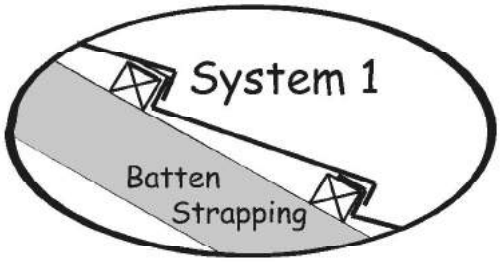
Revised: June 7, 2014

METSTAR®

Installation Guide



Tile FR METSTAR®

Shake FW METSTAR®

Slate FD METSTAR®

Tile 2 FZ METSTAR®

Slate MF METSTAR®

metstar.com

Notice

Recommended installation method for METSTAR Roof Panels and accessories only. Installers should have knowledge of roof structures, and be experienced at working on sloped roofs. This guide shall serve for installation using a batten system for use along with local building codes in the United States and Canada.

Consult your METSTAR representative for additional information.

To obtain PDF reports of METSTAR ROOF Panels use the following links.

ICC -ES Reports(ESR -3331)
http://www.icc-es.org/Reports/pdf_files/load_file.cfm?file_type=pdf&file_name=ESR -3331.pdf

UL report(TGIK.R27053) : Uplift
http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=TGIK.R27053&ccnshorttitle=Roofing+Systems,+Uplift+Resistance&objid=1082676337&cfgid=1073741824&version=versionless&parent_id=1073993603&sequence=1

UL report(TFXX.R27053) : Fire Class
http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=TFXX.R27053&ccnshorttitle=Prepared+Roof-covering+Materials,+Formed+or+Molded+Metal,+Fiber -Cement,+Plastic+or+Fire -retardant-treated+Wood&objid=1082676343&cfgid=1073741824&version=versionless&parent_id=1076422968&sequence=1

UL report(TGAM.R27053) : Hail Resistance Class4
http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=TGAM.R27053&ccnshorttitle=Roof-covering+Materials,+Impact+Resistance&objid=1083983842&cfgid=1073741824&version=versionless&parent_id=1073993585&sequence=1

METSTAR
www.metstar.com

Overview

Introduction

Installation of METSTAR ROOF Panels such as TileFR, Shake FW, Slate FD, Tile 2 FZ and Slate MF must comply with these installation instructions, and the applicable local building codes. The instructions and drawings included here are intended only as a guideline for the installation of METSTAR ROOF Panels with battens on wood decks. Information regarding alternative situations not covered in these instructions can be obtained by contacting METSTAR.
The information in these instructions is for practices in North America and can be changed without notice. International applications may be similar, but may differ in some ways.

Liability

This manual provides suggested application techniques only and is not to be substituted for any local building code. METSTAR panels are covered by a limited warranty, but it does not cover damage due to improper handling or installation. METSTAR assumes no liability for incorrect installation, leaks, other roofing defects or personal injury that may occur as a result of installing its products. It is the responsibility of the installer to adhere to local building codes.

Scope of Work

An independent contractor for installation METSTAR ROOF Panels including all flashings, valley, ridge, hip, roof-to-wall, and etc. is responsible for all equipment and labor necessary to complete the installation.

Safety

Adhere to recommended safe roofing practices. Safety equipment should be worn during the installation process. Wear appropriate clothing and use safety equipment (i.e. light, soft-soled shoes, protective eyewear and safety harness). Use proper tools and keep the roof clear of debris as you work.

Tools

METSTAR panels may be cut using shears or metal snips, or a circular saw using metal-cutting blades. Do not use a grinder to cut panels, because it will cause corrosion. A mechanical or hand bender is recommended to bend the panels for hips, ridges and valleys.

METSTAR ROOF Panels are produced from Aluminum-Zinc alloy coated steel complying with ASTM A792. They are Corrosion resistant, Aluminum-Zinc alloy Coated steel, preformed, stone coated, prefinished, metal panels.

Fire Classification, and Hail Resistance Grade

METSTAR Roof panels are Class A roof assemblies, when installed as shown in TABLE 2 of the Appendix.
METSTAR Roof panels are CLASS 4 Hail Impact Resistant in accordance with Standard UL2218.

Allowable Negative Wind Pressures:

METSTAR roofing panels must be installed where the negative design wind pressure, determined in accordance with Section 1609 of the IBC or Section R301.2.1 of the IRC, as applicable, does not exceed the allowable negative wind pressure specified in Table 1 of this Installation Guide.

Severe Weather Conditions

If the area is prone to high wind, water, severe snow or ice, additional measures may be required. Ice and Water shield is recommended. Follow local building codes. All fasteners used should be corrosion resistant. Also, panels along the perimeter and directly along the hips and gables must be secured with more fasteners than normal as detailed in TABLE 1 of the Appendix.

Preparation

All the other work that can cause contamination of roof panels, such as painting and water proofing, must be finished before METSTAR panel installation.

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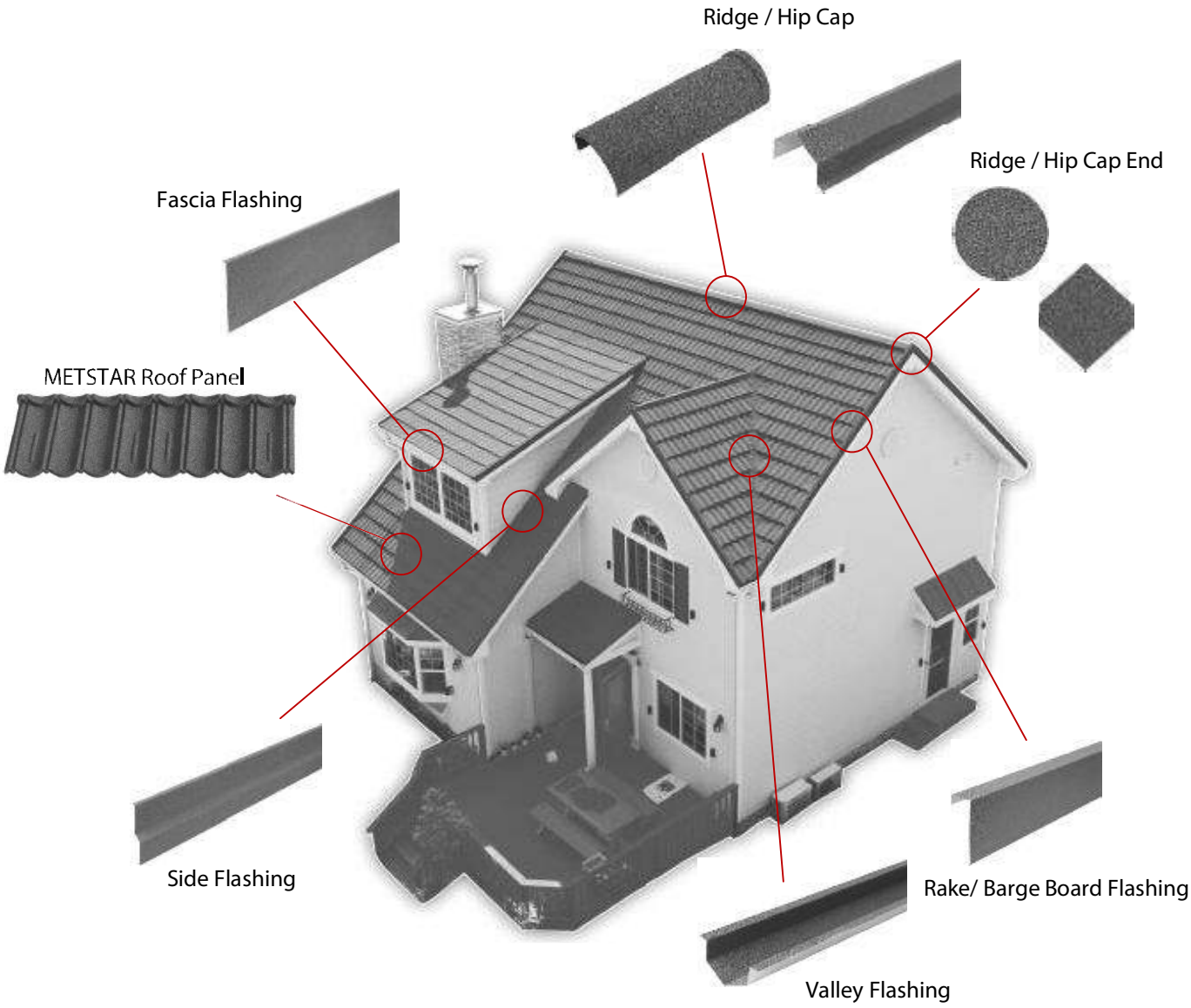
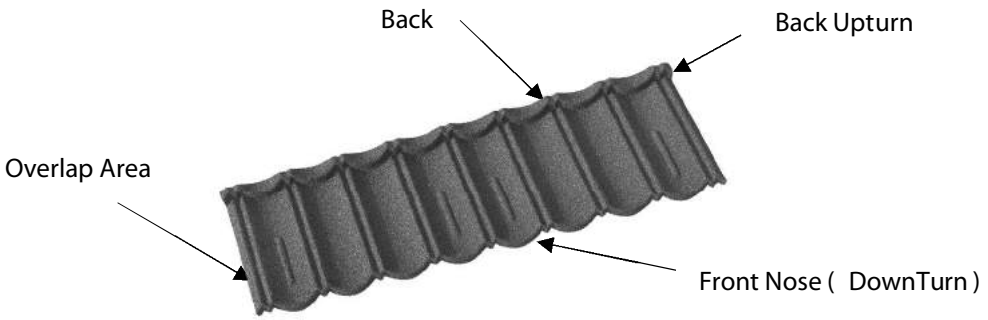
Terminology





Tools

Tools

METSTAR ROOF panels may be cut using shears, metal snips, or a circular saw using metal cutting blades. A mechanical or hand bender is recommended to bend the panels for hips, ridges and valleys. Safety equipment should be worn during the installation process.

Bender

Cutter

Finishing Kit

Finishing Kit

This kit is supplied for repairing minor scuffing or surface damage. Unfinished flashing materials can be painted with durable acrylic aerosol paints.
Always store at room temperature.(5 ~30℃)

Fasteners

All fasteners must be corrosion -resistant. Nails must comply with ASTM F1667. Wood screws must comply with ANSI/ASME Standard B18.6.1. Sheet metal screws must comply with ANSI/ASME Standard B18.6.4.

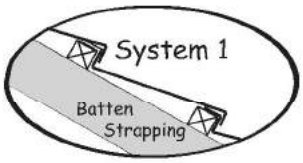
Refer to the TABLE 1 in the Appendix for the number and location of fasteners.

Other Items Needed:

Caulk *(sealant),* Caulking gun
Battery or Electric Drill
Metal snips
Screw Gun
Nail gun
Roofing nails *(ring shank)*
Roofing felt
Hammer
Hand benders
Chalk or construction marker
Tape measure
Extension cord

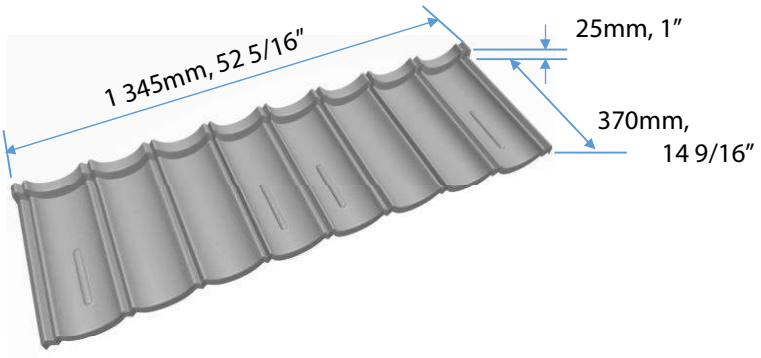
METSTAR Roof Panels / Specifications

METSTAR Roof Panels Specifications:



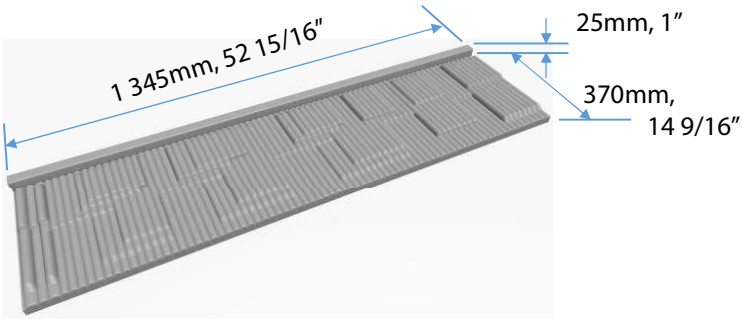
Tile FR METSTAR

Overall Length :	1,345mm (±5mm)	52 5/16″
Length of Cover :	1,280mm	50 3/8″
Width of Cover :	370mm	14 9/16″
Upturn :	25mm	1″
Roof Cover/Panel :	0.474 ㎡	5.1 sq.ft
Panels/Squared Meter :	2.11/ ㎡	19.6/ SQ
Weight/Panel :	2.6~2.7kg	5.9 lbs.



