by the Manufacturer are intended to show only location, diameter, and projection of anchor bolts required to attach the Metal Building System to the foundation. The Manufacturer is responsible for providing to the Builder the loads imposed by the Metal Building System on the foundation. It is the responsibility of the End Customer to ensure that adequate provisions are made for specifying bolt embedment, bearing angles, tie rods, and/or other associated items embedded in the concrete foundation, as well as foundation design for the loads imposed by the Metal Building System, other imposed loads, and the bearing capacity of the soil and other conditions of the building site. This is typically the responsibility of the Design Professional or Engineer of Record, which is another reason that their involvement in the Construction Project from the outset is highly recommended.

3.2.3 Ventilation, Condensation and Energy Conservation

The Manufacturer does not design or check a ventilation or energy conservation system unless required by the Order Documents and is not responsible for the adequacy of specified ventilation and energy conservation components. The End Customer assures that adequate provisions are made for ventilation, condensation, and energy conservation requirements.

3.2.4 Framed Openings

The design of framed openings in accordance with the design loads specified by the Order Documents is the responsibility of the Manufacturer. Design of materials supplied by others to be installed in these openings is the responsibility of the End Customer. It is the responsibility of the End Customer to supply to the Builder design loads and other requirements, which affect the design of the Metal Building System and its compatibility with other materials. The Builder must incorporate these requirements into the Order Documents.

3.2.5 Effect on Existing Buildings

The Manufacturer does not investigate the influence of the Metal Building System on existing buildings or structures. The End Customer assures that such buildings and structures are adequate to resist snow drifts or other conditions as a result of the presence of the Metal Building System.

3.2.6 Inspection

The Manufacturer is not responsible for inspection of a Construction Project unless this is incorporated into the Order Documents. Typically, a Manufacturer is limited because of logistical constraints as well as not having the expertise in inspection services. Furthermore, a Manufacturer is not in the best position to inspect the work of the Builder who is the Manufacturer's Customer. Ideally, an End Customer should utilize the inspection services of the Engineer of Record for the project to provide this important function.

3.3 Manufacturer's Responsibility

3.3.1 General

The Manufacturer is responsible for the design of the Metal Building System as defined by the Order Documents, and for providing engineering data and approval drawings, as required by Order Documents.

3.3.2 Engineering Data

The Manufacturer provides a letter of design certification, design calculations, or other engineering data specified in the Order Documents.

The letter of design certification and design calculations are sealed by the Manufacturer's Engineer who is a Registered Professional Engineer in the jurisdiction where the Construction Project is located. Erection drawings are not required to be sealed. In any event, the supplying of sealed engineering data and drawings for the Metal building system does not imply or constitute an agreement that the Manufacturer or Manufacturer's Engineer is acting as the Engineer of Record or Design Professional for a Construction Project.

The letter of design certification states the order number and lists the design criteria including design codes, standards, loads and other design information supplied to the Manufacturer as provided in paragraph 3.2, and certifies that the structural design complies with the requirements of the Order Documents.

Design calculations include the information contained in the letter of certification plus structural design data for the framing members and covering of the Metal Building System necessary to show compliance with the Order Documents. The structural design data includes magnitude and location of design loads and support conditions, material properties, and the type and size of major structural members.

Design calculations may be manually or computer generated at the discretion of the Manufacturer, and are in accordance with the Manufacturer's usual procedures and standards unless otherwise specified by the Order Documents.

Testing by an independent laboratory or by the Manufacturer may be conducted on components and systems at the discretion of the Manufacturer. Reports of such tests may be part of the adequate evidence necessary to show compliance with the Order Documents.

3.3.3 Approval Documents

When required by Order Documents, approval documents including plans, design calculations, and other specified information are furnished by the Manufacturer to the Builder for approval. In order for the Manufacturer to proceed with preparation of fabrication drawings and the manufacture of the Metal Building System, the Builder returns one set of approval documents to the Manufacturer with a notation of outright approval or approval subject to Builder's requested changes or corrections.

Approval by the Builder without any changes or corrections affirms that the Manufacturer has correctly interpreted Builder's requirements as set forth in the Order Documents.

