

# Metal Products LLC



**INSTALLATION GUIDE** 

## **IMPORTANT NOTICE**

Contents of this guide are suggestions on how to install LifeTite® Metal Products panels and trim details based on the guidelines that were in effect at the time this publication was printed. In an effort to keep pace with the everchanging building codes, LifeTite® retains the right to change specifications and/or designs at any time without incurring any obligations. Application and design details are for illustrative purposes only and may not be appropriate for all environmental conditions and/or building designs. Projects should be engineered and installed to conform to applicable building codes, regulations, and accepted industry practices. LifeTite® assumes no responsibility for any problems which might occur due to improper installation.



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## I. What You Need to Know Before You Install a Metal Roof

## **A.Assessing Your Roof**

Identify weaknesses and deteriorations in your current roofing system.

Roofing is the single biggest investment an owner makes in their home. If there are deficiencies in the current roofing system, they need to be identified and repaired prior to installation. There have been many cases of newly installed roofinghaving to be removed or repaired due to unidentified issues prior to installation. This is a costly and unnecessary incident that can be avoided through a thorough roof inspection.

 Identify areas for possible improvement and strengthening the performance of your home.

A roofing project is the optimum time to identify areas where your homes performance can be improved. Never under estimate the value of items such as better attic insulation or tighter seals around doors and windows.

 Rate the soundness of the current roofing system so that a decision can be made between removing or roofing over current materials.

If your current roofing system is in a good state of repair, a homeowner can often save the expense of removing and disposing of old roofing materials. In addition, two layers of roofing can increase the insulating and protective factors of a roof.

• How to Inspect Your Roof?

A roofing inspection involves examining both the interior and exterior of your home for signs of deterioration and then assessing those findings to identify both causes and solutions.

Construct a simple sheet to record your findings. The most common areas to inspect and the types of damage you may find are found in Table 1.

<u>Current Roofing Materials</u>: including type of roof covering, flashings, penetrations, drainage system and the age of the roof. Outlining your area'sclimatic conditions is also important as varying weather conditions affect roof's differently.

<u>General Roof Appearance</u>: The overall roof appearance will give you a general idea of the condition of the roof. Your assessment should include an overview of the structure (are the ridgelines straight and surfaces flat?) and identify areas that have been damaged or possibly weakened due to external factors (do you see debris buildup or algaegrowth?).

<u>Detailed Roof Conditions</u>: Examine your roof in greater detail paying great attention to areas identified from the general roof appearance. You'll be looking for both obvious damage such as missing roofing material or exposed fasteners and areas that could indicate deterioration such as staining.

**Roof Features**: Examine the features on your roof to ascertain possible damage or weakness. Penetrations should be firmly attached with flashing and sealants firmly in place. Drainage systems need to be directing waterflow away from your home.

**Exterior Walls:** The appearance of exterior walls can also give clues about a faulty roof structure. For example, stained or deformed siding could indicate drainage problems.

<u>Interior Conditions</u>: Damage to the interior of a home can be caused by a weak roofing system. The attic is one of the areas that show damage first. Is your attic full of moisture or is insulation sagging? If so, it could be a sign of roof leakage or indicate ventilations issues.

Walls and ceilings can also help identify roofing issues. Staining, moisture buildup around windows, non-aligned doors and cracks can indicate problems with an existing roof structure.

Assessing Roof Condition: Once you have inspected your roof, you will have a good indication of the overall soundness of the structure and have identified any areas that are in damaged or weakened conditions. The next step is to ascertain what caused any problems. Many times both the cause and the solution are obvious. For example, a strong wind storm loosened some shingles or time has led to degradation of seals around roofing penetrations. Both of these problems would normally be solved during the installation of a new roof. However, it is very important to be sure of the full extent of damage. Seals or flashing can be repaired but if those faults caused leaking which in turn caused rot in the roofing structure itself, this problem won't be repaired by installing new roofing materials and needs to be dealt with either prior to or as part of your roofing project.

**Table 1 Roof Inspection Checklist** 

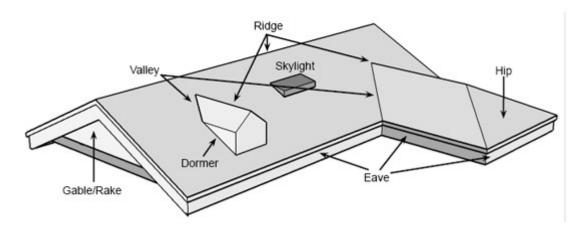
Roof Inspection Checklist	Detailed Roof Conditions	Ice Dams Under Eaves
Name:	Missing Roofing Material	Other
Property Location:	Buckled Shingles	Roof Features Condition
Age of Roof:	Deformed Edges	Fascia
Climate Conditions:	Staining	Soffit
Roofing Materials	Granular Loss	Flashing
Type of Roof Covering:	Denting or Impact Marks	Gutters
Type of Roof Flashings:	Blistering	Chimney
Roof Drainage System:	Ponding	Skylights
Type of Penetrations:	Corrosion	Vents
Exterior Conditions	Missing/Exposed Fasteners	Other
General Roof Appearance:	Missing/Damaged Caulking	

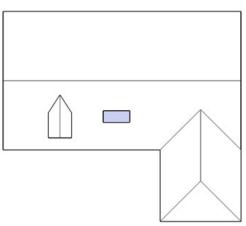
## **B.Measuring for Roof Installation**

Measuring your roof accurately is one the most important parts of your roofingproject. It is key to making an accurate estimate of the materials needed.

The area of a roof is calculated by taking the lineal measurements of the roof from point to point wherever there is a break in flow.

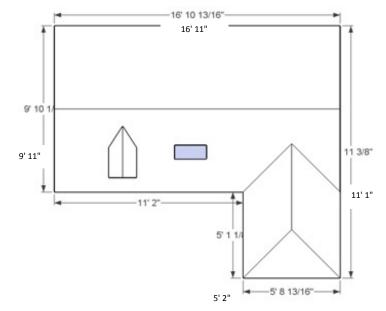
The following image is a basic roofing design.





## Step 1

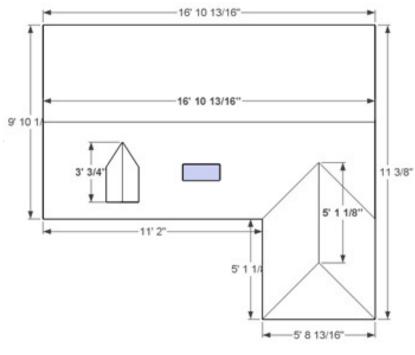
Draw a map of your roof as it looks from the top. Include all roof penetrations. Roof penetrations include chimneys, sun roofs and ventilation pipes and any item that sits on or extends through the roof.



Step 2

Measure the perimeter of your roof. This can be done from the ground (round up to the nearest inch).

5' 9"



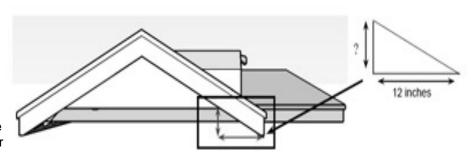
Measure the ridge lines (again rounding up to the nearest inch).

The distance of the ridge lines are necessary to accurately calculate the surface area. On this roof, measuring the ridge on the main area is not necessary as ts length will be the same as the back wall. While it is not necessary to duplicate measurements, it is good policy to measure 11 348° f there is any doubt.

The length of the ridge on the smaller hip roof section must be measured. If it is not safe to measure the ridges, estimate from the ground or roof edge as accurately as possible. Remember, the more accurate your measurements are, the more accurate your materials list will be.

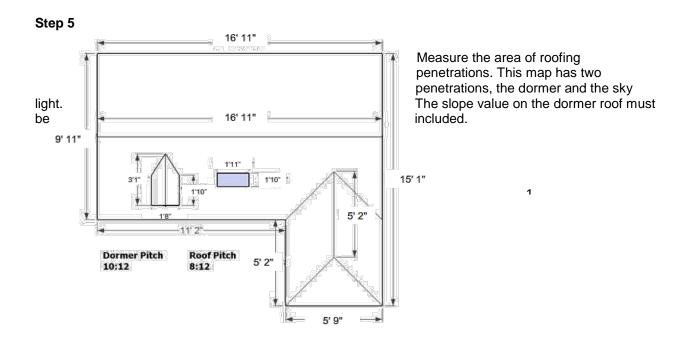
Step 4

Calculate the pitch. The slope or pitch of a roof is the distance the roof rises vertically for each horizontal foot. The gable is the easiest place to take the measurement. From the corner edge measure 1 foot inwards. From that point measure the vertical distance to the edge of the roof. Using a square will keep your lines straight and at a right angle.