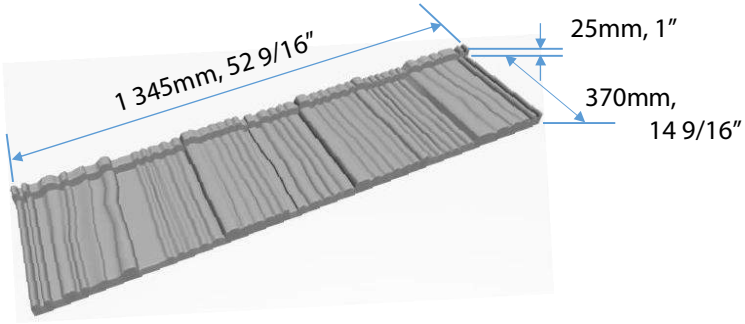
Slate FD METSTAR

Overall Length :	1,345mm (±5mm)	52 15/16″
Length of Cover :	1,280mm	50 3/8″
Width of Cover :	370mm	14 9/16″
Upturn :	25mm	1″
Roof Cover/Panel :	0.474 ㎡	5.1 sq.ft
Panels/Squared Meter :	2.11/ ㎡	19.6/ SQ
Weight/Panel :	2.6~2.7kg	5.9 lbs.



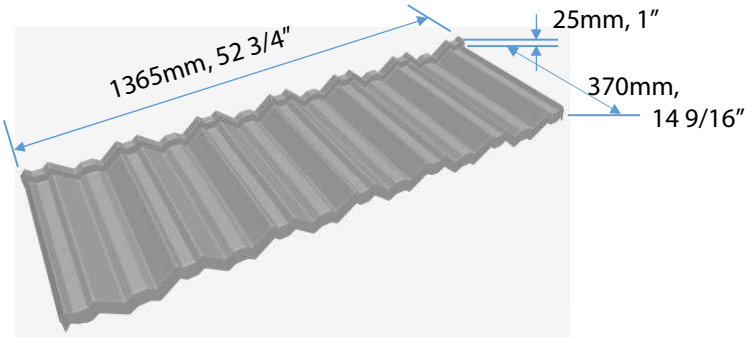
Shake FW METSTAR

Overall Length :	1,335mm (±5mm)	52 9/16″
Length of Cover :	1,280mm	50 3/8″
Width of Cover :	370mm	14 9/16″
Upturn :	25mm	1″
Roof Cover/Panel :	0.474 ㎡	5.1 sq.ft
Panels/Squared Meter :	2.11/ ㎡	19.6/ SQ
Weight/Panel :	2.6 ~2.7 kg	5.9 lbs.



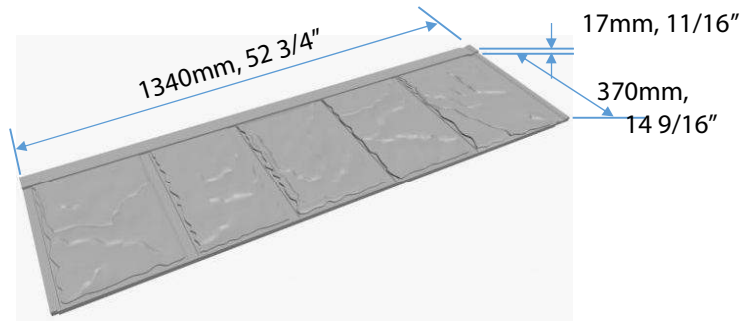
Tile 2 FZ METSTAR

Overall Length :	1,365mm (±5mm)	52 3/4"
Length of Cover :	1,280mm	50 3/8"
Width of Cover :	370mm	14 9/16"
Upturn :	25mm	1"
Roof Cover/Panel :	0.474 ㎡	5.1 sq.ft
Panels/Squared Meter :	2.11/ ㎡	19.6/ SQ
Weight/Panel :	2.6~2.7kg	5.9 lbs.



Slate MF METSTAR

Overall Length :	1,340mm (±5mm)	52 3/4"
Length of Cover :	1,280mm	50 3/8"
Width of Cover :	370mm	14 9/16"
Upturn :	17mm	11/16"
Roof Cover/Panel :	0.474 ㎡	5.1 sq.ft
Panels/Squared Meter :	2.11/ ㎡	19.6/ SQ
Weight/Panel :	2.6~2.7kg	5.9 lbs.



METSTAR Roof Panels

All the above METSTAR Roof Panels are manufactured with the same materials and processes.
METSTAR Roof Panels are highly resistant to fire, and the extremes of weather.
Produced from Aluminum -Zinc alloy coated steel complying with ASTM A792.
Corrosion resistant, Aluminum -Zinc alloy Coated steel, preformed, stone coated, prefinished, metal panels.

Package and Storage:

Care should be taken. Products should be stored in a dry place under cover.

Warranty

METSTAR Roof panels carry a limited lifetime warranty. The lifetime warranty reverts to a 50 year warranty when it's transfered and does not cover damage due to improper installation or handling.

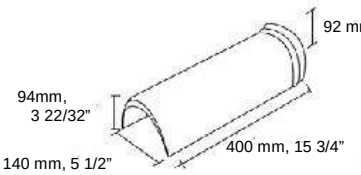
Accessories & Flashing

Accessories & Flashing

Accessories are manufactured in the same color and with the same material as METSTAR panels.

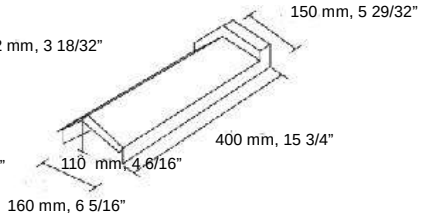
Barrel Hip & Ridge

Overall length : 400mm, 15 3/4"
Length of cover : 370mm, 14 9/16"

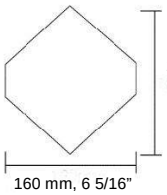


Trim Hip & Ridge

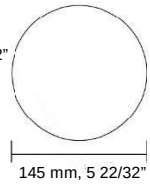
Overall length : 400mm, 15 3/4"
Length of cover : 370mm, 14 9/16"



End Disc Trim

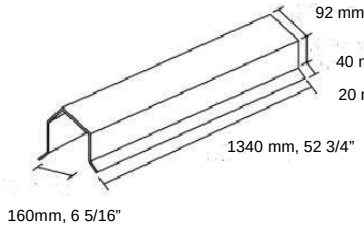


End Disc Round



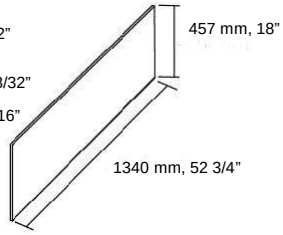
Long Trim

Overall length : 1,340mm, 52 3/4"
Length of cover : 1,300mm, 51 3/16"



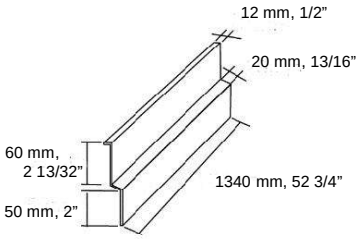
Flat Sheet

Overall length : 1,340mm, 52 3/4"
(±5mm)



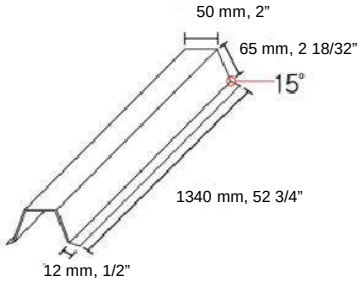
Side Flashing

Overall length : 1,340mm, 52 3/4"
Length of cover : 1,300mm, 51 3/16"



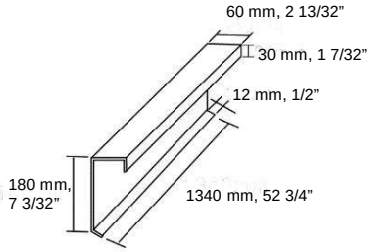
Ridge Hip Flashing

Overall length : 1,340mm, 52 3/4"
Length of cover : 1,300mm, 51 3/16"



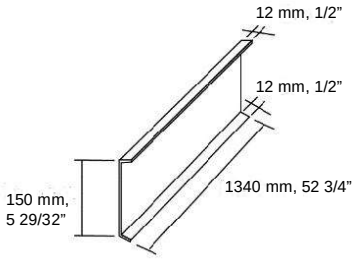
Barge Board Flashing

Overall length : 1,340mm, 52 3/4"
Length of cover : 1,300mm, 51 3/16"



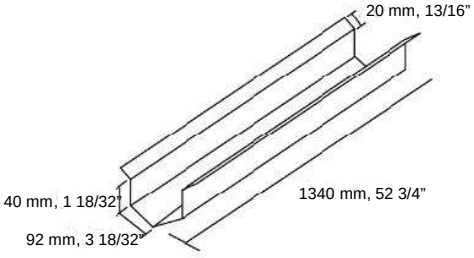
Fascia Flashing

Overall length : 1,340mm, 52 3/4"
Length of cover : 1,300mm, 51 3/16"



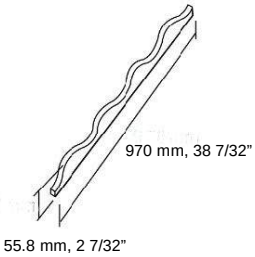
Valley Flashing

Overall length 1,340mm, 52 3/4"



Closer

Overall length : 970mm, 38 1/4"
Height : 34.8mm, 1 3/8"



General Information

INSTALLATION Overview

New Construction:

Support Conditions: The roofing panels must be installed on roofs having a slope of 3:12 (25%) or greater. Roof rafters shall be spaced not more than 24 inches (610 mm) on center. Roof panels must be installed over solid sheathing complying with the applicable code.

Underlayment: Underlayment must comply with Section 1507.5.3 of the IBC, or Section R905.4.3 of the IRC, as applicable.

Tile FR, Shake FW, Slate FD, Tile 2 FZ and Slate MF Installation:

The panels and battens must be installed on minimum 15/32 inch -thick (12 mm) plywood or on solid sheathing complying with the applicable code. Wood battens, nominally 2 by 2 lumber, are attached to the deck, with fasteners spaced a maximum of 24 inches (610 mm) on center. Battens must be fastened to each rafter using fasteners with the minimum sizes as specified in Table 1 of the Appendix having sufficient length to penetrate the deck and rafter 1-1/2 inches (38 mm). Panels in the upper course must lap panels in the lower course at the lower vertical face of each batten. The panel fasteners specified in Table 1 must be installed through the front nose of the upper panel and the back upturn of the lower panel into the vertical face of the batten.

Flashing, Edges and Hips & Ridges: Valley flashing must comply with IBC Section 1507.5.6 or IRC Section R905.4.6, as applicable.

Roof openings must be flashed in accordance with IBC Section 1503.2 or IRC R903.2, as applicable. Openings through the roof for vents, etc., must be waterproofed and supported by additional blocking or roof framing as required by the local building code.

At gable edges, a continuous rake cap or barge cover of the same material as the panels, supplied by METSTAR, must be installed in accordance with this published installation instructions.

Reroofing Applications:

METSTAR panels must be installed over existing roofs in accordance with Section 1510 of the IBC and Section 907 of the IRC. If tearing off the old roof, clean and prepare the deck to meet local building codes.

When skip/spaced sheathing is encountered, use counter battens and battens without filling or fill as necessary and install just battens.

Support Conditions: Roofing panels must be installed on roofs having a slope of 3:12 (25%) or greater. Roof rafters must be spaced not more than 24 inches (610) mm on center.

Batten Installation: Battens must be nominal 2-by-2 lumber. Battens must be fastened to each rafter using fasteners with the minimum sizes as specified in Table 1 of the Appendix and have sufficient length to penetrate 1-1/2 inches (38mm).

Panel Installation: Panel installation must be the same as for new construction.

* Codes & Requirements

Refer to local building codes and METSTAR CO LTD ICC-ES Report ESR -3331.
http://www.icc-es.org/Reports/pdf_files/load_file.cfm?file_type=pdf&file_name=ESR -3331.pdf

* Roof Slope

METSTAR Panels are designed for roofs with slopes of 3:12 or greater. For slopes less than 3:12, ROOF Panels are considered decorative only, and they must be applied over a roof system complying with local codes.

* Underlayment

Underlayment must comply with Section 1507.5.3 of the IBC, or Section R905.4.3 of the IRC, as applicable.
It is required that one layer of underlayment be used before applying METSTAR Panels to a roof deck in new construction or if the existing roofing material is removed. If the panels are installed over another roofing material, additional underlayment is not required unless specified by local code. All underlayment should be of a type and specification that is accepted by the local building code. Check local code requirements as ice and water shield and additional requirements may apply.

* High Wind Zone

In areas prone to hurricanes and high winds, installation must meet local standards and codes. Panels along the perimeter and directly along the hips and gables must be fastened as specified in TABLE 1 of the Appendix.

* Freeze/Thaw

Use ice and water shield as specified in local codes for cold climate conditions.

* Ventilation

Ensure proper attic ventilation as prescribed per local codes.

Roof Panel Estimating

Estimating METSTAR Panel

To compensate for losses from cutting panels at ridge, rake, and hip intersections, an appropriate amount of panels must be added when calculating.

1. Measure square feet of roof area without loss. (Item 1)
2. Measure length of all hips and valleys and multiply the sum by a factor of 2. (Item 2)
3. Add together Item 1 + Item 2 = Total Panel Area (Item 3)
4. Total Panel Area plus waste = Item 3 times 1.1 (Item 4)
5. Total roof squares required = Item 4 / 100 (Item 5)
6. Overall number of panels needed = Item 5 times panels per roof square. (See table at right for panels per square). Always round up to the next full panel.