If there are differences between the approval documents as prepared by the Manufacturer and the Order Documents, the approval documents take precedence.

If the Builder returns the approval documents with requested changes, additions or corrections, the documents shall be considered as a request to modify the Order Documents and must be agreed to by the Manufacturer pursuant to the provisions of paragraph 2.2. If the approval documents with requested changes, additions or corrections are not returned to the Manufacturer and approved pursuant to the provisions of paragraph 2.2, the requested changes, additions or corrections are not binding on the Manufacturer.

The Builder may incorporate Manufacturer's approval data into documents submitted for the approval of the Contractor, General Contractor, or End Customer. In this event, only Builder's approval or Builder's requested changes and corrections are applicable to the Order Documents.

3.3.4 Plans

When approval documents are not required or the Builder has approved the Manufacturer's approval documents, the Manufacturer prepares fabrication drawings and provides the Builder with prints of the final anchor bolt plans, erection drawings and erection instructions.

3.3.5 Fabrication Drawings

Fabrication drawings are not furnished by the Manufacturer.

3.3.6 Quality Assurance

Manufacturers are responsible for assuring quality in the Metal Building System. A quality control program verified by an outside inspection agency, similar to the AISC-MB Certification program described in Section VI of this Manual, will satisfy this responsibility.

Section 4

MATERIALS AND FABRICATION

4.1 Materials and Material Tests

4.1.1 Materials

All materials used in the fabrication of Metal Building Systems shall be new and meet or exceed the physical requirements of the Manufacturer's design and fabrication processes, and shall be in accordance with the Manufacturer's standards and procedures unless otherwise specified by the Order Documents.

4.1.2 Material Tests

The Manufacturer orders or tests materials for inventory to meet the design criteria for strength and to ensure that these materials possess the qualities (including weldability) required by the fabrication process of each specific component of a Metal Building System. Each component is fabricated from inventory material specifically ordered for that component. The Manufacturer checks and retains test reports covering current inventory materials ordered for stock, but because it is impractical to do so and because many components are pre-fabricated in mass production, records are not maintained such that individual components can be identified with individual test reports. If requested, the Manufacturer furnishes test reports of current inventory materials. These practices of ordering, testing, stocking, and fabricating make it unnecessary and impractical for the Manufacturer to furnish test reports on the specific materials used in the manufacture of a specific Metal Building System. Any additional destructive or nondestructive tests shall be expressly provided in the Order Documents and are paid for by the Builder.

4.2 Fabrication

4.2.1 General

The Manufacturer is responsible for accurate quality workmanship.

4.2.2 Fabrication Tolerances

The fabrication tolerances set forth in Section 9 are applicable to cold-formed and built-up welded, structural members. For hot-rolled structural shapes, the fabrication tolerances shall be in accordance with the "Specification for Design, Fabrication, and Erection of Structural Steel for Buildings" published by the American Institute of Steel Construction, Inc. The Manufacturer may vary specific tolerances if proper consideration is given to the effects that such variations may have on structural performance, fit-up, or appearance.

4.2.3 Welding Procedures

Welding procedures shall meet or exceed requirements of the Manufacturer's design. For welding procedures and pre-qualified welds, refer to "Structural Welding Code" (AWS D1.1) and "Specification for Welding Sheet Steel in Structures" (AWS D1.3) published by the American Welding Society.

4.2.4 Structural Framing Shop Primer

It is common industry practice for metal building Manufacturers to use the Society for Protective Coatings (SSPC) Paint Specification No. 15 for primer used on primary and secondary structural members.

All structural members of the Metal Building System not fabricated of corrosion resistant material or protected by a corrosion resistant coating are painted one coat of shop primer. All surfaces to receive shop primer are cleaned of loose rust, loose mill scale and other foreign matter by using, as a minimum, the hand tool cleaning method SSPC-SP2 (Society for Protective Coatings) prior to painting. The Manufacturer is not required to power tool clean, sandblast, flame clean, or pickle. The coat of shop primer is intended to protect the steel framing for only a short period of exposure to ordinary atmospheric conditions. The coat of shop primer does not provide the uniformity of appearance, or the durability and corrosion resistance of a field applied finish coat of paint over a shop primer.