If your vertical measurement is 4 inches then your slope is 4:12. If your vertical measurement is 8 inches then your slope is 8:12. If your roof has sections with differing pitches, each slope value must be calculated and recorded.

5'9"



## Step 6

Use the slope factor to determine the area of the roof. Measure the area (length x width) on the ground, and then multiply this by the slope (in decimal form). Find the square footage for the entirety of your roof, and add up the total to find out how much metal roofing needed. (Total Square Feet = Length X Width X Slope)Allow for a minimum of 10% waste (extra roofing).

## **C.Choosing the Right Roofing Materials and Accessories**

#### 1. Panels

LifeTite®roofing panels are made of 100% galvalume metal. Our panels and trim are available in Forest Green, Copper Penny, Polar White, Light Stone, Sahara Tan, Ash Gray, Barn Red, Bright Red, Burgundy, Hawaiian Blue, Emerald Green, Charcoal, Burnished Slate, Cocoa Brown, Stealth Black, and Royal Blue (samples available). We cut our panels to the inch to meet our customers satisfaction. We offer two styles of panels:

 29 Gauge AG PANELS:"AG" also known as Agricultural Panels. AG PANELSare durable, weather-resistant roofing solution for agricultural and residential projects. The panels not only provide excellent protection against the elements and increase the life cycle of your roof but they lower the need for maintenance on your roof. AG PANELS are cost effective, high performance metal roofing system.

Coverage	MINIMUM SLOPE	RIB HEIGHT	GAUGE	RECOMMENDED SUBSTRATE	LENGTH
36"	3:12	3/4 on 9" centers	29	½" - <sup>5</sup> / <sub>8</sub> "	1' to 60'



 26 Gauge Standing Seam Panels: Standing seam refers to an exposed metal roof system designed with interlocking sidelaps forming a watertight joint without the use of through fasteners. 29gauge is the most common roof thickness for a metal roofing system in America. Most metal roofing companies require a 24 gauge or better to ensure the roof will be suitably impact resistant.

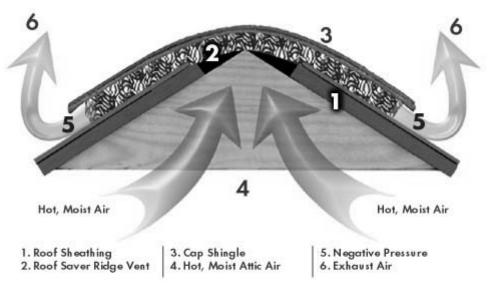
COVERAGE	MINIMUM SLOPE	RIB HEIGHT	GAUGE	RECOMMENDED SUBSTRATE	LENGTH
16"	3:12	1½"	26	½" - <sup>5</sup> / <sub>8</sub> "	1' to 40'



(True measurement 15.25)

### 2. Ventilation& Moisture Barriers

• Roof Saver: Attic ventilation that guarantees to be long lasting, easy to install, and meets Class A fire rating.



Air flow across the exterior roof ridge draws hot, moist attic air out through the Ridge Vent and pulls fresh air into the attic through the soffit vents. Removal of hot, moist air from the attic reduces cooling costs and eliminates potential damage to your roof.

- Felt #30 organic felt contains a strong organic mat saturated with high-quality grade asphalt. It is used as a secondary guard from moisture. #30 Felt contains approximately 216 sq. ft. and weighs approximately 45 lbs.
- Foam Closure(11/4" x 1" x 20' Exp Tape):used where panels come into valleys, etc.
- Inside/Outside Closure Glued
- Profile Vent: used under the ridge cap to seal out weather but allow ventilation.
- Flex-O-Vent: can be used on ridge caps, most useful on hip roofs.
- Titanium 10sq: BEST choice for all types of roofing. It is about 10 times lighter but 20 times stronger than organic felt.

#### 3. Fasteners

- Screws are available in 12, 14, 17. They are also available in any color listed on our color chart. Hex washer head with EPDM rubber washer provides a water tight seal on roof applications.
- Plastic Cap Nails 1 1/4"
- Standing Seam Flat Head Screws, 5,000 count.

#### 4. Trim

- Angle Trim 10': May be used as a drip edge.
- Double Angle Trim 10': Trim used to separate two panels, mostly used at the top of a wall where the gable starts on pole barns.
- Drip Edge 10': Installed under the bottom of a roof panel. It will help prevent rotting.
- Endwall Flashing 10' / Pitch Change: This flashing is used when there is a pitch change in the roof and also at the top of the panel when it meets a wall.
- Fasica Trim 4", 6", 8":
- Flat Sheet 41"x10"
- Gambrel Roof Joint: A trim used in the gambrel of the roof, similar to a gable but has 2 pitch changes. Used mainly for barn style roofs.
- J Channel: A fitted joint normally used around windows and doors to receive the metal panels and provides a finished appearance.
- Rake & Corner 10', 13', 16'& 20': Gabled ends of house or pole barn.
- Rake & Gable Special 10' (4x6): Serves the same purpose as a Rake & Corner, but one of the sides is longer than the other.
- Rat Guard: Installed around the base of a building to prevent rodents from entering and to set the wall panels on.
- Sidewall Flashing 10': A special type of trim used to flash up against the side of building, dormer, chimney, etc.
- Universal Ridge Cap 10', 13': Designed to cover the ridge of the roof to seal off openings, along with closures, solid or vented, protects from leaking, and assists in making a more strong and durable roof.
- W Valley 20" painted x 10': Used in open valleys of the roof. We recommend to use expandable foam where panels come into a valley.
- Water Diverter 10': Covers up the end of metals; when it rains it helps divert the water into the gutter.
- Custom made trim: 1" to 40"
- Custom Trim: You draw it, we can make it.

### 5. Cannon Ball

- Key-Hole Track: The key-hole track system is available in length from 6' to 16'. It
  can be used with either metal or wood door frames. It is the most common door
  track system and can be used on doors up to 600 lbs.
- End Cap: Used to prevent the door from sliding off the end of the track. Though it is not required for installing your door, it is highly recommended.
- Delrin Trolley: For use on wood or metal door frames. Trolley used to hang doors not exceeding 450 lbs for each set of Trolley (2 in a set for 450 lbs).
- We also offer a wide variety of side rails, bottom rails, etc. that you may need to finish your door.

### 6. Boots

- EPDM Boots: #2 EPDM (1 1/4 3), #3 EPDM (1/4 4), #4 EPDM (3 6), #5 EPDM (4 7), #6 EPDM (5 9), #7 EPDM (1/4 4 , #8 EPDM (7 13), #9 EPDM (10 18), EPDM Maxi (13-26)
- Retro-Fit: Retro-Fit Decktite Size 1,2, & 3. Retrofit boots are made to fit around your existing power supply mast pole. For more information on installation please visit the Aztec Washer Company websitehttp://aztecwasher.com/.
- Silicone Heat Boots: Our silicone heat boot are only available in one color. They are tested to stand continuous temperatures of up to 450 F and intermittent temperatures up to 500 F. #3 Silicone Heat Boots (1/4 4), #4 Silicone Heat Boots (3 6), #5 Silicone Heat Boots (4 7), #6 Silicone Heat Boots (5 9), #7 Silicone Heat Boots (6 11), #8 Silicone Heat Boots (7 13), #9 Silicone Heat Boots (10 18), Silicone Heat Boots Maxi; EPDM Maxi is only available in Black. (13 26).
- (Our boots are provided by the Aztec Washer Company. They are a family owned company located in Poway, California and have been in business for over 40 years. Aztec offers the best quality boots in the industry.)

### 7. Insulation

- Fanfold (2 square)
- Bubble Wrap: Single and Double 6'x125'
- Insulation Low E Alum 4'x125'
- 4'x50'4" R13 or 6" R19 Fiberglass
- Styrofoam (¾ Insulation) 21"x8'

### 8. Tools

The tools needed are common and most homeowners will already have them. In general, you will need a large garbage can, hammer, tape measure, utility knife, square, hand tongs, tin snips (left, right, and straight), drill, caulking gun, power metal shear, staple gun, 1 ¼ inch roofing nails, metal roofing screws, and self drilling, self sealing wood screws.