METSTAR Roof Panel	Panels per roof square
Tile FR	2.11*0.093*100=19.6
Shake FW	
Slate FD	
Tile 2 FZ	
Slate MF	

* Example (Shake FW)

1. Roof Area (Item 1) = 2,000 sq. ft.
2. Hip + Valley Length = 180 ft.
   Item 2 = 180 * 2 = 360
3. Item 3 = 2000 + 360 = 2,360 sq. ft.
4. Item 4 = 2360 * 1.1 = 2,596 sq. ft.
5. Item 5 = Item 4 / 100 = 25.96 sqs .
6. Overall number of panels needed:
   = 25.96 times 19.6 = 509 panels

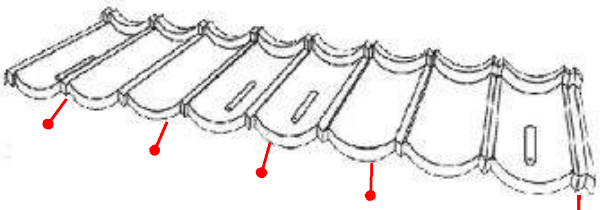
- 1 roofing square = 100 square feet
- 1 square foot = 0.09290304 square meters

Fastening

Fasteners

All fasteners must be corrosion-resistant. Nails must comply with ASTM F1667 Wood screws must comply with ANSI/ASME Standard B18.6.1. Sheet metal screws must comply with ANSI/ASME Standard B18.6.4.

Refer to the TABLE 1 in the Appendix for the number and location of fasteners.



Front Nose Fastening Position
Five Fasteners

Overlap

* With one fastener at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.

Front Nose Fastening Position
Twelve Fasteners

Overlap

* With two fasteners at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.

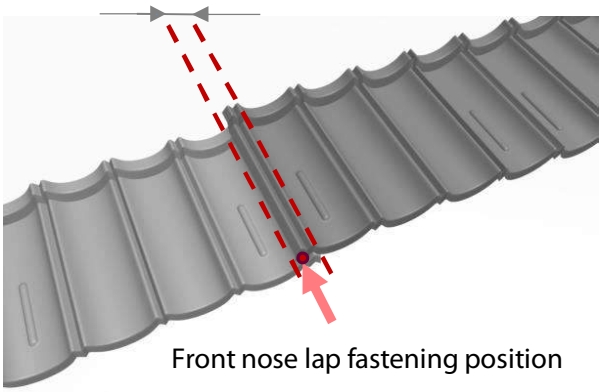
Fastening Panels to Battens

Fasteners specified in Table 1 of the Appendix shall be installed through the front nose of the upper panel and the back upturn of the lower panel into the vertical face of the batten.

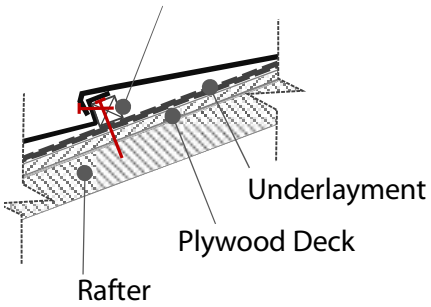
Care must be taken while fastening to avoid striking the finished panel surfaces.
Damaged surfaces can be refinished by using a METSTAR Finishing Kit.

The first course is set by overlapping panels side to side. The next course is set by overlapping over the back of first course, making sure to stagger lay the second course so the panel side laps do not line up.
The fastener in the side lap position is marked in red in the illustration below. Make sure to always place one fastener through the front nose of both panels at the side lap. Refer to the Panel overlap on next page for each METSTAR roof panel type. All fasteners are spaced across the panel as marked in red above.

Lap = see next page for each Panel Type



Front nose lap fastening position



Warning

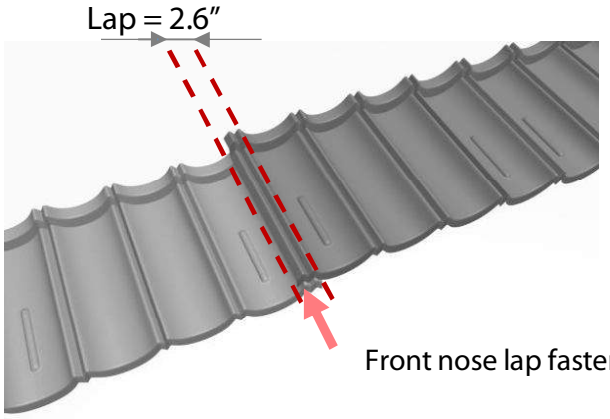
Avoid fastening in places with electrical wiring above or below.

Roof Panel Overlaps

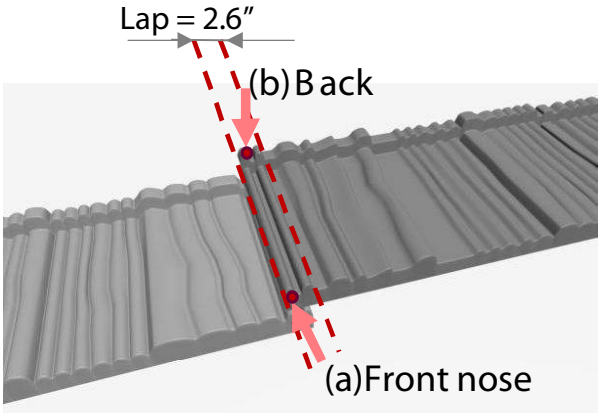
Panel Overlap

Install the fasteners at the positions on the left of the panel leaving the final fastening position, on the far right of the panel, without a fastener. Properly lap the next panel to the right of the panel and fasten both panels into the batten with one fastener through the nose at the front.

Tile FR METSTAR
Tile 2 FZ METSTAR

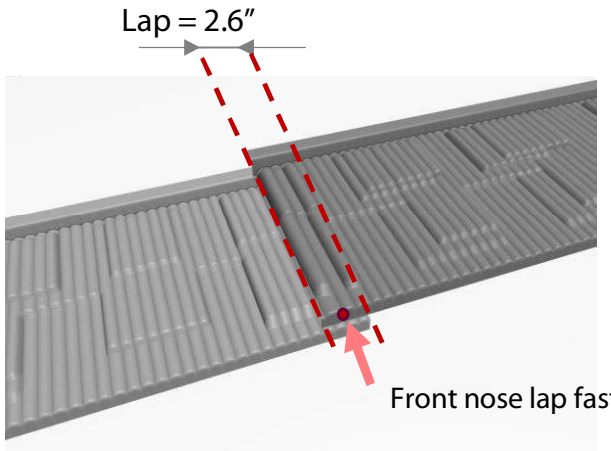


Shake FW METSTAR

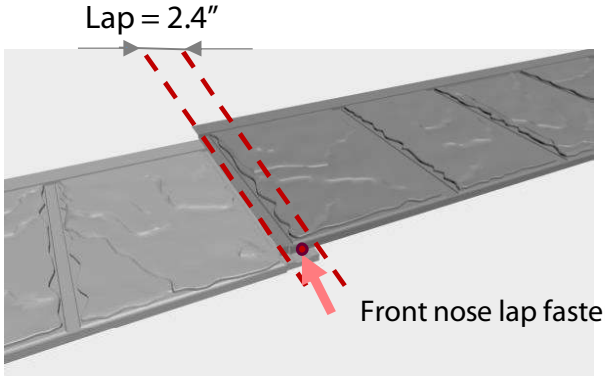


(a) Overlap and place fastener at front downturn and penetrate both panels at the lap.
(b) Back is fastened through both panels vertically into the deck.

Slate FD METSTAR



Slate MF METSTAR



Setup Battens

Batten Installation

Battens are wood 2 x 2 nominal size standard grade Douglas fir-larch or better.
Battens may be installed over counter battens or direct to deck. Panel batten spacing is critical.
Each panel's front nose overlaps tightly against the back upturn of the next panel. Fasten battens to the deck with nails or screws according to the wind requirements.

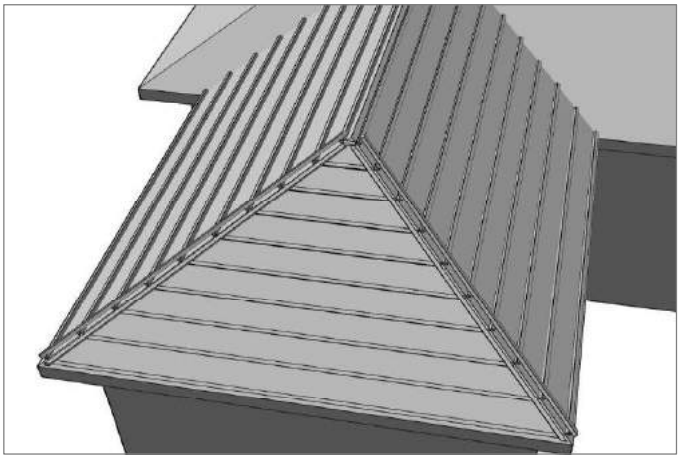
Recommended batten spacing is 2 mm(1/16") less than the panel width of cover for proper setup. Panel battens are installed parallel to the ridge/fascia spaced 368 mm (14 -1/2 inches) on center for all System 1 profiles in this guide.

Fasten battens with fasteners spaced at a maximum of 24" on center into rafters . Position the first batten at the edge of the fascia board parallel with the ridge. Position the second and following battens spaced as described above and shown in the TABLE below. The last batten near ridge is positioned to fit the ridge cap.

At hips, install 2 x 2 vertically over the horizontal batten, adjust the spacing to fit the Caps.
At the ridge, adjust the spacing to fit the Caps.

It is recommended to use a Batten Spacer. Check batten spacing for accuracy with a tape measure.

In high wind areas additional fasteners are required for battens as shown in Table 1 of the Appendix.

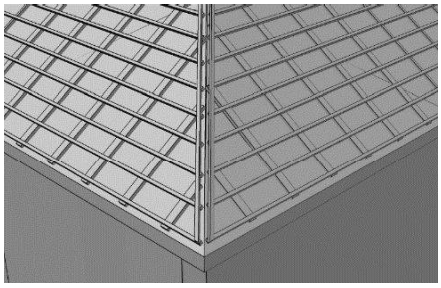


METSTAR ROOF Panel type	Batten Distance o.c.
Tile FR	368 mm (14 -1/2")
Tile 2 FZ	
Shake FW	
Slate FD	
Slate MF	

Counter Battens

Use counter battens when installing over an irregular surface, hard surface, or existing roof. Position nominal size 1 x 4 counter battens over the roof framing members or rafters (no more than 24" on center), and secure using nails or screws as required by local code for local wind conditions. After counter battens, install horizontal battens for METSTAR panels setup as described above.

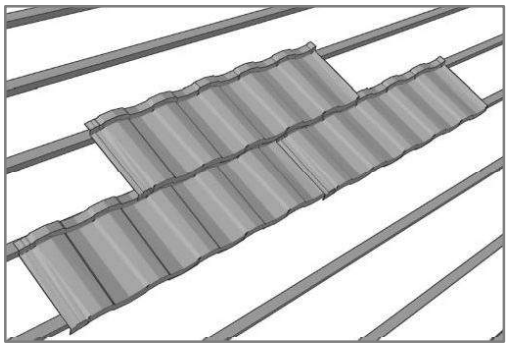
To provide a solid nailing position, the existing roof is cut back around the perimeter . The new wood buildup conforms on top of the existing roof. Consult local building code.



Roof Panel Installation

METSTAR Panel Installation

Panels, fitted from left to right, across the roof, and up towards the ridge. The panels can be overlapped either right to left or left to right, or both, depending on which profile and what looks best when viewing the roof. Fasten through the nose of the panels, one course at a time, working up the roof.
At the lower vertical face of each batten, panels in the upper course must lap panels in the lower course.
Lap each panel according to the side lap width. (See Panel Overlap page 13.)
The fasteners specified in Table 1 of the Appendix must be installed through the panels into the batten.



Stagger installation

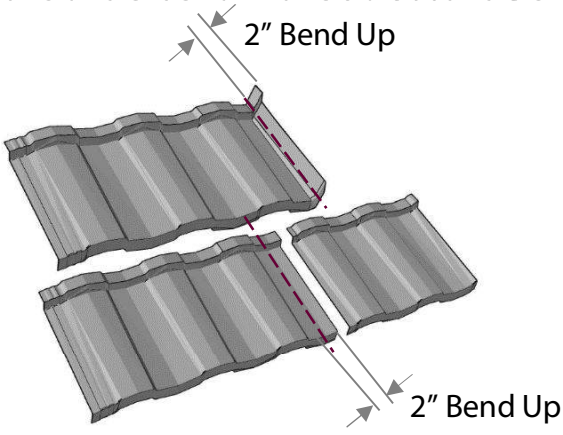
It is better if you do not install panels vertically up the roof or use even panel offsets, this will detract from the appearance of the roof. Staggering is recommended but not required.

Panels Installation at Rake / Gable, Valley, Ridge and Hips

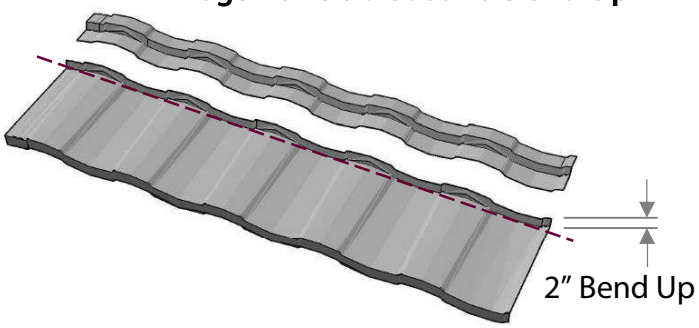
Proper drainage will be attained by removing a portion of the panel at the front, back, or side.
Lay panels starting left, Cut, bend and fit to the Batten. Recommended bend width is 2".
Fit the panel into place and fasten.
Fasten at the bent portion into batten, and use sealant if needed.