Pre-painted material may be used at the Manufacturer's option provided the pre-painted coating provides protection equal to or greater than that provided by the shop primer.

The Manufacturer is not responsible for the deterioration of the primer or corrosion that may result from exposure to atmospheric and environmental conditions, nor the compatibility of the primer to any field applied coating. Minor abrasions to the shop coat caused by handling, loading, shipping, unloading and erection after painting are unavoidable. Any touch-up painting of these minor abrasions is the responsibility of the End Customer.

Primed steel which is stored in the field pending erection should be kept free of the ground, and so positioned as to minimize water-holding pockets, dust, mud, and other contamination of the primer film. Repairs of damage to primed surfaces and/or removal of foreign material due to improper field storage or site conditions are not the responsibility of the Manufacturer.

There has been considerable confusion industry wide within the Federal Standards TT-P-636D (Rust Inhibiting Red Oxide Primer) and TT-P-664D (Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC Compliant) for primers. Federal Standard TT-P-636D has been obsolete since 1988 but still appears inappropriately in specifications. Many of the provisions within that specification are now contrary to environmental rules and law. Federal Standard TT-P-664D is a quantitative and qualitative specification that can in some cases run counter to state and local EPA standards. Because of this fact, the common industry practice is to use the SSPC No. 15 specification as a performance-based specification for a one-coat shop primer.

There has also been confusion about the suitability of a shop applied coated material and a field applied finished paint system. The Manufacturer will provide the Manufacturer's standard one-coat shop applied primer unless otherwise specified in the Contract Documents. The End customer is responsible for determining the compatibility of any coating systems to be applied over the Manufacturer's standard one coat shop primer.

When specifically required in the Contract Documents, the Manufacturer may have the ability to provide or contract for other coating systems. The End Customer should give very careful consideration to this matter. Due to strict environmental standards, the manufacturer may have to send the structural steel to a specialty-coating firm for application of a special primer and/or a finish paint system. There are a significant number of different coating systems available. The End Customer must fully investigate, select and specify the exact primer and finish coating system required. Some of the issues the End Customer should consider include compatibility between primer and finish coat, durability, color availability, cost, gloss and abrasion resistance. If handling of the structural members after painting is of major concern for the End Customer, he/she may want to consider field painting by a specialty paint contractor.

4.2.5 Piece Marking and Identification

All individual parts or bundles and packages of identical parts are clearly marked for verification and erection identification. Bolts and fasteners are packaged according to type, size, and length. Loose nuts and washers are

packaged according to size. The shipping documents include a shipping list which shows the quantity, description and piece mark of the various parts.

4.2.6 Inspection

Material and parts are inspected by the Manufacturer during fabrication in accordance with Manufacturer's quality assurance program. Any additional inspections desired by the End Customer must be expressly provided in the Order Documents by the Builder and are performed in the Manufacturer's plant, the cost of which is paid by the Builder.

4.2.7 Loading

Materials are packaged in accordance with the Manufacturer's standards and loaded in the manner and sequence most convenient and economical for the Manufacturer unless otherwise provided by the Order Documents.

Materials are commonly fabricated for loading on 40 foot, flatbed, open trailers. If Builder or Builder's common carrier requires special size, packaging, and loading of materials, all such requirements must be specified on the Order Documents. The carrier is responsible for securing materials loaded for delivery by truck. The Manufacturer is not responsible for the adequacy or legality of carrier's load or equipment.

Section 5

DELIVERY AND RECEIPT

5.1 Delivery

Transportation may be by Builder or Manufacturer as specified on the Order Documents. In any event, Metal Building System materials are delivered in the order or sequence that is most convenient and economical to the Manufacturer unless otherwise specified on the Order Documents. If materials are transported by a common carrier, the Builder is bound by the rules pertaining to shipment and receipt by common carrier. Materials may not be returned to the Manufacturer without the Manufacturer's prior written authorization.