- Turbo Shears: A tool used to make precise cuts into metal up to 20 gauge galvanized steel. It is used in most 14 volt & higher drills. And it's the perfect addition to any homeowners tool box. It will attach to any 3/8 or 1/2" drill and will save you a lot of time.
- Snips (Left or Right Handed)

## 9. Skylights

- Clear: Our clear skylight panel is used if you want to have a lot of light. The total light transmission from this panel is 90%.
- Opal: The opal style skylight panel gives off about half the amount of light. It is a clear
  white and a nice touch to a building. Total light transmission is 52%.

### 10. Miscellaneous

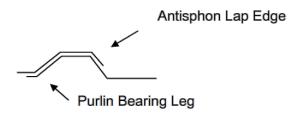
- Caulk:We sell caulk at LifeTite®including: butyl caulk and Solar Seal #900 made by NPC
  Colored Sealants and comes in clear and colors to match your metal. It is a terpolymer
  rubber adhesive sealant that forms a tough weather seal.
- Furring Strips
- Triple Bead (Tacky Tape): Available in 1/2", 7/8", 2.5"
- Paint Bottle and spray (Touch Up)
- Sheeting Board (1 x 9 ¼" x 16)
- Snow Guards

## D. Proper Handling and Storage of Metal Panels

## 1. Panel Laping

Each sheet measures 39" in width. After lapping appropriately, the panel has full coverage of 36" (3').

The steel laps as follows:



On roofs that have a 2/12 or less pitch, butyl tape or caulking is recommended along the lap edge to prevent any leaking.

## 2. Sawing, Cutting, and Trimming Panels

There will always be a certain amount of cutting and trimming necessary on the job site, such as for openings and gable end panels. Tin snips are more than adequate for the job; however, for even better results, cutting may also be accomplished by a portable shear profiled to conform to the panel for perfect across the profile cutting.

Panels are to be cut one at a time and should be turned with the exterior side down and the reverse side up in order that the hot metal particles and filings from the cutting do not become embedded in and cause rust marks on the exterior face of the panel. Also, care should be taken to brush off all panel particles after cutting to further reduce the possibility of rust marks and bleeding on the panel after it is installed. To prevent unsightly premature edge rust on exposed edges, which includes factory cut edges. We recommend coating with an acrylic clear coat or equivalent clear coat.

## 3. Fastening and Screw Placement

**If you** wish to predrill fastener holes, use a cover sheet to prevent hot shavings from sticking to panels.

Screws and Placement - Attachment of panels to the decking substraight is with 10X 1½" washered wood screws in the flat of thepanel adjacent to each rib as shown in theillustration below.Drive the fastener so that the washer is compressed securely against the metal.DO NOT overdrive the fastener as this willform a dimple thatcan collect waterand cause leakage. DO NOT leaveany loose fasteners that havemissed the purlin.At eaves, laps, and ridges, the fastenersare placed on both sides of each rib.

#### RECOMMENDED FASTENING PATTERN FOR 1 1/2" SCREWS



### 4. Storage

If metal is not to be used immediately, store inside in a well ventilated, dry location. Condensation or other moisture can form between the sheets during storage causing waterstains or white rust which detract from the appearance of the product and may affect theproducts useful life. Trapped moisture between sheets of painted metal can causewhiterust to form underneath the paint -- this can cause the paint to flake off the panelimmediately or several years later. To prevent white rust and staining, break the shipping bands on the material. Store the material on end or on an incline of atleast 8" with a supporting board underneath to prevent sagging. Fan the sheets slightly at the bottom toallow for air circulation. Keep the sheets off the ground with an insulator such as wood. Any outdoor storage is at the customer's own risk. If outdoor storage cannot beavoided, protect the metal using a canvas cover or waterproof paper. Never cover themetal with plastic as this will cause condensation to form.

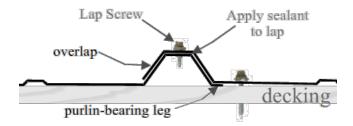
## **E.Safety**

- <u>ALWAYS WEAR SAFETY GLOVES</u> when working with steel panels to avoid cuts from sharp edges.
- ALWAYS WEAR SAFETY GLASSES when cutting or drilling steel panels. Sweep
  off any metal shavings immediately to prevent eye injury from flying metal fragments.
- ALWAYS WEAR NON-SLIP SOLED SHOES and take great care if you must walk on a metal roof. Metal panels can become slippery.
- AVOID WORKING ON METAL ROOFS DURING WET CONDITIONS when the panels become extremely slippery.
- AVOID WORKING ON METAL ROOFS WHEN POLEN IS FALLING AND CREATING A SLIPPERY SURFACE

- AVOID WORKING ON METAL ROOFS ON WINDY DAYS. Fasteners or metal fragments flying around may take you by surprise and lead to accidents.
- <u>DO NOT FOR ANY REASON WALK ON A ROOF MADE OF MATERIALS LESS</u> THICK THAN 29 GAUGE.
- WALKING OR STANDING ON A METAL ROOF WHICH DOES NOT HAVE A
   PLYWOOD OR OTHER DECK BENEATH IT IS NOT RECOMMENDED. Appropriate underlayment or substrate must be ensured before starting work on site in order to prevent fall-through.
- PAY EXTRA ATTENTION NEAR ROOF EDGES. Nearing the roof edges may cause fatal falls.
- ARRANGE FORA LIFELINE SYSTEM TO TIGTHEN THE SAFETY MEASURES, ESPECIALLY WHEN WORKING ON STEEPER-THAN-USUAL ROOFS.
- Don't go ahead with a task if you are in doubt. Professional assistance, more often than not would resolve the issue. **KNOW YOUR LIMITS.**

## F. Common Mistakes

<u>LAPPING THE PANEL INCORRECTLY</u> - Put fat lip down first (piece with extra wide lip), then place the short lip of next panel over the fat lip so that the short lip is showing when you are done.



- <u>SCREW SETS INCORRECTLY</u> Be careful not to make screws too tight or too loose.
- <u>TOO MUCH SEALANT</u> Do not use sealant as the primary source of waterproofing or to fix problems (PROPER INSTALLATION OF PANELS AND TRIM IS YOUR GOAL). Apply sealant underneath panel or trim where it is protected from weather and sunlight.
- RUNNING THE PANEL TOO LONG OVER THE EDGE Bottom end and gable end should overhang no more than 1½ to 2 inches.
- TOO FEW SCREWS IN YOUR PIPE FLASHING When putting on the pipe boot, make sure you put sealant underneath and then put screws 2" apart around the boot so that the boot lies flat against the roof. (THIS IS WHERE MOST LEAKS APPEAR LATER ON DOWN THE ROAD SO EXTRA ATTENTION AT INSTALLATION IS IMPORTANT!)
- REMOVE ANY LOOSE METAL SHAVINGS LEFT ON THE ROOF IMMEDIATELY TO PREVENT CORROSION. After installing roof, remove any debris such as leaves or dirt to prevent moisture from getting trapped on panels.

## **II.Roofing Installation**

## A.Preparing the Work Site

In order to make your installation as easy as possible, it is important to have a well organized work area. You will need a large bin for trash (old roofing and debris), a place for tools, and your scaffolding or ladder set up. Remember to store the material in a readily accessible area, protected from the weather.

## **B.** Roof Preparation

### 1. The Substructure (Roof Deck)

Insure that the structure is square and true before beginning panel installation. If the structure is not square, the panels will not properly seal at the side laps. Start the first panel square to eave by using 2, 4, 5 Triangle Method.

Green or damp lumber is not recommended. Moisture released from the damp lumber may damage the metal panels. Nails installed in green or damp lumber may back out.

### 2. Removing Old Roofing

Although you can install corrugated metal roofing over shingles, for the best foundation it is recommended that all the old roofing be removed. Work at a slow and steady pace, not trying to rip-up or carry-off too much old roofing at once.