At both sides of the hips, cut METSTAR panels to fit into the hip batten and make a 2 " bend up.
At the ridge, cut METSTAR panels to fit into the ridge batten and make a 2 " bend up.
At the valley, cut METSTAR panels to fit tightly into the valley and make a 2 " bend down.
At the rakes/gables, cut METSTAR panels to fit into the rake/gable batten and make a 2 " bend up.

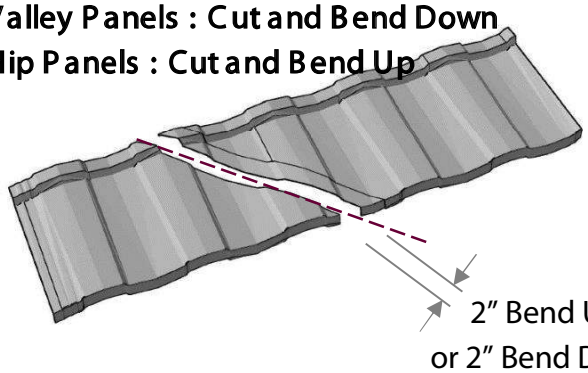
Rake and Sidewall Panels : Cut and Bend Up



Ridge Panels : Cut and Bend Up



Valley Panels : Cut and Bend Down
Hip Panels : Cut and Bend Up



* Measuring, Cutting and Bending:

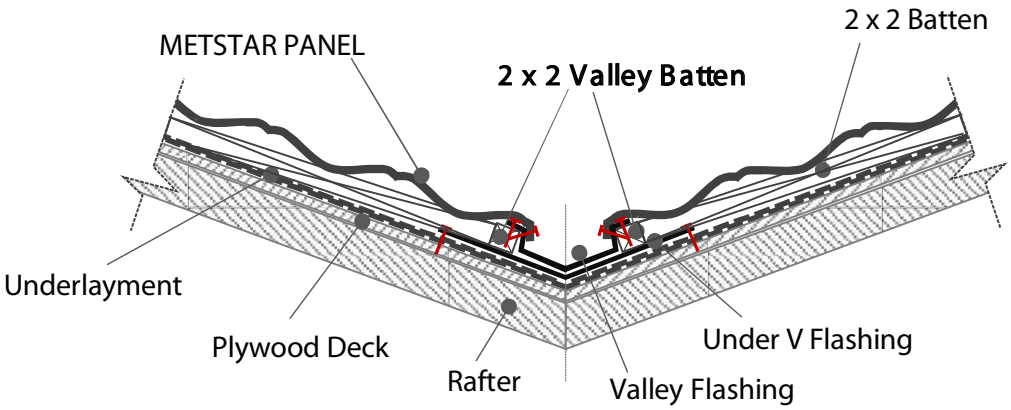
Measurements are made on the roof.
Cutting and bending are conducted on the ground for safety. Panels may be cut with a cutter, tin snips, or circular saw. A hand bender is used.

Valley

Nailing Position , direction

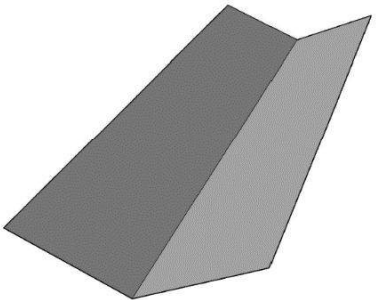
Valley Cross Section Details

Valley installation with Valley Flashing



Before setting valley batten, install Under V Flashing, and finish with sealant.
Install Valley Flashing between Valley Battens.
Fasten the Valley Flashing into the top of the Valley Battens.
Install cut and bent down METSTAR Panel into the Valley Flashing.
Bend width is 2". Make sure bend down is neat and flat.

Under V Flashing

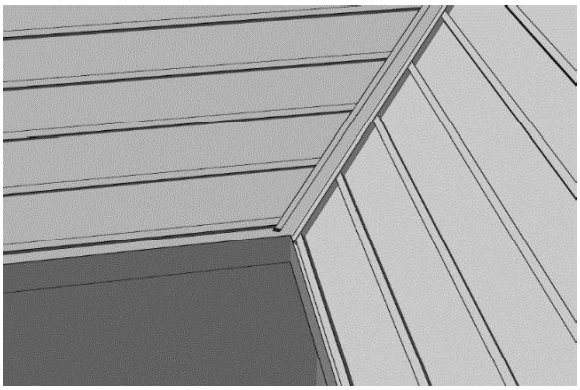


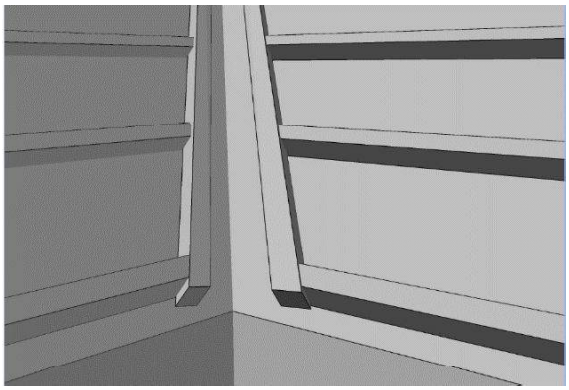
Valley Flashing

Valley Batten installation

Valley Batten distance is to accommodate the valley flashing.
Use 2 x 2 wood battens.
Field roof batten ends must be cut to fit the valley battens at the same level.

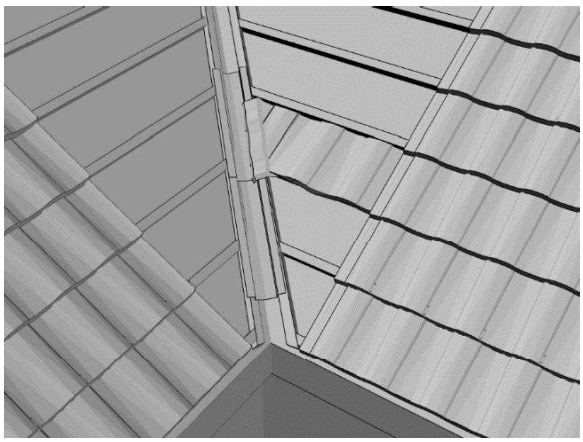
Position the Valley Flashing between the valley battens.

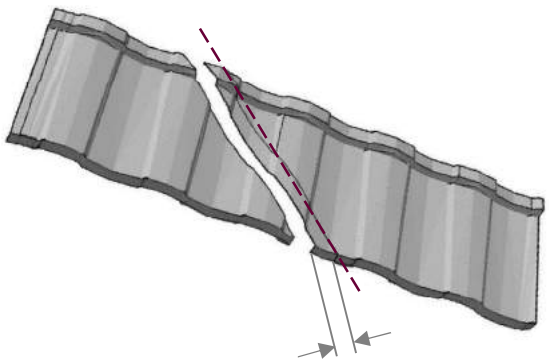




Valley Panel Installation

Valley panels are shaped by measuring, cutting, bending down to conform with roof geometry.
After full panels are laid out in the field, cut and bent panels are to be installed.
Bend down approximately 2" as shown.





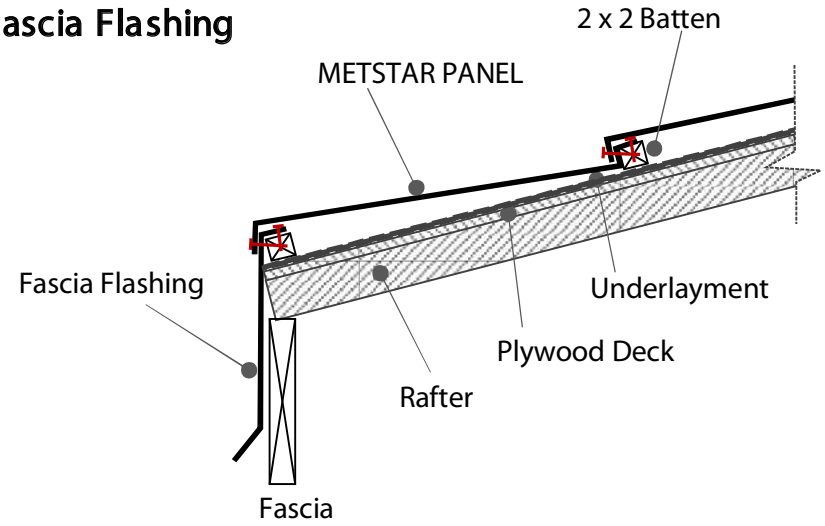
2" Bend Down

Eave

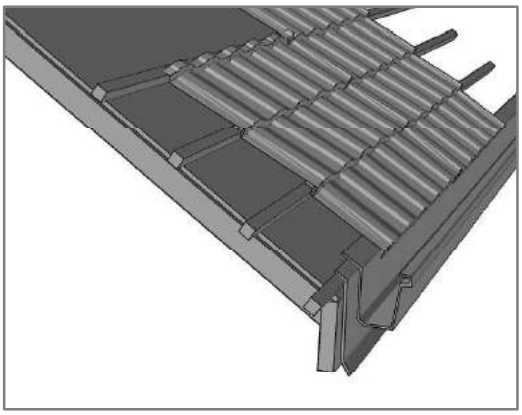
Nailing Position , direction

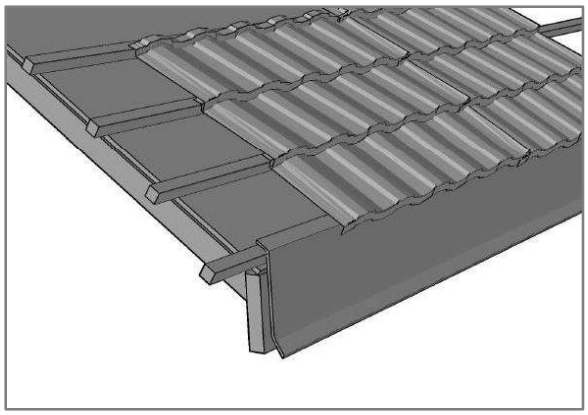
Eave Cross Section Details

Using Fascia Flashing



At the eave, install Fascia Flashing on the batten and fascia.
Install the first course METSTAR panel over the fascia flashing.