If transportation is by Builder, delivery is made to the Builder at the Manufacturer's plant and Builder is responsible for receipt at the Manufacturer's plant as provided herein. The Builder may subcontract all or part of the transportation to a common carrier. If Builder subcontracts transportation, the common carrier is responsible for receipt of materials at the Manufacturers' plant and transportation of materials to the delivery address, and Builder is responsible for receipt of materials at the delivery address as provided herein. The Builder may subcontract receipt of materials to Erector or Contractor.

If transportation is by Manufacturer, delivery is made to the Builder at the nearest accessible point to the delivery address specified on the Order Documents and Builder is responsible for promptly receiving materials as provided herein. The Manufacturer may subcontract all or a part of the transportation to a common carrier. In any event, Builder or the Erector is not a borrower of carrier's equipment during unloading or any other operation.

5.2 Receipt

5.2.1 Short Materials

Immediately upon delivery of material, material quantities are verified by the Builder against quantities billed on shipping document. Neither the Manufacturer nor the carrier is responsible for material shortages against quantities billed on shipping document if such shortages are not noted on shipping documents upon delivery of material and acknowledged by the carrier's agent. If the carrier is the Manufacturer, claim for shortages is made by the Builder to the Manufacturer. If the carrier is a common carrier, claims for shortages are made by the Builder to the Manufacturer. If the material quantities received are correct according to the quantities billed on the shipping documents, but are less than the quantities ordered or the quantities that are necessary to complete the Metal Building System according to the Order Documents, claim is made to the Manufacturer.

5.2.2 Damaged Material

Damaged material, regardless of the degree of damage, shall be noted on the shipping documents by the Builder and acknowledged in writing by the carrier's agent. The Manufacturer is not responsible for material damaged in unloading or for packaged or nested materials, including, but not limited to, fasteners, sheet metal, "C" and "Z" sections, and covering panels that become wet and/or are damaged by water while in the possession of others. Packaged or nested materials that become wet in transit shall be unpacked, unstacked and dried by the Builder.

If the carrier is the Manufacturer, claim for damage shall be made by the Builder to the Manufacturer. If the carrier is a common carrier, claim for damage shall be made by the Builder to the common carrier. The Manufacturer is not liable for any claim whatsoever including, but not limited to labor charges or consequential damages resulting from the Builder's use of damaged materials that can be detected by visual inspection.

5.2.3 Defective or Incorrect Materials

Claim for defective or incorrect material shall be made by the Builder to the Manufacturer. The Manufacturer is not liable for any claim whatsoever, including, but not limited to, labor charges or consequential damages, resulting from the Builder's use of defective or incorrect materials that can be detected by visual inspection.

5.2.4 Excess Materials

The Manufacturer reserves the right to recover any materials delivered in excess of those required by the Order Documents.

Section 6

ERECTION AND OTHER FIELD WORK

6.1 General

The Manufacturer of a Metal Building System is not responsible for the erection of the Metal Building System, the supply of any tools or equipment, or any other field work unless it has specifically contracted for these responsibilities. The Manufacturer does not provide any field supervision for the erection of the structure nor does the Manufacturer perform any intermediate or final inspections of the Metal Building System during or after erection. The term Erector in the following subparts refers to whichever firm or corporation has contracted to erect the Metal Building System.

6.2 Metal Building Systems Erection and Other Field Work

All work included in the erection of the Metal Building System shall be in accordance with the Erector's standard methods and procedures unless otherwise specified in the Erector's Contract.

When erection of the Metal Building System is included in the Contract Documents, only the erection work listed in the Contract Documents is included in the Metal Building System erection.

6.2.1 Work Usually Included in Erection - The Erector furnishes:

1. All field labor, tools, and equipment necessary to unload at the building site and to completely erect, safely and properly, the Metal Building System. Some standard and non-standard components and accessories of a Metal Building System including, but not limited to, field located openings, special framing, flashing, trim, etc., require minor field modification and fitting.
2. Insulation and insulation accessories assembled in conjunction with the exterior wall and roof of the Metal Building System.
3. The compressed air and electric power required for Metal Building System erection if commercial power is not available at the job site.
4. Removal from the building and the job site of Erector's temporary buildings, rubbish resulting from erection work, unused screws and bolts, and drill shavings.