- Start from the highest, furthest point and take up all the old shingles, flashing, vents, and boots. You should be replacing all these with the new metal roofing.
- If you come across any large nails that are sticking out, either remove them and put them in your debris container or hammer them in deep so that they aren't a danger to anyone working.
- If you need to reposition your gutters, do so at this point.
- Always remove the old roofing on a day (or set of days) when the weather is
  expected to be dry and sunny, as you don't want any rain or moisture to seep into
  your structure.
- Repair any damage. With the old materials removed, the bare bones of the roof frame or plywood sheathing (the wood under the shingles) will be exposed. If there is any damage to the sheathing, insulation, or ventilation, fix it now.

### 3. Installing Over Existing Roofing Materials

Check with local code official for re-roofing restrictions and landfill disposal should existing roofing need to be removed.

Re-roofing over most existing fiberglass or asphalt shingles can be done (see Section C: Sequence of Install: Underlayment/Furring Strips). The shingles must be smooth (without curling, blisters, etc.) and 30 lb. felt or other acceptable underlayment is to be used over the shingle.

Existing roofs of multiple layer fiberglass or asphalt shingles and various other types of shingles should be removed.

## C. Sequence of Install

## 1. Underlayment/Furring Strips

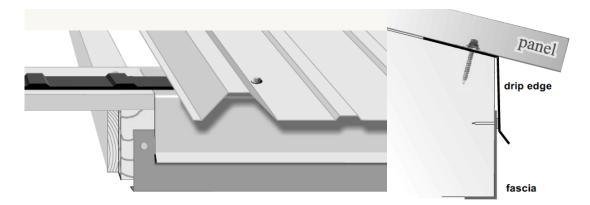
Since metal weighs only 1/3 as much as shingles, you can often attach metal panels without tearing off your existing shingle roof. This eliminates the cost and problems of disposing of the old shingles. The best way to do this is to attach 1" x 4" or 2" x 4" furring strips at 24" o/c parallel to the eave and ridge. In some cases, furring stripsare not necessaryand a layer of underlayment is applied before installation. REMEMBER to refer to local building codes before you begin installation.

Steel can also tend to condensate due to weather changes, so even if you install furring strips, it is still advisable to install a new underlayment. Add your insulation layer covering the entirety of the roof and securing it with a staple gun ornails. This helps to block out moisture from getting trapped betweenthe metalroof and the sheathing.

In areas where local building codes requirements exceed the following recommendations, the local code will govern. Install underlayment, 30 lb. felt paper inaccordance with manufacturers recommendation. In areas requiring an ice barrier, two layers of underlayment adhered together or a self-adhering polymer modified bitumen sheet should be used in lieu of normal underlayment and extend from the eave's edge to a point at least 24 inches inside the exterior wall line.

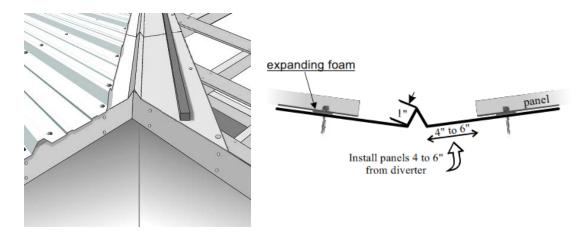
## 2.InstallingDrip Edge

The edging, or eave flashingare metal strips that are used to cover the perimeter of the roof. Use your 1 ¼ inch nails to secure the flashing to the roof. It should overlap the edge of the gutter (if you have them).

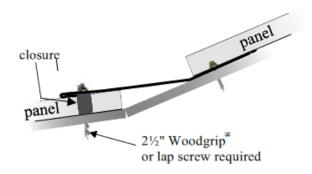


Drip edge and fascia will give a finished look along the drip eave of the building, as well as providing protection for the materials they cover. The drip edge should completely cover the top edge of the fascia. Inside closures, which seal off the open ribs of the panel, are optional.

## 3. Valley Flashing



Preformed valleys use a diverter to prevent water from rushing under the panels on the opposite side while meanwhile channeling water off the roof. Expanding foam closures are transition flashing. Transition flashing prevents leakage at the point where two roof pitches meet. It is sealed underneath the upper panels with inside closures.



### 4. Installing Metal Panels

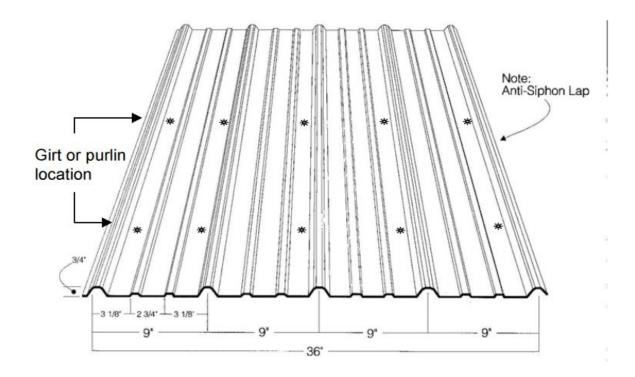
**Step 1:** Place the trim and inside closures prior to panel installation.

**Step 2**: Begin laying the roofing panels on the end of the building away from prevailing wind so that the side-lap seams face away from the prevailing wind-driven rain. That provides extra security against water penetration.

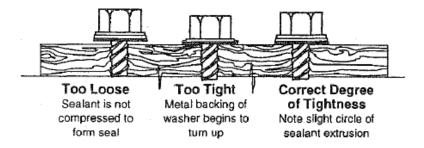
The first panel determines the alignment of all remaining panels on the roof, so extreme care must be taken to accurately square the first sheet. The overlapping rib edge should be flush with the edge of the roof and the panel should overhang the eave approximately 1" to provide for a drip edge. The side rib with the drain channel should face the direction in which the sheets are being laid down. When the panel is positioned, the panel should be attached completely before starting the next panel.

**Step 3**: After the first panel is placed properly, secure with screws. Generally, 1" screw fasteners are placed in the flat area of the panel at 24" on center, along the length of the

panel and next to each major rib approximately ½" from the rib. If purlins are placed over 24" apart, stitching screws are recommended on the lapping rib between the purlins.



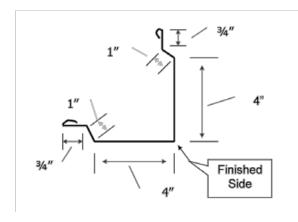
For exposed fasteners, avoid over tightening the fastener. Each fastener has a durable rubber grommet that seals the roof from the weather. Tighten the fastener just enough to seal the site. If you over tighten and the grommet is displaced, remove and replace.

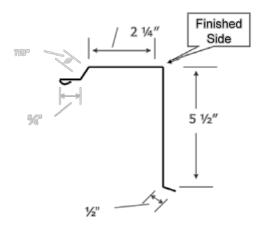


**Step 4**: Lay down the next two panels, checking the alignment at the eave and ridge to ensure the panels are square.

Continue installing the metal panels, making sure that the edges overlap at least one inch, or as required with the adjacent panel. Do this until the entire roof is covered. If you feel the need for sealants, lay a bead of 100% silicone or adhesive silicone before laying the sheet down and make sure the bead is towards the edge of the bottom sheet. This will allow the silicone to squeeze out towards the edges, making it a more tight seal.

## 5.Rake, Sidewall, Endwall, Chimney & Pipe Flashing





#### Rake

- Possessing a dual identity, the gable trim is an accessory fastened to the edges of the roof, clutching the edge of the eave to the ridge. It is a triangular segment of the end wall of a structure.
- 2. Install the roofing panels considering the same plane as the gable edge with Self-drilling Wood grip screws, leaving an overhang of minimum 1" to attach the dripedge. Intermittent checks to ensure that the panels are square and true is important to the corroboration of the project.
- 3. Secure Double-seal Butyl Bead mastic strip sealant along the lower profile of the panel.
- 4, Install the rake trim beginning at the butt end of the eave trim. Make sure that the other rake trim pieces must overlap the piece that lies underneath by 4", using the lapping pattern.
- 5. Fasten the rake/gable trim with Trim Pancake/Stitch Screws distancing them 2" apart from each other.

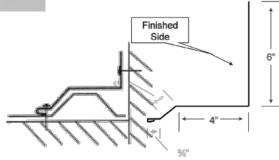


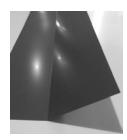


#### **SIDEWALL**

Sidewall flashing isapplied when the side of the roof butts up against an adjacent wall. The wall-side of theflashing can either be covered over with siding or sealed with counter-flashing. Butyltape should be applied where the "foot" of the flashing attaches to the roof, and, if used, along the top edge of the counter-flashing.