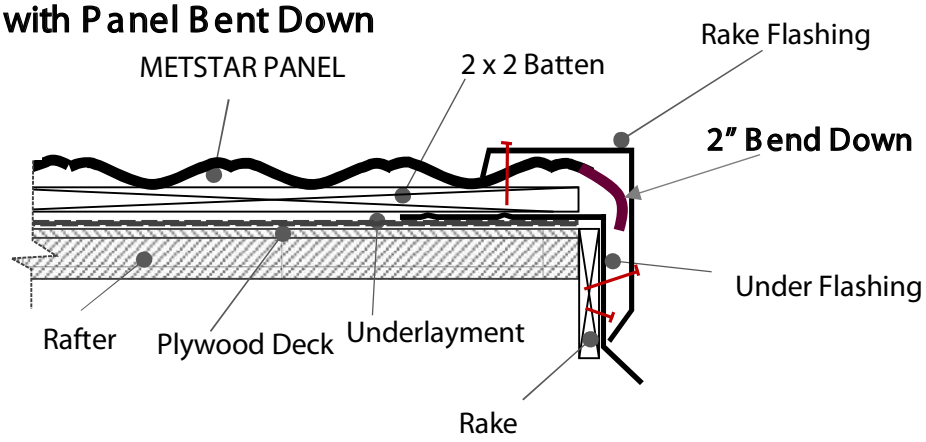


Rake / Gable

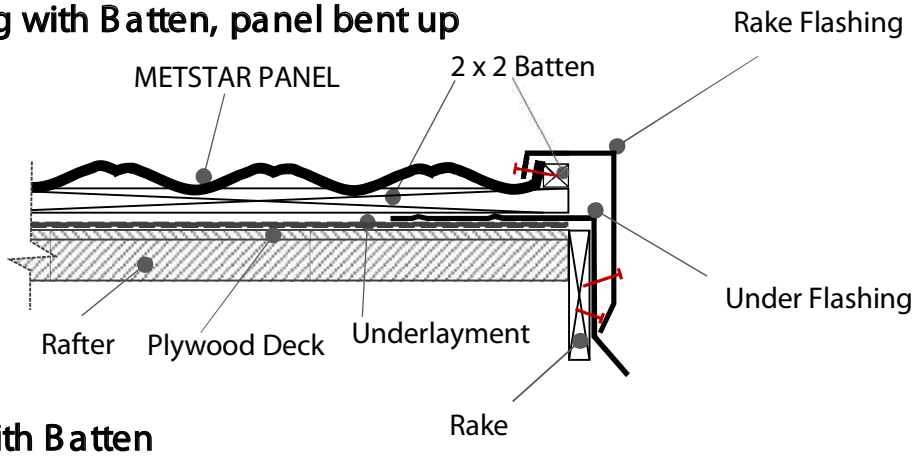
Rake Cross Section Details

Nailing Position , direction

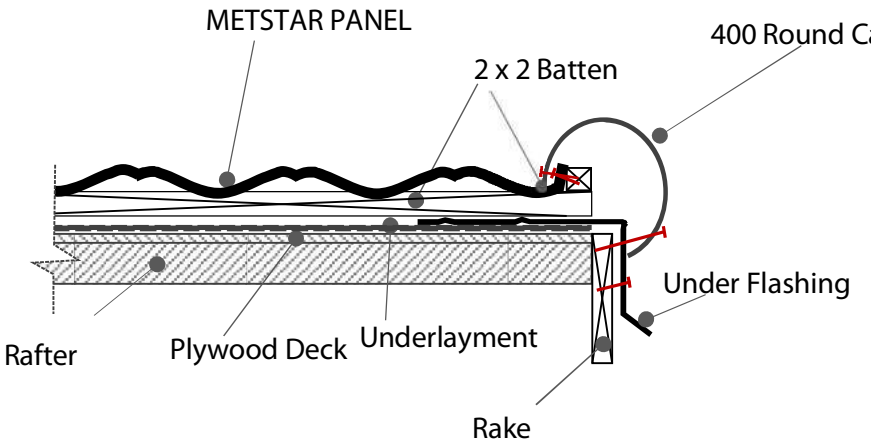
Rake Flashing with Panel Bent Down

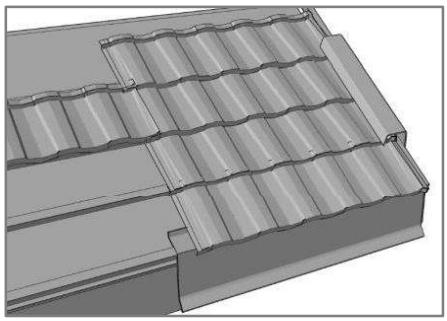


Rake Flashing with Batten, panel bent up

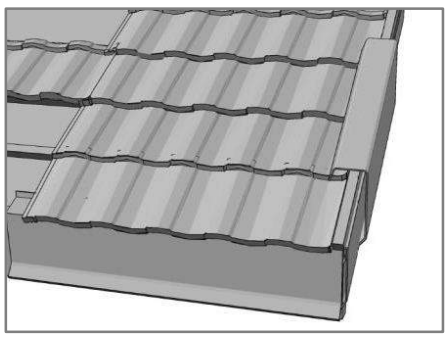


Round Cap with Batten





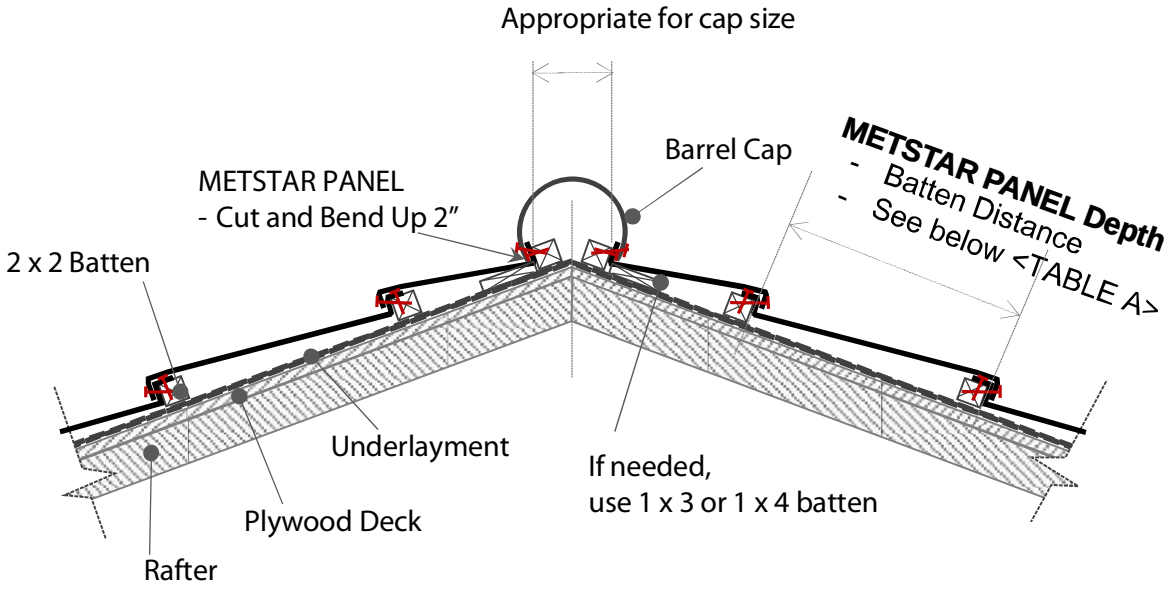
Rake flashings are used to complete the rakes.
Use the specified fasteners to secure them.
Seal the fastener near the top.
Install a 2 x 2 batten along the rake on top of the panel battens. The edge of the METSTAR panels must be bent up to the rake batten so that the part tucked under the rake flashing is long enough to prevent water damage. Position the 2 x 2 vertically just back from the edge of the rake on top of the panel battens to accommodate the proper look and fit.

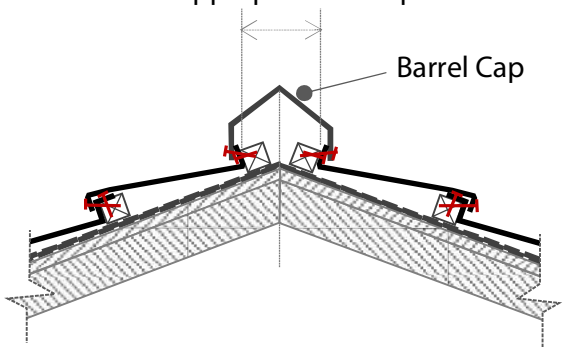


Ridge / Hip

Nailing Position , direction

Ridge Cross Section Details





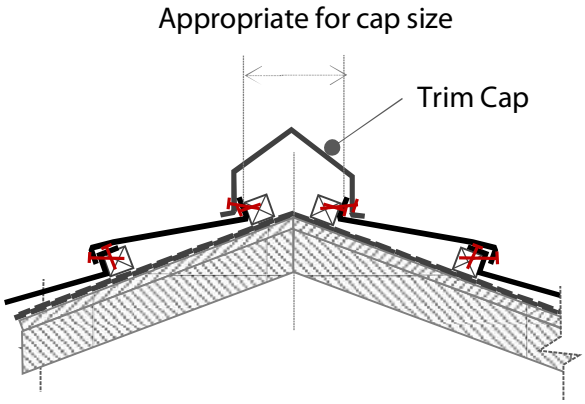
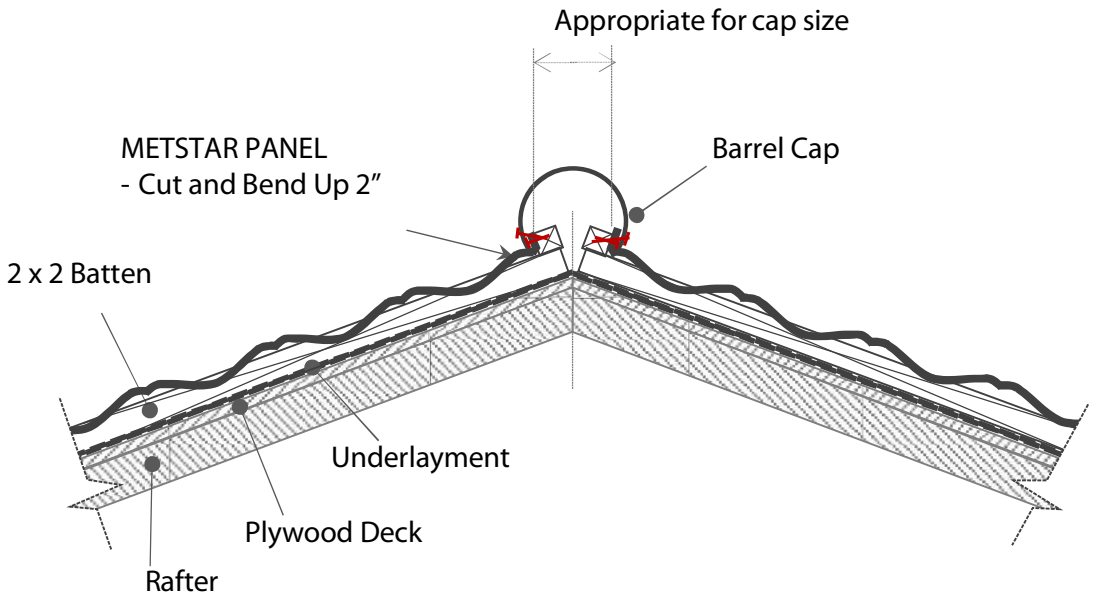


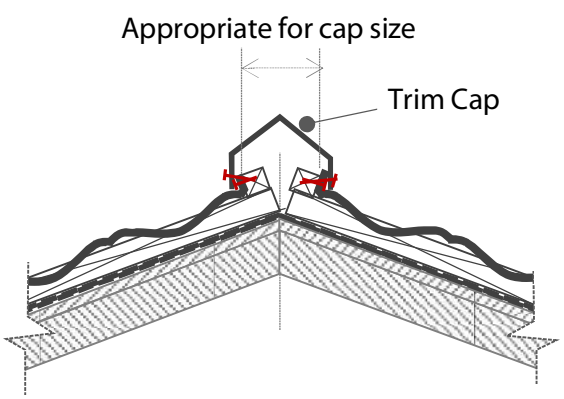
TABLE A : Batten Distance

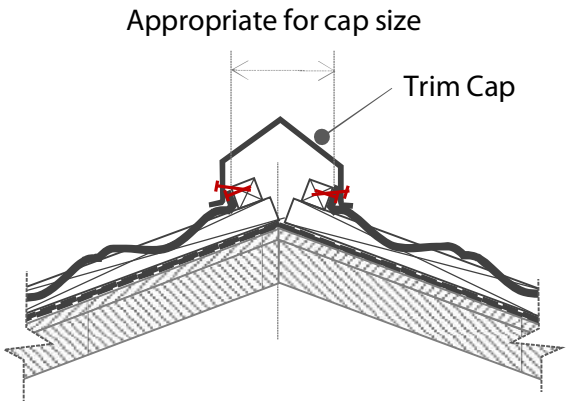
METSTAR ROOF Panel type	Batten Distance o.c.
Tile FR	368 mm (14 -1/2")
Tile 2 FZ	
Shake FW	
Slate FD	
Slate MF	

Hip Cross Section Details

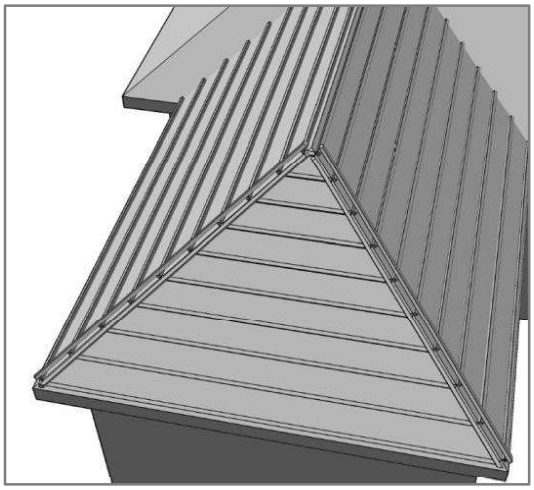
Nailing Position , direction







Ridge & Hip Battens Installation



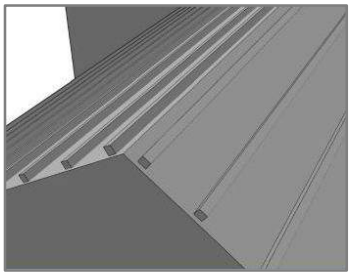
Use 2 x 2 battens

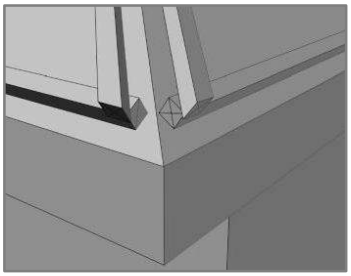
Ridge Battens

Ridge Battens are installed along the ridge. Keep the ridge batten distance for proper cap installation.

Hip Battens

Hip Battens go over horizontal battens along the hip.
Run a 2 x 2 batten vertically up the battens next to the hip
Keep the hip batten distance for proper cap installation.





Ridge / Hip Panels Install

Panels will be cut and bent up against the ridge and hip battens.
After cutting the panels, make a 2″ bend up that will run along the 2″ x 2″ batten.
Caps will be installed at the Hip and Ridge Battens.

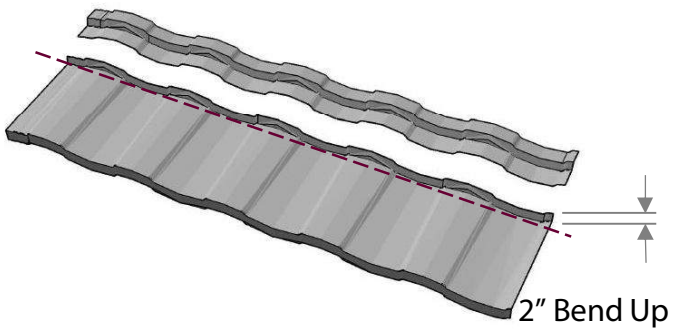
Ridge Panels

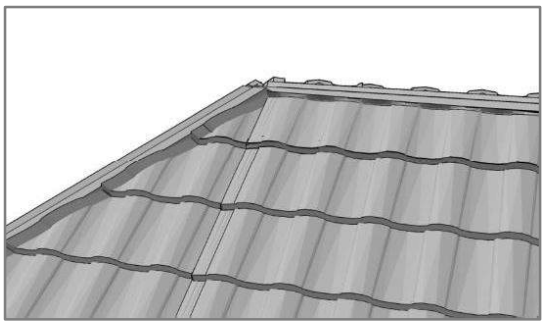
Panels at ridge require cut and bend up.
Bend all ridge panels.
Measure before cut and bend.
Bend up 2" and fasten against the ridge batten.