5. Temporary guys and bracing where needed for squaring, plumbing and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces comparable in intensity to those for which the completed structure is designed, as well as loads due to erection equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the Manufacturer for the Metal Building System cannot be assumed to be adequate during erection. The temporary guys, braces, false work and cribbing are the property of the Erector, and the Erector removes them immediately upon completion of erection.

6.2.2 Work Usually Not Included in Erection

Due to the widely varied types of work encountered in conjunction with the construction of metal building projects, the following is a partial list of the types of work not included in the erection of the Metal Building System:

1. Receipt of materials, including inspection for short and damaged materials.
2. Site work.
3. Foundation, concrete or masonry work.
4. Setting or inspection of setting of anchor bolts, leveling plates, templates, column base tie rods or any item to be set or imbedded in concrete or masonry.
5. Grouting or filling of any kind under columns or door jambs or in the recess at the base of wall panels.
6. Glazing for the Metal Building System accessories.
7. Field painting or field touch-up of the structural framing shop coat or bolts, except the touch-up of field cuts and welds of the structural framing.
8. Commercial power, if available, including temporary power pole adjacent to the building.
9. Interior finishing or carpentry work of any kind.
10. Flashing, cutting, drilling or otherwise altering the Metal Building System, as required, for the assembly or installation of accessories, materials, or equipment supplied by other trades.
11. Glass cleaning.
12. Electrical, mechanical, masonry or fireproofing work.

6.3 Site Survey

The End Customer, upon execution of the contract, furnishes a current correct survey of the site certified by a Registered Land Surveyor and showing property lines and encroachments, bench marks, adjacent tracts, recorded or visible easements or rights of way easements known to the surveyor or easements for utilities and access restriction to adjacent streets. In addition, the End Customer causes property lines to be accurately staked on the job site and accurately identified to the Erector.

6.4 Concrete Slab, Foundation and Anchor Bolt Setting

The End Customer is responsible for all additional costs resulting from errors in the concrete slab and foundation or in the setting of anchor bolts, except where the concrete slab and foundation are constructed by the Builder. The Erector is responsible for ensuring that concrete dimensions and anchor bolt locations are correct before setting any steel.

6.5 Interruptions, Delays, or Overtime Wages

The contract consideration for erection and other field work is computed on the basis of a normal forty-hour (five eight-hour days) work week (excluding Saturdays, Sundays, and recognized holidays). Any additional cost incurred by Erector through interruptions, delays, errors, or overtime wages caused by the End Customer or the End Customer's contractors, is paid by the End Customer. Interruptions include call backs to complete portions of the erection or other field work that is postponed at End Customer's request.

6.6 Hazardous Job Site Conditions

If hazardous job site conditions prohibit the use of exposed arcs, standard electric motors or normal erection tools and equipment, the End Customer pays any additional costs resulting from such prohibition.

6.7 Accessibility of Job Site and Building Floor Area

The contract consideration for erection is based upon the End Customer furnishing the job site clean, level, fully accessible to trucks for delivery of materials and to erection equipment, and sufficiently compacted to support and permit ready movement of such trucks and equipment. In addition, the End Customer furnishes the building floor area, together with a level and compacted work area outside the building at least twenty feet wide on all sides of the building. This work area shall be free of any existing structure not being tied into by the Metal Building System, property lines, fences, overhead obstructions, pits, machinery, ditches, pipe lines, electric power lines, unsafe or hazardous conditions or other obstacles and shall be fully accessible to Erector's employees, trucks and erection equipment to deliver, store, and lay out materials and to erect the Metal Building System. The End Customer pays to the Erector any additional costs incurred by the Erector resulting from the End Customer's failure to furnish the foregoing.

6.8 Erection Tolerances

Erection tolerances are those set forth in "AISC Code of Standard Practice"

Variations are to be expected in the finished overall dimensions of structural steel frames. Such variations are deemed to be within the limits of good practice when they do not exceed the cumulative effect of rolling, fabricating and erection tolerances.