Fasten lower leg to sheeting every 24". Fasten leg to wall every 24"

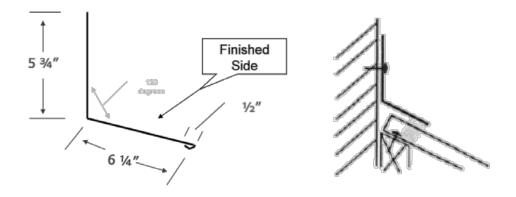




### **ENDWALL**

End-wall flashing is applied where the upward slope of a roof meets a wall. The wall sideof the flashing can be covered with siding or counter-flashing, and outside closures areused to seal between the flashing and the panel.

Fasten upstanding leg to wall every 24". Then fasten through lower leg near edge of flashing on every rib. Roof slope should be specified when aroof slope exceeds 5/12 pitch.



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## CHIMNEY/PIPEBOOTS



Chimney/Pipe Boots provide a water tight seal around roof vents and come in a variety of sizes. Boots seal with caulk or butyl tape and conform to the shape of the metal panel ribs.

## Step 1 - TRIM

Trim opening to 20% smaller than pipe diameter.



## Step 2 - SLIDE

Slide pipe flashing down over pipe



## Step 3 - SEAL

Apply silicone sealant between pipe flashing and metal panel.



## Step 4 - FORM

Press down, bending flashing to fit panel profile. Use large slot screw-driver to press down into tight angles.



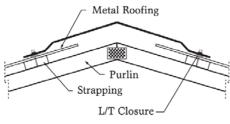
## Step 5 - FASTEN

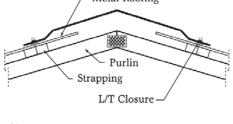
Use fasteners to finish sealing

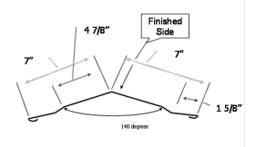


NOTE: Retro-fit "zipper" pipe flashings are available for electrical, weather-head pipes. Also, high temp pipe flashes available for stove pipes.

## 6. Ridge cap, Water Diverter







### RIDGE CAP

The Ridge Cap is used to seal the upperpoint at which two slopes meet. This canbe both along the ridge of the roof as wellas the covering for a hip.

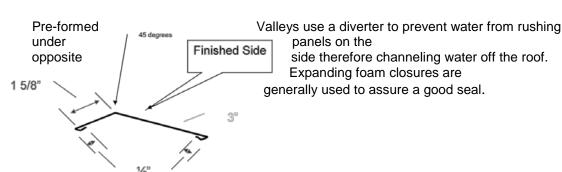
Debris, insects, and blowing rain canfind easy access under the ridge cap, soclosures are often used to

eithercompletelyor partially to seal the opening.

Apply ridge cap as shown, fasteningthrough cap and roofing atevery rib.Ridge Cap is appliedand fastened overthe GableTrim.

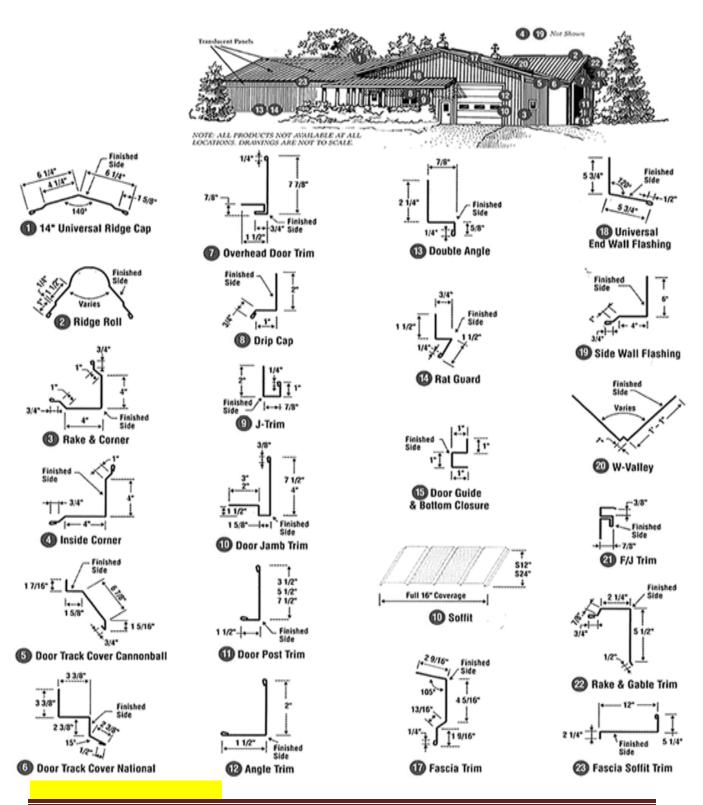


## WATER DIVERTER





## Accessories and Trims Guide



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### D. Maintenance

## **Roof Checkup Guide for Homeowners**

LifeTite® recommends a checkup on your roof system in the <u>FALL</u> and <u>SPRING</u> will help diagnose potential problems early.

## When cleaning your gutters or inspecting your roof system, remember important ladder safety tips:

- Make sure the ladder is on solid, level ground.
- Secure the ladder at the top to prevent it from slipping.
- Inspect the ladder, rungs and rails for damage.
- Extend the ladder at least 3 feet beyond the gutter, and angle it 1 foot back from the house for every 4 feet in eave height.
- Always use both hands when climbing the ladder.

## Once on the ladder, you should look for:

- Shingles that are buckling, curling or blistering; this indicates the end of the shingles' life expectancy.
- Loose material or wear around chimneys, pipes and other penetrations.
- Excessive amounts of shingle granules in your gutters; granules give shingles added weight and protect them from ultraviolet rays.

## III. Appendix

## **A.Glossary of Metal Industry Terms**

Glossary of common metal building terminology normally associated with fabrication and construction of metal building projects.

## A

- Accessory A supplementary building product such as doors, windows, skylights, vents, gutter, etc.
- AISC The American Institute of Steel Construction.
- AISI The American Iron and Steel Institute.
- Aluminum Coated Steel An aluminum coating applied to light gauge steel for corrosion protection.
- Anchor Bolts Bolts used to anchor structural members to concrete floors, foundations or other masonry supports. Usually refers to the bolts at the bottom of all columns and door jambs.

## B

- Bar Joist Normally used as beams or horizontal structural members suitable for the support of
  floors or roof decks. Bar joists are fabricated with steel bars and formed shapes welded into open
  web load carrying members.
- Base Angle A continuous angle secured to the perimeter of the foundation to support wall
  panels.
- Base Plate A plate attached to the base of a column which rests on a concrete floor, foundation
  of other support, usually secured by anchor bolts.
- **Base Trim** A light gauge member secured to the perimeter of the base to close off wall panel configurations.
- Bay The space between frame center lines or primary supporting members in the lengthwise direction of the buildings. In endwalls, it is determined by outside girt of endwall to center line of next frame.
- **Bead Mastic** Sealant furnished in a continuous roll, normally used for sealing roof panel endlaps and sidelaps.
- Bearing Plate A steel plate that is set in the top of a masonry wall on which a beam or purlin
  rests.
- **Blind Rivet** A small headed pin with expandable shank for joining light gauge metal. Typically used to attach flashing, gutter, etc.
- Bracket A structural support projecting from a wall or column on which to fasten another structural member. Examples are canopy brackets, width extension brackets and crane runway brackets.
- **Building Code** Regulations established by a recognized agency such as U.B.C. describing design loads, procedures, and construction details for structures. Usually applying to designated geographical areas (city, county, state, etc.). The legal requirements set up by various governing agencies covering the minimum requirements for all types of construction.