Hip Panels

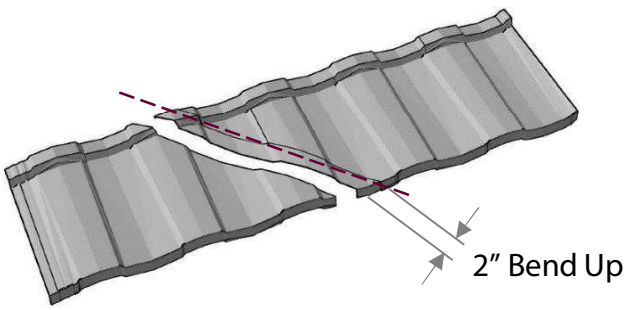
Panels at hip will be cut and bent up.
Install in a similar way to ridge panels.

Ridge Panels : Cut and Bend Up





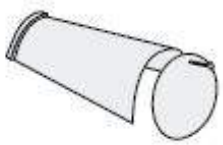
Hip Panels : Cut and Bend Up

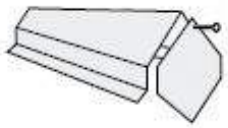


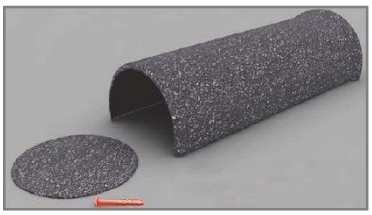
Ridge and Hip Cap Installation

Hip Ridge Start/End
Install hip caps from the bottom upwards.
The first cap is assembled with its end cap.
Fasten to hip or ridge battens at each side of the cap.

#9 x 1 ½"long, ¼"diameter head hex -head screws shall be used to fix cap, one screw on each side.

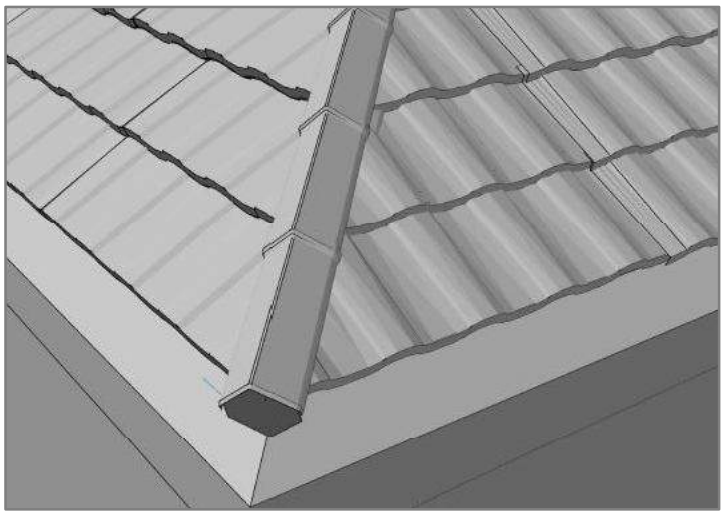




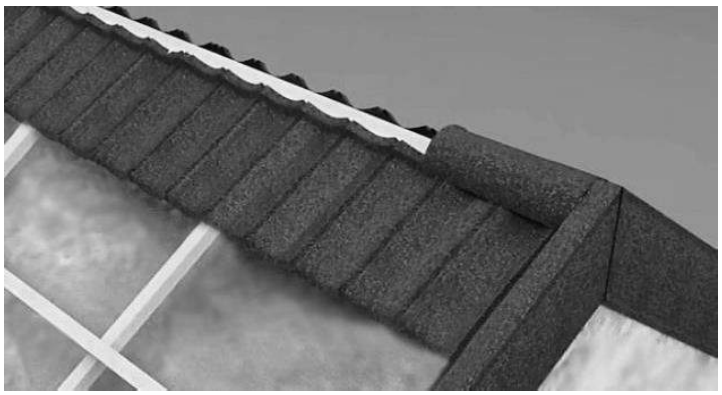


Cap

Cap End

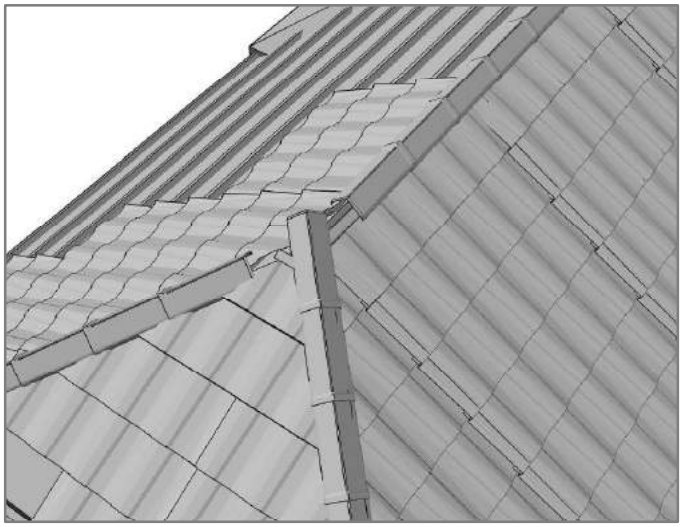


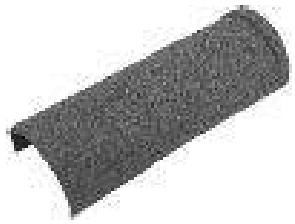
When installing the hip cap, the first hip cap is assembled with hip cap end according to the illustration.
Install it on the battens at the bottom of the hip, then the second hip is added over the first cap, and so forth.



After finishing the rake installation, install the first ridge cap.
Cut the ridge cap to fit rake shape, attach ridge cap end if needed.
Finish with sealant.

Ridge / Hip Intersection Cap Install

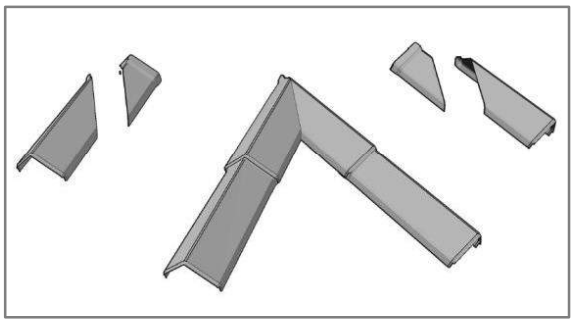




Install hip caps from the bottom.
At the ridge/hip intersection, cut and fit as shown below.

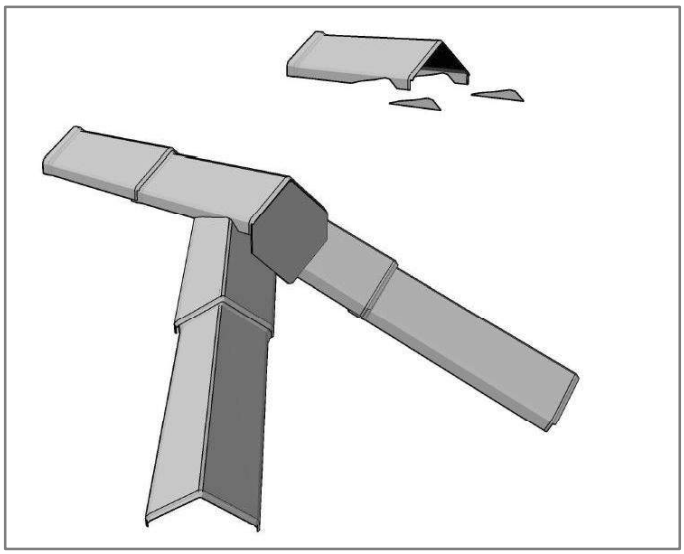
After fastening, seal the seams with sealant and touch-up kit.

Trim Hip Caps



As hip caps meet, cut caps symmetrically to fit, and set up them.
Cut the ridge cap end to fit this assembly.
After setting up, finish with sealant.

Trim Ridge Cap

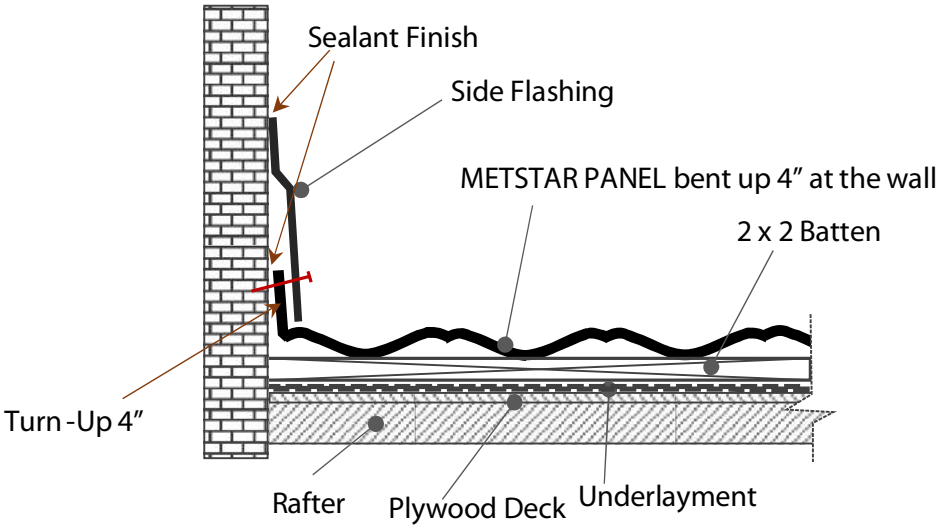


Roof -To-Wall

Roof -To-Wall Cross Section Details

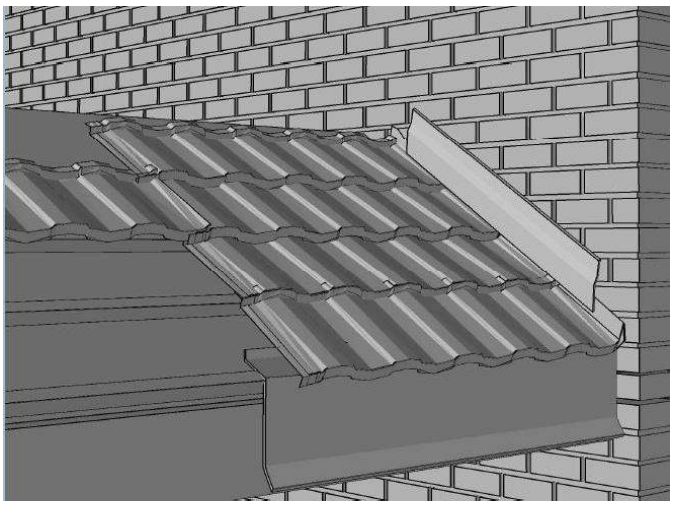
Nailing Position , direction

Roof to Side Wall



In the case of a roof to vertical side wall boundary, connect the METSTAR Panel with the vertical wall and finish vertical wall with Side Flashing.
If there is a valley in which water flows at the boundary with the vertical wall, install a gutter.

At the wall bend the METSTAR Panel up 4".
Seal turn up against the wall and seal Side Flashing before applying to wall with roofing grade sealant.



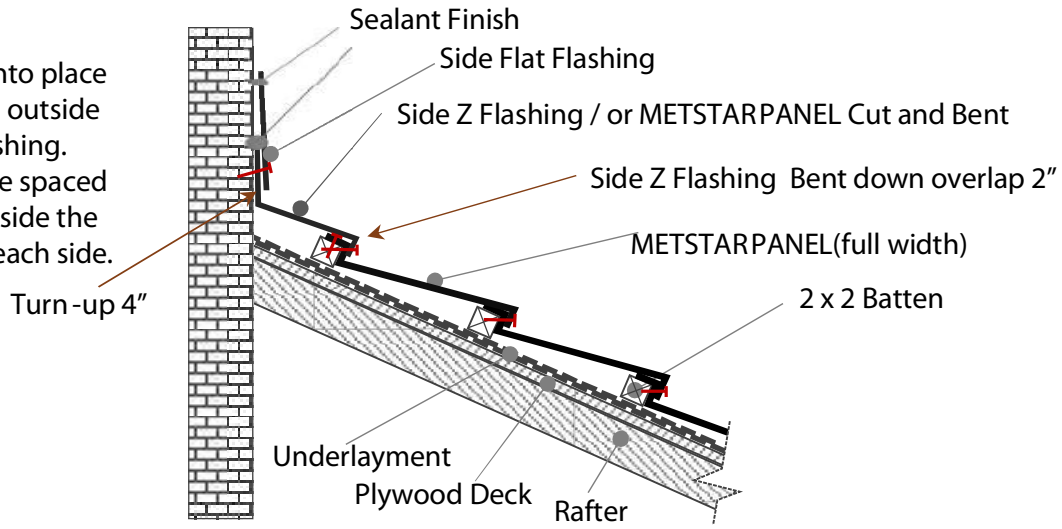
Roof -To -Wall Cross Section Details

Nailing Position , direction

Roof to Head Wall

Insert the top edge of the roof tile or a piece of sheet metal such as Side Z Flashing inside the Side Flat Flashing.