When crane support systems are part of a Metal Building System, erection tolerances for crane runway beams given in Table 6.1 are applicable. To achieve the required tolerance, grouting of columns and shimming of runway beams may be required. If grouting of column bases is required, the End Customer shall provide such grouting. The party erecting the runway beam is responsible for shimming, plumbing, and leveling of the runway beams. When aligning the runway beams, the alignment should be with respect to the beam webs so that the center of the aligned rail is over the runway beam web.

6.9 Method or Sequence of Erection

The Erector, by entering into a contract to erect the Metal Building System, holds itself out as skilled in the erection of Metal Building Systems and is responsible for complying with all applicable local, federal and state construction and safety regulations including OSHA regulations as well as any applicable requirements of local, national or international union rules or practices.

The Manufacturer may supply erection drawings and instructions suggesting the sequence of erection and appropriate connection of the metal Building System components. The erection drawings are not intended to specify any particular method of erection to be followed by the Erector. The Erector remains solely responsible for the safety and appropriateness of all techniques and methods utilized by its crews in the erection of the Metal Building System. The Erector is also responsible for supplying any safety devices, such as scaffolds, runways, nets, etc. which may be required to safely erect the Metal Building System.

The proper tightening and inspection of all fasteners is the responsibility of the Erector. It should be noted that recent revisions to the AISC Specification and RCSC Specification permit A325 bolts to be snug-tightened in most metal building applications except for those used in the supporting structure for cranes over 5-ton capacity (See Ref. 8.58). A325 bolts that require full tensioning, and A490 bolts and nuts must be tightened by the "turn-of-the-nut" method unless otherwise specified by the End Customer in the Contract Documents. Inspection of heavy structural bolt and nut installation by other than Erector must also be specified in the Contract Documents and Erector is responsible for ensuring that installation and inspection procedures are compatible prior to the start of erection.

Table 6.1
Crane Runway Beam Erection

Item		Tolerance	Maximum Rate of Change
Span		$A = \frac{3}{8}''$	$\frac{1}{4}''/20'$
Straightness		$B = \frac{3}{8}''$	$\frac{1}{4}''/20'$
Elevation		$C = \frac{3}{8}''$	$\frac{1}{4}''/20'$
Beam to Beam Top Running		$D = \frac{3}{8}''$	$\frac{1}{4}''/20'$
Beam to Beam Underhung		$E = \frac{3}{8}''$	$\frac{1}{4}''/20'$
Adjacent Beams		$F = \frac{1}{8}''$	NA

6.10 Correction of Errors and Repairs

The correction of minor misfits by the use of drift pins to draw the components into line, shimming, moderate amounts of reaming, chipping and cutting, and the replacement of minor shortages of material are a normal part of erection and are not subject to claim.

Except for friction type structural connections (not normally utilized in metal building system design), visible gaps between column and/or rafter connection plates can occur as a result of various causes without critical effect to the structural integrity. Minimal shimming at bolt locations is considered acceptable regardless of material yield and does not require full surface contact of the connection plates. The purpose of shimming, besides any aesthetic benefits, is to provide resistance to the tightening procedures of high-strength bolts for proper installation. The types of shim can be of a uniform thickness, full size, tapered or notched around bolts to permit installation without removal of bolts. Bolt holes oversized by 3/16" are permitted in full-size shims to facilitate alignment.

For further information regarding shimming, refer to the AISC publication, "Engineering for Steel Construction". In the event of connection gaps, the manufacturer must be consulted for approval and specific recommendations for proper shimming.

The Manufacturer does not pay claims for error correction unless the following claim and authorization procedure is strictly complied with by the Builder, or if the correction work is begun prior to receipt by the Builder of the Manufacturer's written "Authorization for Corrective Work". If erection is not by the Builder, the Erector is responsible for providing the Builder the information necessary to make claim to the Manufacturer as provided below.

The Manufacturer is not liable for any claim resulting from use of any drawings or literature not specifically released for construction for the project.