## C

- "C" Section A member formed from coiled steel stock in the shape of a block "C" that may be used either singularly or back to back.
- **Camber** A permanent curvature designed into structural members to offset anticipated deflection when loads are applied.
- Canopy An overhang or projecting roof structure with the extreme end usually unsupported.
- Cantilever A projecting beam or column that is supported and restrained at one end only. A
  structural member like a truss, beam or slab, projecting from a fixed end. The projected end is
  free and clear of any support. (e.g. Flag pole, road signs, overhangs)
- **Cantilever Beam** A beam with support at one end. The support provides restraint against rotation and horizontal and vertical movement.
- Capillary Action That action which causes movement of liquids when in contact with two adjacent surfaces such as panel sidelaps.
- Caulk To seal and make weather-tight at joints, seams or voids by filling with a waterproofing compound or material.
- Chalking Oxidation of the paint vehicle exposing the titanium dioxide to the surface.
- Channel: Hot Rolled A member formed while in a semi-molten state at the steel mill to a
  general "C" shape having standard dimensions and properties specified by AISC or the steel
  producer.
- Circular Vent Usually a 20 inch diameter roof mounted accessory which allows air movement.
- **Clear Span** The distance or clear width between two supports of a beam; generally less than the effective span.
- Clevis A device, usually U-shaped, made of iron or steel with the ends drilled to receive a pin. Used in construction to attach a draft chain to a vehicle or a load to a crane cable.
- Concentrated Load A load applied to a structural element that is considered as being applied
  at a point rather than being applied uniformly across a span. (e.g. a ceiling mounted heater hung
  from a beam.
- Continuous Beam A beam which has more than two points of support.
- Clip A plate or angle used to fasten two or more members together.
- Closer A mechanical device attached to a door, allowing it to close at normal speed.
- **Closure Strip** A resilient strip, such as neoprene, flat on one side and formed to the contour of ribbed sheets on the other, used to close openings created by joining metal sheets and flashing.
- **Cold Forming** The process of using press brakes or rolling mills to shape steel into desired cross sections at room temperature.
- **Collateral Load** All specified additional dead loads other than the metal building framing such as sprinklers, mechanical and electrical systems, and ceilings.
- **Column** A primary member used in a vertical position on a building to transfer loads from main roof beams, trusses or rafters to the foundation.
- Covering The exterior roof and wall sheeting for a metal building system.
- Crane A machine designed to move material by means of a hoist.
- Crane Rail A track supporting and guiding the wheels of a bridge crane or trolley system.
- **Crane Runway Beam** The member that supports a crane rail and is supported by columns or rafters depending on the type of crane system. On underhung bridge cranes, a runway beam also acts as a crane rail.
- **Curb** A raised edge on a concrete floor slab. Also refers to a "boxed out" opening in a roof for HVAC equipment.
- **Curtain Wall** Perimeter wall panels which carry only their own weight and wind load. Also as DRAFT curtain referring to an interior partition suspended from the roof structure to a preset elevation above the floor to reduce wind draft in large, open buildings.

## D

- **Damper** A baffle used to open or close the throats of ventilators.
- **Dead Load** The weight of all permanent construction such as floor, roof, framing and covering members.
- **Deflection** The displacement of a structural member or system under load. When compared to a static position, the difference is known as its "yield".
- Design Loads Loads specified in building codes published by Federal, State, County or City agencies, or in owner's specifications to be used in the design of a building.
- Diagonal Bracing See "Brace Rods".
- **Diaphragm Action** The resistance to racking generally offered by the covering system, fasteners and secondary framing.
- **Door Guide** An angle or channel guide used to stabilize or keep plumb a sliding or rolling door during its operation.
- **Double Channel** Two channels placed web to web for additional strength. Normally used in endpost conditions.
- Downspout A conduit used to carry water from the gutter of a building to the ground or stone drain
- **Downspout Elbow** Cold formed sheet metal matching to downspout shape and curved to direct water away from a wall when attached to the lower end of a downspout.
- Drift Pin A tapered pin used during erection to align holes in steel members for connection by bolting.

## E

- **Eave** A line along the roof/sidewall intersection formed by the inside faces of the roof and wall panels.
- Eave Height The vertical dimension from finished floor to the eave.
- **Eave Strut** A structural member at the eave to support roof panels. It may also transmit wind forces from roof bracing to wall bracing.
- **Elastic Design** A design concept utilizing the proportional behavior of materials when all stresses are limited to specified allowable values.
- **Elastic Limit** The furthest point to which an elastic body can be stretched and still return to its original size and shape.
- **End Frame** A frame at the endwall of a building to support the roof load from one half the end bay.
- End Post A secondary column at the endwall of a building to support the rafters and or girts.
- **Expansion Joint** A separation between adjoining parts providing small relative movements (occurring independently) such as those caused by temperature changes.

## F

- Fascia A decorative trim or panel projecting from the face of a wall.
- Filler Strip See "Closure Strip".
- **Fire Resistance** -A relative term, used with a numerical rating or modifying adjective to indicate the extent to which a material or structure resists the effect of fire. (e.g. Fire resistance of two hours as measured on the standard Time-Temperature curve.

- Fixed Base A column base that is designed to resist rotation as well as horizontal movement.
- Flange The projecting edge of a structural member.
- **Flange Brace** A bracing member used to provide lateral support to the flange of a beam, rafter or girder. Also called a "Flange Stay".
- **Flashing** A sheet metal closure which functions primarily to provide weathertightness in a structure and secondarily to enhance appearance.
- Force The action of one body on another which changes or tends to change its state of rest or motion. A force may be expressed in pounds, kips or other similar units and may act in any one of the following ways:
  - o A.) Compression
  - o B.) Shear
  - o C.) Tension
  - o D.) Torsion
- Framed Opening Framing (headers and jambs) and flashing which surround an opening of a roof or wall in a building. Used for field installed accessories such as overhead door, windows and smoke hatches.
- Frost Line The greatest depth to which ground may be expected to freeze.

## G

- **Gable** The triangular portion of the endwall of a building directly under the sloping roof and above the eave height line.
- Gable Trim See "Rake Trim".
- **Galvalume** Aluminum zinc alloy (Approximately 55 % aluminum and 45 % zinc) coated steel. The aluminum zinc alloy is applied by the continuous hot dip method also referred to as Zincalume.
- Galvanized Coated with zinc for corrosion resistance.
- **Gauge** The numerical designation for the thickness of sheet metal. Also refers to the distance between punched or drilled holes.
- **Girder** A main horizontal or near horizontal structural member that supports vertical loads. It may consist of several pieces.
- **Girt** A horizontal secondary structural member attached to sidewall or endwall columns to which wall covering is attached and supported horizontally. Usually a Zee shape.

## H

- **Haunch** The deepened portion of a column or rafter, designed to accommodate the higher bending moments at such points. (Usually occurs at connection of column and rafter).
- **High Strength Bolts** Any bolt made from steel having a tensile strength in excess of 100,000 pounds per square inch. (e.g. ASTM A-325, A-354, A-449 and A-490).
- **High Strength Steel** Structural steel having a yield point in excess of 36,000 pounds per square inch.
- Hinged Base See "Pin Connection".
- **Hip Roof** A roof which rises by inclined planes from all four sides of a building. The line where two adjacent sloping sides of a roof meet.
- Holes In Plates Pitch: The distance between holes along longitudinal axis of plate. Gage: The
  distance between holes along transverse axis of plate. Edge Distance: Distance from center of
  hole to edge of plate.
- **Horizontal Thrust** A lateral load in the horizontal plane. Always present at the base of a loaded rigid frame or arch. The tendency of a rigid frame column to "kick outward" at its base.

 Hot Rolled Shapes - Steel sections (angles, channels, I-beams, etc.) which are formed while in a semi-molten state at the steel mill to a shape having standard dimensions and properties specified by AISC or the steel producer.

## I

- I.C.B.O. International Conference of Building Officials.
- **Impact Load** The assumed loading from the motion of machinery, elevators, craneways, vehicles and other similar dynamic forces such as the starting and stopping of an overhead crane.

- Jack Beam A primary member used to support another beam or truss and eliminate a column support.
- **Jamb** The vertical structural member on the sides of a door, window or other framed opening.
- **Jib Crane** A cantilevered beam or horizontal beam with hoist and trolley. This lifting machine may pick up loads in all or part of a circle around the column to which it is attached.
- Joist A lighter beam for supporting the floor or roof.

## K

- **Kip** A unit of measure equal to 1,000 pounds.
- **Knee** The joint between the column and rafter of a structural frame such as a rigid frame. Also referred to as "haunch".
- **Knee Brace** A diagonal brace designed to resist horizontal loads usually from wind or moving equipment. This member normally has the lower end connected to the column and the upper end connected to a rafter or eave strut.