Lock the panel into place and screw down outside the Side Flat Flashing. Screws should be spaced every 6" and outside the last turn -up on each side.



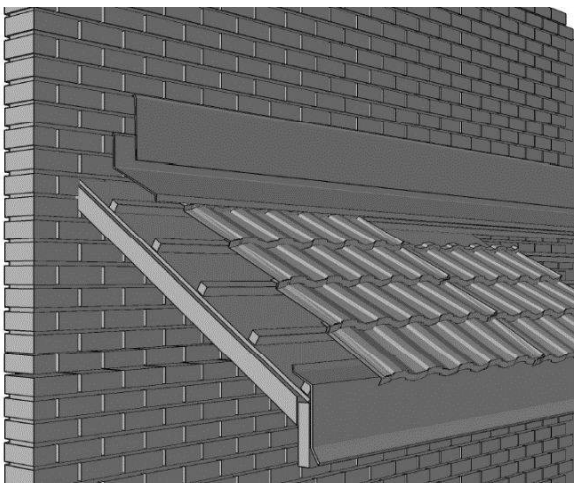
METSTAR PANEL Cut and Bent

Start by measuring from the full panel below the wall. Cut METSTAR panels to fit this area allowing for a minimum of a 4" turn-up at the top to the wall. Bend each panel up against the head wall and fasten the panel to the head wall. For siding, tuck the panel metal underneath the siding and seal with sealant. Apply sealant to the Side Flashing before attaching to the wall.

Side Z Flashing

Insert Side Z Flashing inside the side flashing.
Make a 2" overlap at the front where the panel fits into the METSTAR Panel.

Start at the eave. Work the METSTAR Panel behind stucco or wood siding whenever possible or surface mount to the wall for surfaces like brick and seal with wall flashing. Overlap the METSTAR Panel at least 2" working up the roof.

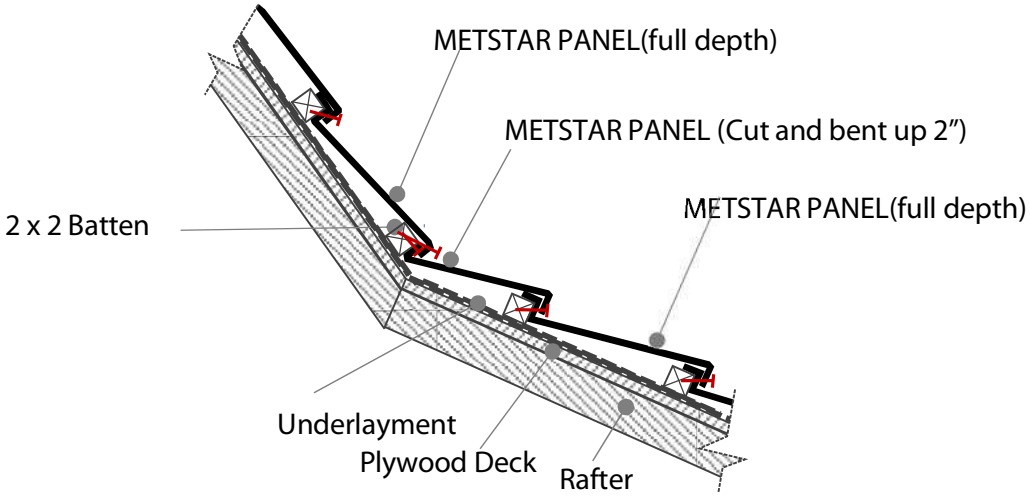


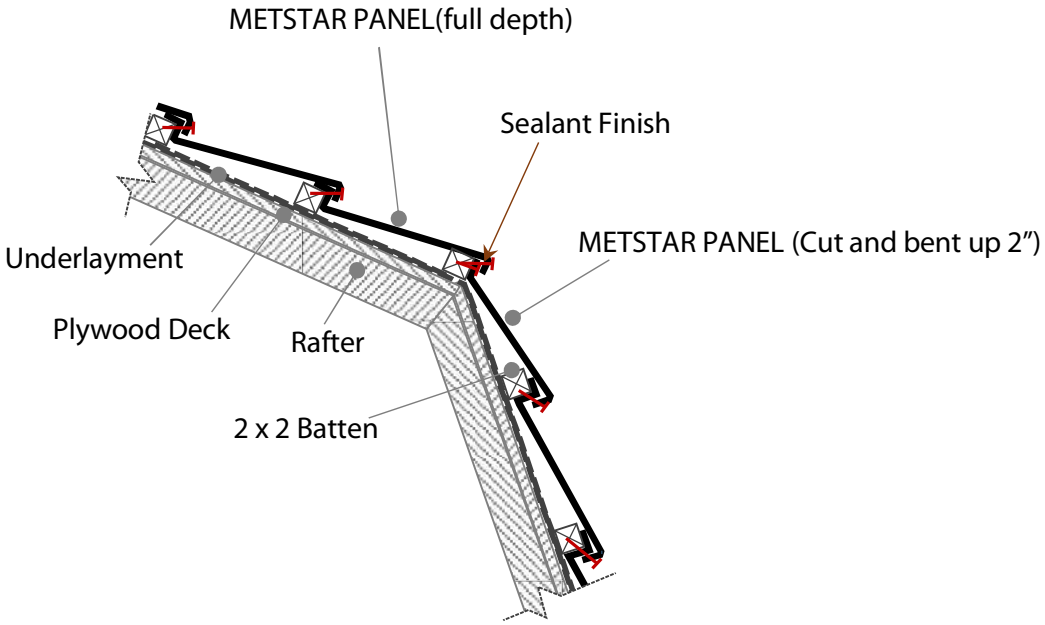
Change of Pitch

Nailing Position , direction

Change of Pitch

Above the pitch change, keep the batten distance for full panels, and install a full panel. Immediately below the pitch change, the batten distance is reduced, to maintain spacing so the eave panel is a full panel. In this narrower batten spacing, panels are cut and bent up 2.

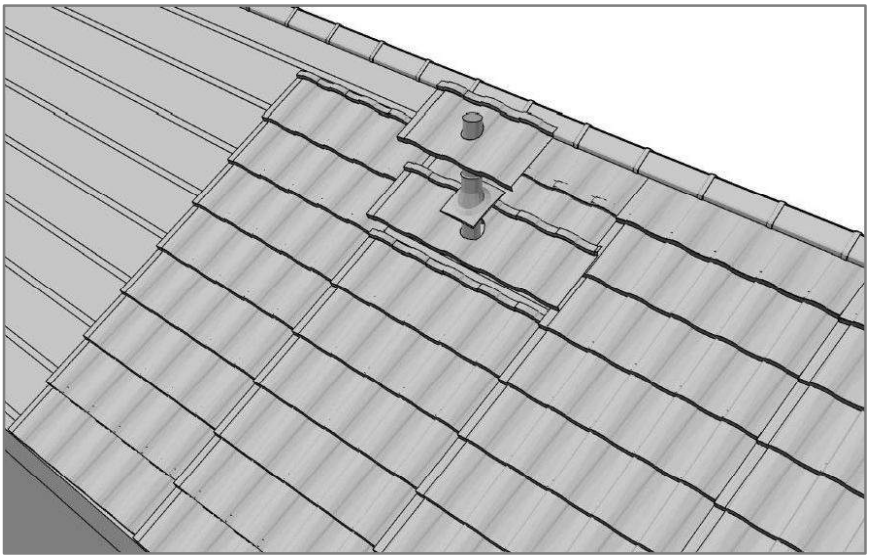


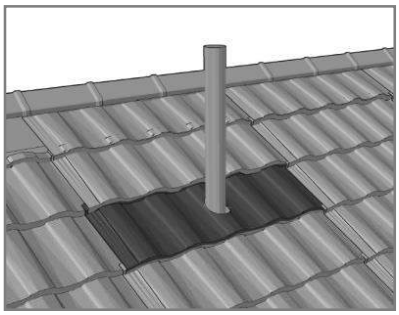


Penetration

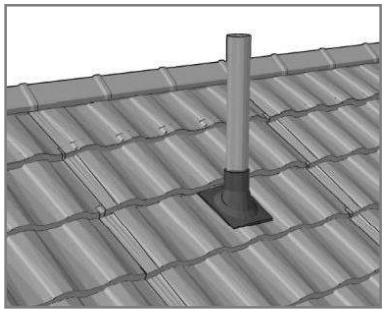
Pipe Penetration

When a METSTAR panel meets a pipe, it is important to keep a tight fit around the pipe.
METSTAR panels sandwich the pipe flashing. Standard galvanized pipe flashing is recommended.
Roof penetrations are to be flashed with standard roof jacks and flashings as required by local codes.

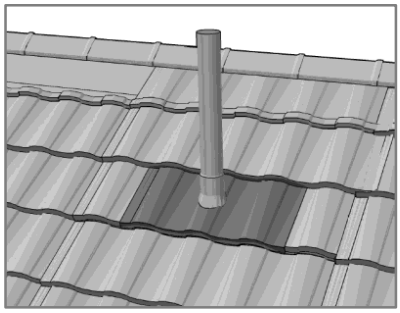




(1) Install the full panels around the pipe by cutting a hole larger than the pipe.



(2) Slide the pipe flashing over the pipe and seal it onto the panel face.



(3)Fit a half cut of METSTAR panel with a hole over the flashing.

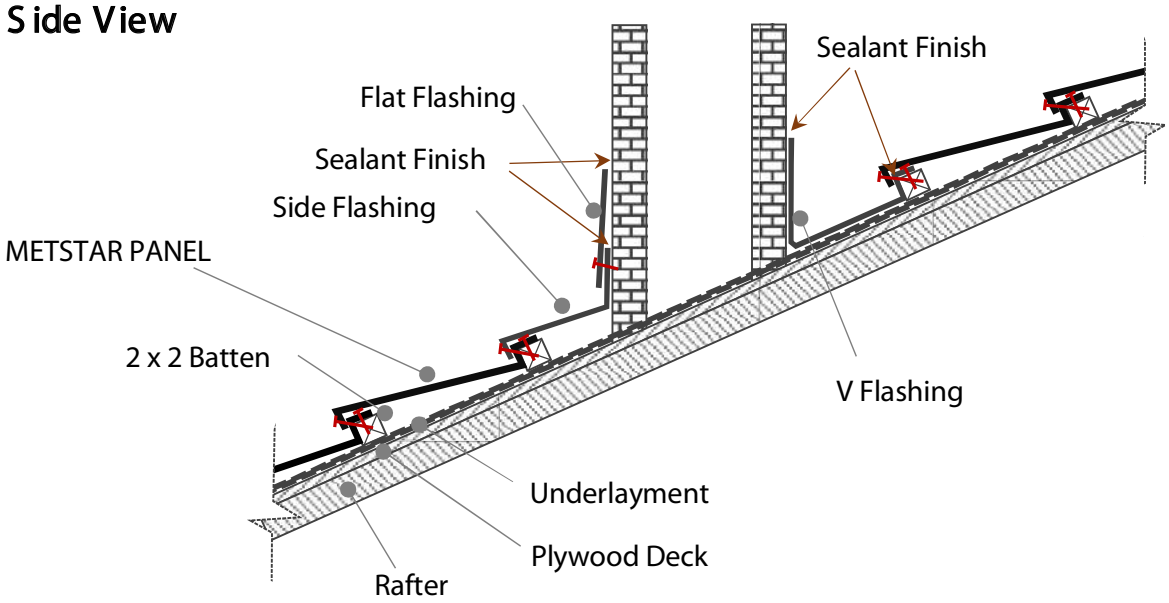
Seal around base using a roofing grade sealant/adhesive and finish with METSTAR Finishing Kit.

Chimney

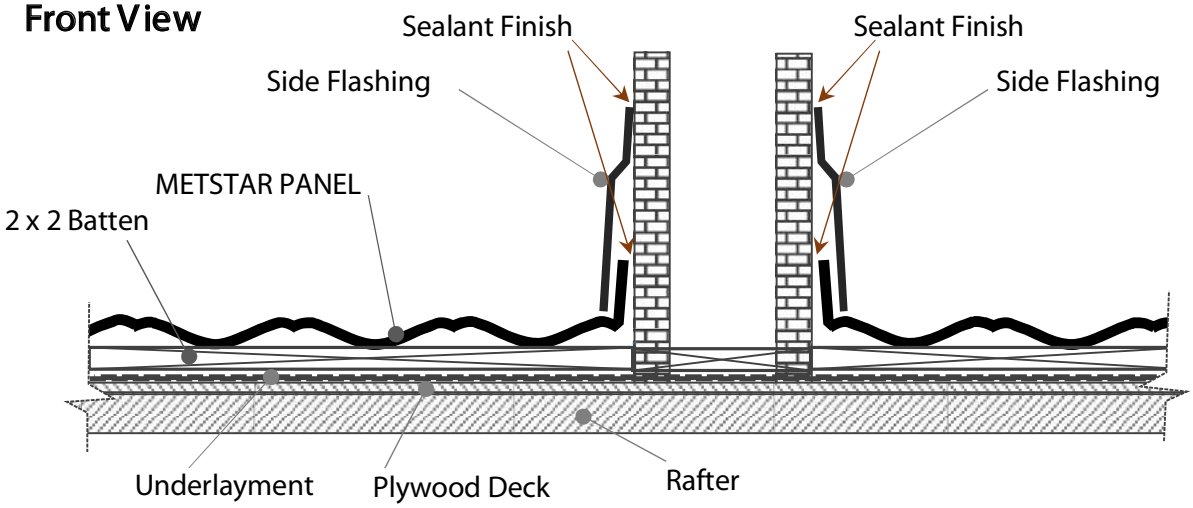
Nailing Position , direction

Chimney Cross Section Details

Side View



Front View



Run full panels around the chimney. All the open areas will be filled in with cut and bent panels that have been bent up 2" toward the chimney. Measure the width and add 2" for bending up. Start from the lower part of chimney.