The Manufacturer is not liable for any claim resulting from use by the Erector of any improper material or material containing defects which can be detected by visual inspection. Costs of disassembling such improper or defective material and costs of erecting replacement material are not subject to claim.

6.10.1 Initial Claim

In the event of error, the Builder shall promptly make a written or verbal "Initial Claim" to the Manufacturer for the correction of design, drafting, bill of material or fabrication error. The "Initial Claim" includes:

1. Description of nature and extent of the errors including quantities.
2. Description of nature and extent of proposed corrective work including estimated man-hours.
3. Material to be purchased from other than the Manufacturer including estimated quantities and cost.
4. Maximum total cost of proposed corrective work and material to be purchased from other than the Manufacturer.

6.10.2 Authorization for Corrective Work

If the error is the fault of the Manufacturer, an "Authorization for Corrective Work" shall be issued in writing by the Manufacturer to authorize the corrective work at cost not to exceed the maximum total cost set forth.

Alternative corrective work other than that proposed in the "Initial Claim" may be directed by the Manufacturer in the "Authorization of Corrective Work". Only certain persons specifically designated by the Manufacturer may authorize corrective work.

6.10.3 Final Claim

The "Final Claim" in writing shall be forwarded by the Builder to the Manufacturer within ten days of completion of the corrective work authorized by the Manufacturer. The "Final Claim" shall include:

1. Actual number of man-hours by date of direct labor used on corrective work and actual hourly rates of pay.
2. Taxes and insurance on total actual direct labor.

3. Other direct costs on actual direct labor.
4. Cost of material (not minor supplies) authorized by Manufacturer to be purchased from other than the Manufacturer including copies of paid invoices.
5. Total actual direct cost of corrective work (sum of 1, 2, 3, and 4). The "Final Claim" shall be signed and certified true and correct by the Builder. "Final Claims" are paid to such Builder by the Manufacturer in an amount not to exceed the lesser of the maximum total cost set forth in written "Authorization for Corrective Work" or total actual direct cost of corrective work.
6. Cost of equipment (rental, or depreciation), small tools, supervision, overhead and profit are not subject to claim.

Section 7

INSURANCE

7.1 General

Insurance carried on each individual Metal Building System project is subject to negotiation by the contracting parties. The following is a listing of insurance that may be carried in total or in part by Manufacturers, Builders, Erectors, Contractors, General Contractors, and End Customers. It is essential that the End Customer verify the insurance carried by the Contractors and the General Contractor.

7.2 Manufacturer Insurance

7.2.1 Workman's Compensation

7.2.2 Comprehensive General Liability Including:

1. Bodily Injury
2. Property Damage (broad form)
3. Completed Operation--Product Liability
4. Contractual Liability (blanket form not excluding broad form agreement of specific contract form)
5. Personal Injury Liability

7.2.3 Comprehensive Automobile Liability Including:

1. Bodily Injury
2. Property Damage
3. Division I, Owned Automobiles
4. Division II, Hired Automobiles
5. Division III, Non-Ownership Liability
6. Collision
7. Comprehensive Including Fire and Theft
8. Medical Payments
9. Uninsured Motorist

7.2.4 Umbrella Excess Comprehensive General and Comprehensive Automobile Liability

7.3 Dealer, Erector, Contractor and General Contractor Insurance

That insurance listed in Paragraph 7.2, Manufacturer Insurance, plus:

7.3.1 Contractor's Equipment Floater

7.4 End Customer Insurance

7.4.1 Comprehensive General Liability

7.4.2 Comprehensive Automobile Liability

7.4.3 Builder's Risk

7.5 Leased Equipment Insurance

The equipment owner carries a Contractor Equipment Floater on leased equipment and lists the equipment lessee as an additional insured on the floater policy or requires insurance carrier to waive subrogation against the equipment lessee.

7.6 Insurance Certificates

Upon request, the Builder, Erector, Contractor, General Contractor, and End Customer cause their insurance carrier to furnish to the other(s) a certificate of their respective insurance coverage expressly noted as to type of coverage, endorsements and limits of such insurance which have been negotiated between the End Customer and the Builder as contained in the Contract Documents. Such certificates provide that the carrier issue thirty days notice of any changes to or cancellation of the insurance coverage.