## L

- Lateral Proceeding from or directed toward the side of something; such as a column.
- Lateral Movement Horizontal movement of a structure, earth, sheeting or bracing.
- Lateral Stability That quality of a structural member that prevents it from twisting under load. Usually accomplished by bracing a member with secondary framing, ties or struts.
- **Leveling Plate** A square or rectangular steel plate fabricated with pre-punched holes that match the anchor bolt spacing.
- Lip A flange extension
- Live Load The temporary load applied to a structure in addition to its own weight. (e.g. People
  on roof, materials stacked on roof, snow, etc. It does not include wind loads, earthquake loads or
  dead loads.
- Loads Anything that causes an external force to be exerted on a structural member. (e.g. Dead, impact, roof live load, seismic, wind and crane.
- Load Bearing Walls Any wall that bears its own weight as well as other weight from other sources such as building and wind.

- **Longitudinal** Pertaining to length, running lengthwise. The longitudinal strength of a structural system is its resistance to forces coming from the end in a lengthwise direction. The bracing system provides most of the longitudinal strength of a building.
- Louver An opening provided with slotted fins (fixed or moveable) to allow air flow.

## M

- Masonry Anything constructed of materials such as bricks, concrete blocks, etc.
- Mastic See "Bead Mastic".
- MBMA Metal Building Manufacturers Association.
- Mezzanine A second floor above the ground floor.
- Mild Steel (Soft, low carbon). A grade of steel having a low percentage of carbon content and generally low strength.
- Mill Section See "Hot-Rolled Shapes".
- Moment The tendency of a force to cause rotation about a point or axis.
- Moment Connection A connection between two members which transfers the moment from
  one side of the connection to the other side and maintains under application of load the same
  angle between the connected members that exists prior to the loading. Also, a connection that
  maintains continuity.
- Moment of Inertia A physical property of a structural member which helps define strength and deflection characteristics.
- Monorail A single rail support for a material handling system. Normally a hot-rolled "I" beam. (EG-hoist)
- MS Colorfast45® -This is a thermoset paint system with a 45 year warranty composed of
  polyester resin which has been modified with a silicone resin. The MS Colorfast45® system offers
  good protection to the elements with special consideration to chalk and fade resistance,
  durability, and chemical resistance. See Color Guide for available colors.
- MS Strongcoat45® -This is a thermoset paint system with a 45 year warranty composed of polyester resin which has been modified with a silicone resin. This system offers good protection to the elements with special consideration to chalk and fade resistance, durability, and chemical resistance. See Color Guide for available colors.
- Multi-Gutter See "Valley Gutter".
- Mullion A slender vertical bar between panes or section of windows, screens, etc.

## N

 Non-Combustible - Not capable of burning. A non-combustible material or item will not support fire.

## 0

- Out to Out A term meaning overall dimensions.
- Overhang See "Roof Overhang".

P

- Panel See "Covering".
- Panel Line The outer, or exterior, edge of panels attached building structural system.
- Parapet Wall The portion of the vertical wall which extends above the roof line.
- **Partition** A non-load bearing interior wall. It can sustain its own weight but does not support the ceiling or roof and does not withstandwind loads.
- Peak See "Ridge".
- Peak Box The finish trim at the highest point of the rake.
- **Perimeter** The total length of the distance around the outside of a building.
- Piece Mark A number given to each component of the building for erection identification.
- Pier A concrete structure designed to transfer vertical load from the column base to a footing.
- **Pilaster** A projection from a masonry wall intended to support roof members or reinforce the wall to resist lateral loads; structurally it is treated as a pier, architecturally as a column. -
- **Pin Connection** In structural analysis; the assumption that a member is connected to a foundation, structure or other member allowing free rotation.
- **Pitch** Slope, to incline. The inclination of a roof. Usually stated in terms of vertical rise as compared to horizontal coverage, as 1: 12 refers to 1 foot rise for every 12 feet horizontally.
- **Plastic Design** Design for steel based on multiplying the actual loads by a suitable factor of safety and using the yield point as the maximum stress in any member.
- Point Load See "Concentrated Load".
- Ponding The gathering of water at low or irregular areas on a roof.
- Pop Rivet See "Blind Rivet".
- Portal Frame A rigid frame structure that offers rigidity and stability in its plane. It is used to resist longitudinal loads where brace rods are not permitted.
- Post See "End post".
- Post and Beam Endwall A system of endwall framing consisting of upright or vertical members (posts) supporting horizontal beams with hinged connections to support V2 of the end bay roof load.
- **Prepainted Coil** Coil steel which receives a paint coating prior to the forming operation.
- Prestressed Usually applies to prefabricated concrete. Before concrete is hardened, the
  reinforcing steel is pulled or put in tension by jacks at the sides or ends of the concrete form.
  When the concrete hardens, the stretch of the steel is in tension while the concrete is in
  compression.
- Press Brake A machine used in cold-forming metal sheet or strip into desired shapes.
- **Primary Framing** The main load carrying members of a structural system, generally the columns and rafters or other main support members.
- **Primer Paint** The initial coat of paint applied in the shop to the structural framing of a building for protection against the elements during shipping and erection.
- **PSF** Unit of measure expressed as pounds per square foot (psf).
- PSI Unit of measure expressed as pounds per square inch (psi).
- **Purlin** A horizontal secondary structural member bolted to the rafters which transfers the roof loads from the roof panels to the rafters or main frames, usually a Z or C shape.
- PVDF (Kynar 500®) This paint system with a 45 year warranty combines ceramic pigmentation with polyvinylidene fluoride for a superior, long-lasting performance. The PVDF system is respected for its durability, resistance to chalking and fading, chemical resistance, and color retention. Please note: the PVDF system meets both Kynar 500/Hylar 5000 specifications and contains 70% Kynar 500® or Hylar 5000 resins. Kynar 500® and Hylar 5000 are produced under license from Atofina and Ausimont, respectively. See Color Guide for available colors.

R

- Racking Action The tendency for a building to lean and/or fall in one direction due to wind loads imposed from an opposite side.
- Rafter A primary beam supporting the roof loads.
- Rake The intersection of the plane of the roof and the plane of the endwall.
- Rake Angle Angle fastened to purlin ends at the rake for attachment of endwall sheets.
- Rake Beam See "End Rafter".
- Rake Extension See" Roof Overhang"
- Rake Fascia/Trim A flashing designed to close the opening between the roof and endwall panels.
- Reactions Forces required to resist the loads from a structure.
- Red Oxide Finish Red Oxide primer is applied to structural framing members to prevent surface rust.
- Reinforced Concrete Concrete containing metal bars, rods or wire mesh incorporated into the
  mass to increase its tensile strength and durability.
- Reinforcing Steel The steel placed in concrete to help carry the tension, compression and shear stresses.
- Ridge Highest point on the roof of a building which creates a horizontal line running the length of the building.
- Ridge Cap/Flashing Continuous metal strip (normally conforming to roof panel configuration)
  used to close roof material along the ridge.
- Ridge Panel A die formed ridge cap with the same configuration as the roof panel.
- Ridge Vent See "Circular Vent" and "Continuous Vent".
- Rigid Connection A joint capable of transmitting moment to another member of the system.
- **Rigid Frame** Any structure in a plane, made up of rigidly connected beams and columns, so designed that the frame depends on its own bending strength for transverse stability.
- Rolling Doors Doors that are supported by wheels that run on a track.
- Roof Covering The exterior roof skin consisting of panels (or sheets) and their attachments, trim and weather sealant.
- **Roof Curb** An accessory used to mount and level units (EG. air-conditioning units, exhaust fans, etc.) on the sloped portion of a building roof.
- Roof Extension See "Roof Overhang".
- **Roof Height Change** The condition where a lower building is attached to a higher building at the endwalls, resulting in one building with different eave heights at each end.
- Roof Jack An accessory used to cover pipes (such as sewer or furnace pipes) that penetrate
  the roof panel)
- Roof Overhang A roof extension beyond the endwall or sidewall of a building.
- Roof Slope See "Pitch".
- Rope Sealant See "Bead Mastic".