Section 8

GENERAL

8.1 Permits, Assessments, Pro Rata and Other Fees

The End Customer obtains and pays for all building permits, licenses, public assessments, paving or utility pro rata, utility connections, occupancy fees and other fees required by any governmental authority or utility in connection with the work provided for in the Contract Documents. The End Customer provides at his expense all plans and specifications required to obtain a building permit. It is the End Customer's responsibility to insure that all plans and specifications comply with the applicable requirements of any governing building authorities.

8.2 Code or Deed Restriction Compliance

Due to the wide interpretations given to design standards, building codes, zoning codes, and deed restrictions encountered in the construction industry, the Manufacturer does not warrant the Metal Building System to comply with any building or zoning code requirements, permit requirement, deed restriction, design procedures, design load, material or equipment requirements, effect of (or on) existing structures, or fabrication procedures except those expressly set out in the Order Documents. Costs of any additions, deletions, modifications, or changes that may be required to comply with such codes, procedures or requirements which are not expressly set out in the Order Documents, must be paid by the Builder.

When the size, shape, general characteristics or design criteria of a Metal Building System are specified to the Manufacturer, the Manufacturer is not responsible for the suitability, adequacy, or legality of the Metal Building System or its design.

8.3 Postponement of Shipment

The consideration for the sale of the Metal Building System by the Manufacturer does not include provision for the cost of storage of the Manufacturer's products beyond the originally scheduled shipping date. If the Builder requests postponement of shipment of the Manufacturer's products beyond the originally scheduled shipping date, the Builder is responsible for payments as originally scheduled as well as any additional storage, handling, trailers, repainting, erection or other costs resulting from the requested postponement.

8.4 Penalties and Bonds

Unless otherwise specified in the Order Documents, Manufacturer is not liable for any penalties or liquidated damages, regardless of cause, and does not furnish or pay for any performance, payment or maintenance bond. Likewise, unless specified in the Contract Documents, the Builder is not liable for any penalties or liquidated damages, regardless of cause, and does not furnish or pay for any performance, payment or maintenance bond.

8.5 Completion and Acceptance

Upon notice by the Builder or Erector to the End Customer of substantial completion of the work provided in the Contract Documents, the End Customer shall determine that the work provided in the Contract Documents is satisfactorily completed and deliver to the Builder or Erector a signed completion certificate noted as to any items

in need of correction or completion. Failure of the End Customer to deliver such noted completion certificate within ten days after notice of substantial completion conclusively constitutes acceptance of the work as satisfactorily completed and waiver by the End Customer.

If the work provided in the Contract Documents is substantially complete except for minor items noted on the completion certificate that cannot be promptly corrected or completed due to circumstances beyond the control of the Builder or Erector, the work provided in the Contract Documents is deemed complete. In addition, partial or complete occupancy of the building by the End Customer, or by others with permission of the End Customer, conclusively constitutes acceptance of the work as satisfactorily completed and waiver by the End Customer.

8.6 Indemnification for Modifications, Adaptations and Repairs

The End Customer agrees and obligates himself to indemnify, hold harmless, and assume the defense of the Manufacturer, Builder, Erector, and their employees against any and all actions, claims, damage, liability, costs and expenses whatsoever in any manner resulting from or arising out of any modifications, adaptations, or repairs made to the Metal Building System or work of the Builder or Erector by employees or agents of End Customer, unless authorized in writing by the appropriate parties.

8.7 Consequential Damages

The Manufacturer is not liable for any consequential damages including that resulting from late arrival of the Metal Building System material to the job site or from short, damaged, defective, incorrect or misfit materials.

8.8 Changes in Product or Standards

Manufacturer may make changes in Manufacturer's products and standards without notice.

8.9 Paragraph Headings

Paragraph headings are included for convenient reference and have no bearing on the interpretation of the wording of any paragraph and do not limit one practice to one heading or paragraph.