## S

- Sag Rod/Angle/Strap Secondary structural members located between girts and/or purlins intended to provide lateral web stability and spacing.
- Sandwich Panel An integrated structural covering consisting of a core of insulation material (foam, fiberglass, etc.) covered on one or both sides with exterior covering (EG. metal, plywood).
- **Scab Plate** Steel plate, factory or field welded, to the flange or web of a column or rafter to increase their load carrying ability.
- Sealant Any material which is used to close up cracks or joints to prevent leaks.
- Seamer A mechanical device used to lock or seal the sidelaps of a standing seam roof.
- **Secondary Framing** Members which carry loads to the main or primary framing. In metal buildings this term includes base angles, purlins, girts, struts, knee braces, flange braces, etc.

- **Section Modulus** A physical property of a structural member. It is used in design and basically describes the bending strength of a member.
- **Seismic Load** An assumed lateral load acting in any horizontal direction on the structural frame due to the action of earthquakes.
- **Self-Drilling Screw** A fastener which drills and taps its own hole. Commonly used to attach panels to purlins and girts.
- **Self-Tapping Screw** A fastener which forms receiving threads when turned into a previously drilled hole. It attaches panels together and connects trim and flashing.
- **Shear** The force tending to make two contacting parts slide upon each other in opposite directions parallel to their plane of contact.
- **Shear Diaphragms** Membrane-like devices that are capable of resisting deformation when loaded by in-plane shear force.
- **Shear Strength** The ability of a structural element to withstand loads of forces perpendicular to its principal access. These loads may be withstood by the structure as a whole, but investigation at particular location within the structure is necessary.
- **Sheet Notch** A groove or block-out formed along the outside edge of the foundation to provide support for the wall panels and serve as a closure along their bottom edge.
- Sheeting See "Covering".
- Shim A piece of steel used to level or square beams and base plates. Shipping List See "Bill of Material".
- **Shop Details/Drawings** Details prepared for and used by manufacturing in the fabrication of parts and assemblies.
- **Sidelap** A term used to describe the lap condition occurring at the side or lengthwise direction of panels or sheeting.
- **Sidewall** A term used to describe the entire composition of a building side.
- **Silicone** A compound containing silicon, a non-metallic element which has strong chemical, physical and electrical stability. Especially adaptable for industrial uses.
- Sill The bottom horizontal framing member of an opening such as a window or door.
- **Simple Span** A term used in structural analysis to describe a support condition for a beam, girt, purlin, etc., which offers no resistance to rotation at the support.
- **Single Slope** Refers to sloping roof with one surface. The slope is from one sidewall of a building to the opposite sidewall.
- **Siphon Break** A small groove to arrest the capillary action of two adjacent surfaces, usually found at a roof panel sidelap.
- Skylight A reinforced plastic panel fitted into an opening in a roof to admit daylight.
- Sleeve Nut A long, slender nut used to join together two brace rods of the same diameter. -
- Slide Door A single or double leaf door which opens horizontally by means of overhead trolleys.
- **Sliding Clip** A clip used to attach a standing seam roof to the secondary structural members allowing the roof to expand and contract independently of the structural system.
- Snow Load A load imposed on buildings or other structures due to snowfall.
- Soffit The underside covering of any portion of a metal building usually at a roof overhang.
- Soil Pressure The load per unit area a structure exerts through its foundation to the soil.
- **Spall** A chip or fragment of concrete that has broken from the main mass of concrete.
- **Span** The distance between the supports of beams, girders or trusses.
- **Specification** A statement of particulars of a given job, as to size of building, quality and performance of men and materials to be used, and the terms of the contract. Through the M.B.M.A., the metal building industry has published a "Recommended Guide Specifications For Pre-Engineered Buildings".
- Splice Plate See "Butt Plate".
- **Spud Wrench** A long tapering steel handle with a wrench on one end; used by ironworkers to line up holes for bolted connections.
- Stainless Steel An alloy of steel which contains a high percentage of chromium. Also contains copper and 10-30 % of nickel and other metals. Provides excellent resistance to corrosion.

- **Standing Seam Roof** An exposed metal roof system designed with interlocking sidelaps forming a watertight joint without the use of through fasteners.
- **Steel Line** The extreme outer limits of a building's structural framing system to which the sheeting is attached.
- Stiffener A member used to strengthen plate against lateral or local buckling. Usually a bar welded perpendicular to the longitudinal axis of the member. Large concentrated loads such as crane loads usually require stiffeners at the point of connection.
- Stitch Screw A self-tapping screw used to connect panels together at the side lap.
- Structural Line See "Steel Line".
- **Structural Steel Members** Load carrying members such as hot-rolled sections, coldformed shapes or built-up shapes.
- Strut A supporting piece; an inside brace resisting pressure along its length.
- **Stud** A vertical wall member, load bearing or non-load bearing, covered by exterior or interior covering.

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- **Tape Sealant** Sealant furnished in a continuous roll, normally used for sealing roof panel endlaps and sidelaps.
- **Tapered Member** A built-up plate member consisting of flanges welded to a variable depth web.
- **Template** A pattern made from wood or metal, used as a guide in shaping something or checking the accuracy of work. (e.g. a template is used to set and align anchor bolts.
- **Tensile Strength** The longitudinal pulling stress a material can bear without tearing apart usually expressed in pounds per square inch.
- Tension Stress in a structural member created by forces tending to draw it apart longitudinally.
- Thrust A force tending to push a member of a structure outward or sideways.
- **Tolerance** A fractional allowance for variations from the specified standard weight, dimensions, etc., in construction.
- Torque The twisting force exerted by or on a shaft without reference to the speed of the shaft.
- **Torque Wrench** A wrench containing an adjustable mechanism for measuring and controlling the amount of torque or turning force to be exerted. Often used in tightening nuts on high strength holts
- Torsion A force acting on a body causing it to rotate or twist.
- Translucent Panel See "Skylight".
- **Trim** A sheet metal closure which functions primarily to provide weathertightness in a structure and secondarily to enhance appearance.
- **Truss** A structure, acting like a beam, made up of three or more members with each member designed to carry a tension or compression force.
- **Turnbuckle** A form of threaded coupling connecting two metal rods lengthwise that regulates the distance between them by a turning motion.
- **Turnkey Construction** A construction service that includes all phases of construction in a single contract.
- Turn of the Nut Method A method of tightening high strength bolts in accordance with AISC
   "Specifications for Structural Joints Using ASTM A-325 bolts."

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- Underhung Crane A multi-rail, underhung material handling system manually or electrically operated.
- UL Rating Underwriter's Laboratories certification rating.

- Uniform Load Loads that cover all or part of a beam where the amount of load per unit of length is the same.
- **Uplift** Wind load on a building causing a load in the upward direction.



- Valley Gutter A channel formed to carry water from a common low point in the roof The condition is usually created when two buildings are joined side by side.
- Vapor Barrier Material used to prevent condensation by retarding the flow of vapor or moisture into walls or roofs.
- **Ventilation** The process of moving air to/from an enclosure.
- Ventilator An accessory designed to allow air movement.
- **VersaRib** Economical paint system with a 20 year warranty comprised of polyester resins.



- Wall, Bearing Wall capable of supporting a structural system.
- Wall, Non-Bearing Wall not capable of supporting a structural system.
- Wall Covering The exterior wall skin consisting of wall panels (or sheets) and their attachments, trim and weather sealant.
- Web The portion of a structural member between the flanges.
- **Weep Holes** Openings in flashing, etc., to permit drainage and reduce pressure. Usually field drilled holes.
- Width Extension A single slope structure dependent upon another structure for partial support. Usually high side eave height of wing unit connects to eave of "stand-alone" building.
- **Wind Bracing** Cables, rods or other structural members used in roof and walls to transfer loads (wind, seismic and crane thrusts) to the foundation.
- **Wind Column** A vertical member supporting a wall system designed to withstand horizontal wind loads only.
- Wind Load A load representing the pressure exerted on a structure by a given wind velocity. A
  load caused by the wind blowing from any horizontal direction.
- Wing Unit See "Width Extension".
- Work Point An intersection of planes from which dimensions are located.



• "X" Bracing - See "Wind Bracing".



• Yield Point - The amount of stress, measured in a unit area, under which a given material such as a rod of metal, will exhibit permanent deformation. The point at which a stress or strain exceeds the elastic strength of the material.

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