1) From the full panel below the chimney up to the base of the chimney. Cut panel to fit this area.
2) Install panels to fit the left and right sides of the chimney .
3) Finally, above the chimney, install the chimney saddle to fit.

If the chimney is wide, build a cricket to divert water around the chimney.

Finishing and Maintenance

Installation Labor
It is recommended to have a minimum of two experienced roofers on the job.

Foot Wear
To avoid surface damage and provide greater traction for safety, soft soled footwear or rubber soled athletic shoes are recommended.

Foot Traffic
When working on the finished roof, be careful to walk on the front edge of the panels in the middle of lower sections, placing your weight on the ball of your foot. If installing over battens, walk directly over the battens.

Sealants
For flashing and wall finishing, use a roofing grade sealant or adhesive which can be covered by the METSTAR Panels or with matching stone granules. Sealant should not be used to refinish damaged panel surfaces. Use METSTAR Finish Kit to repair any surface damage of METSTAR Panel.

Finishing and Maintenance
After installation is completed be sure to clean all debris off of the roof, especially any metal shavings.
In cases where it is necessary to touch up or repair a panel, METSTAR Finish Kits are available in all of the colors matching the stone coated panel finishes.

After finishing the panel installation, no kind of painting work shall be conducted unless using extreme care.
After finishing the roof perimeter such as the eave and the rake there shall be no visible battens.
After fastening, in order to prevent water damage, always use roofing grade sealant or adhesive to finish installation.

Ensure flashings are installed properly, sealed well , follow local building codes.
Remove any discoloration from airborne pollutants off roof by washing it .

As a last installation step do a complete inspection of the roof to make sure everything is properly installed, fastened and the roof is clean.

Gutters must be cleaned regularly so that rainwater will drain freely.

Appendix

TABLE 1- Allowable Wind Uplift Pressures

Panel Type	Panel to Batten Fasteners	Batten to Deck Fasteners	Panel Fastener Installation	Allowable Wind Uplift Pressure(psf)
Tile FR Shake FW Tile 2 FZ Slate FD Slate MF	#9 x 1 ½"long, hex-head screws, 5 screws per panel head lap, Maximum spacing 12.6"(320mm)	#10 x 3 ½"long, hex-head screws, Maximum spacing 24"(610mm)		67
Tile FR Shake FW Tile 2 FZ Slate FD Slate MF	#9 x 1 ½"long, hex-head screws, 12 screws per panel head lap, Maximum spacing 7.3"(185mm)	#10 x 3 ½"long, hex-head screws, Maximum spacing 8.3"(211mm)		156*

Please note that ratings with an * are calculated based on increased fastening for edge and corner condition high wind loads. These values can not be tested due to testing equipment limitations (maximum actual pressure attainable is 250 psf)

TABLE 2- Fire Classification Assemblies

Panel Type	Substrate	Barrier Board*	Underlayment	Max. Roof Incline	Roof Class
Tile FR Shake FW Tile 2 FZ Slate FD Slate MF	15/32 in. plywood	Min. ¼ in. thick G-P Gypsum DensDecks ® or min. ½ thick gypsum board.	Underlayment complying with ASTM D226 Type II or ASTM D4869	Unlimited	A
		None	GAF VersaShield Underlayment		

* All gypsum barrier joints to be staggered a minimum of 6 inches from plywood joints.

TABLE 3 – Fastening Pattern

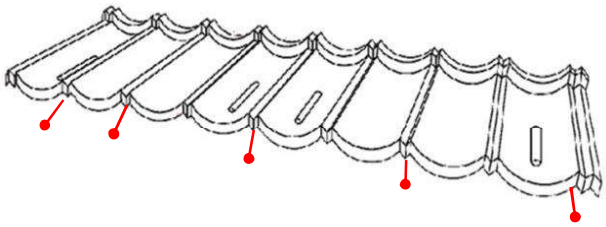
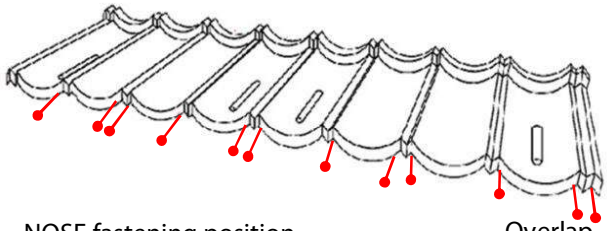
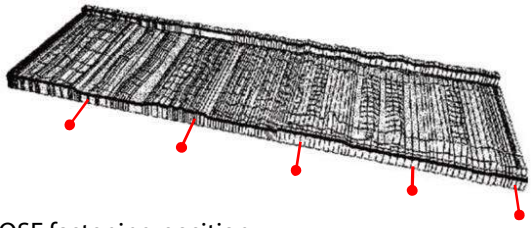
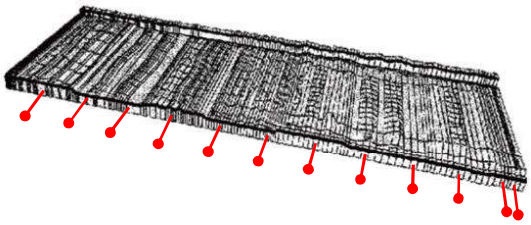
Normal (5 / Panel)	Increased Fastening (12 / Panel)
(1) Tile FR  NOSE fastening position Overlap * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.	(1) Tile FR  NOSE fastening position Overlap * With two fasteners at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.
(2) Shake FW  NOSE fastening position Overlap * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.	(2) Shake FW  NOSE fastening position Overlap * With two fasteners at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.

TABLE 3 – Fastening Pattern

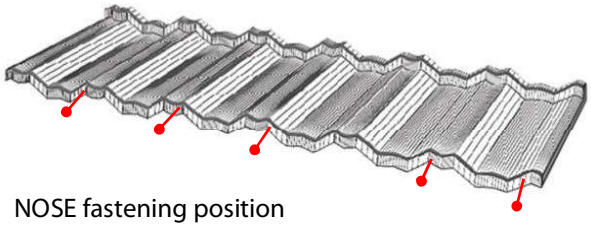
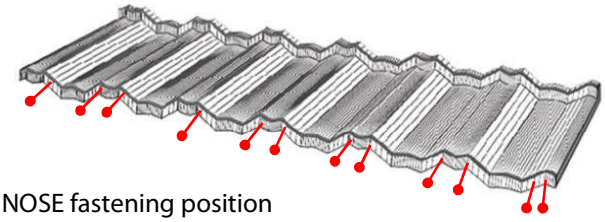
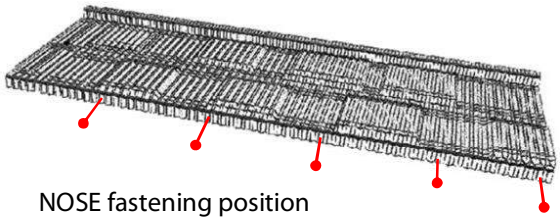
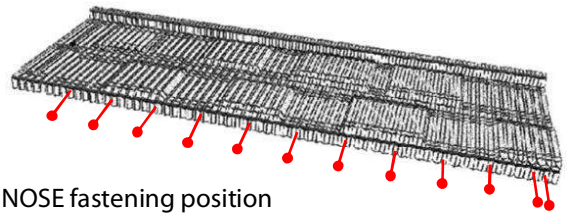
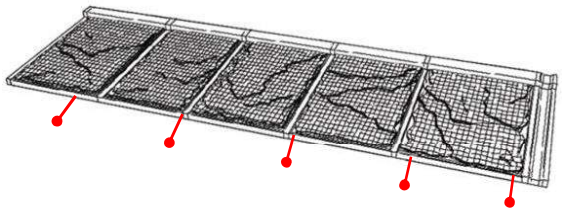
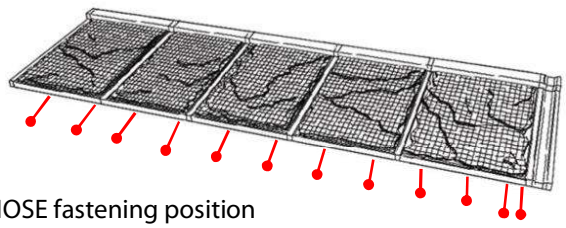
Normal	Increased Fastening
(3) Tile 2 FZ  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible. * Near the place close to batten.	(3) Tile 2 FZ  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible. * Near the place close to batten.
(4) Slate FD  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.	(4) Slate FD  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible in the lower part of the front downturn close to the batten.
(5) Slate MF  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible. * Near the place close to batten.	(5) Slate MF  * With one fastener at the side lap and the remaining fasteners spaced as evenly as possible. * Near the place close to batten.

TABLE 4 - Reference Table from ASCE-7
Required Design Uplift Pressure, p (psf)
EXPOSURE C

Approved September 19, 2007 *ANSI/SPRI WD-1*

Building Category II, Exposure C - 90 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-20.8	-34.8	-52.4
20	-22.1	-37.0	-55.7
25	-23.0	-38.6	-58.1
30	-24.0	-40.2	-60.5
40	-25.5	-42.8	-64.4
50	-26.7	-44.7	-67.3
60	-27.6	-46.3	-69.7
70	-38.4	-60.3	-82.1
80	-39.7	-62.2	-84.8
90	-40.6	-63.7	-86.9
100	-41.2	-64.7	-88.2
120	-43.0	-67.5	-91.9
140	-44.6	-69.9	-95.3
160	-45.5	-71.4	-97.3
180	-46.9	-73.7	-100.4
200	-47.9	-75.1	-102.4
250	-50.1	-78.6	-107.1
300	-52.1	-81.8	-111.5
350	-53.7	-84.3	-114.9
400	-55.3	-86.8	-118.3
450	-56.7	-89.0	-121.3
500	-58.0	-91.0	-124.0

Building Category II, Exposure C - 100 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-25.7	-43.1	-64.8
20	-27.2	-45.6	-68.7
25	-28.4	-47.6	-71.7
30	-29.6	-49.7	-74.8
40	-31.4	-52.7	-79.3
50	-32.9	-55.2	-83.2
60	-34.1	-57.3	-86.2
70	-47.3	-74.3	-101.2
80	-48.9	-76.8	-104.7
90	-50.2	-78.7	-107.3
100	-51.0	-80.0	-109.0
120	-53.0	-83.2	-113.4
140	-55.0	-86.3	-117.7
160	-56.2	-88.2	-120.3
180	-57.8	-90.8	-123.7
200	-59.1	-92.7	-126.3
250	-61.9	-97.1	-132.4
300	-64.3	-100.9	-137.6
350	-66.3	-104.1	-141.9
400	-68.4	-107.3	-146.2
450	-70.0	-109.8	-149.7
500	-71.6	-112.4	-153.2

Building Category II, Exposure C -110 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-31.1	-52.1	-78.5
20	-32.9	-55.2	-83.1
25	-34.4	-57.7	-86.8
30	-35.8	-60.1	-90.5
40	-38.0	-63.8	-96.0
50	-39.8	-66.9	-100.6
60	-41.3	-69.3	-104.3
70	-57.3	-89.9	-122.5
80	-59.2	-93.0	-126.7
90	-60.7	-95.3	-129.8
100	-61.7	-96.8	-131.9
120	-64.1	-100.6	-137.2
140	-66.6	-104.5	-142.4
160	-68.0	-106.8	-145.5
180	-70.0	-109.9	-149.7
200	-71.5	-112.2	-152.9
250	-74.9	-117.5	-160.2
300	-77.8	-122.1	-166.5
350	-80.3	-126.0	-171.7
400	-82.7	-129.8	-176.9
450	-84.7	-132.9	-181.1
500	-86.6	-136.0	-185.3

Building Category II, Exposure C -120 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-37.0	-62.0	-93.4
20	-39.1	-65.7	-98.9
25	-40.9	-68.6	-103.3
30	-42.6	-71.5	-107.7
40	-45.2	-75.9	-114.2
50	-47.4	-79.6	-119.7
60	-49.2	-82.5	-124.1
70	-68.1	-107.0	-145.8
80	-70.5	-110.6	-150.8
90	-72.2	-113.4	-154.5
100	-73.4	-115.2	-157.0
120	-76.3	-119.8	-163.2
140	-79.2	-124.3	-169.5
160	-81.0	-127.1	-173.2
180	-83.3	-130.7	-178.2
200	-85.0	-133.5	-181.9
250	-89.1	-139.9	-190.6
300	-92.6	-145.4	-198.1
350	-95.5	-149.9	-204.3
400	-98.4	-154.5	-210.6
450	-100.8	-158.2	-215.6
500	-103.1	-161.8	-220.5

Building Category II, Exposure C - 130 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-43.4	-72.8	-109.6
20	-45.9	-77.1	-116.0
25	-48.0	-80.5	-121.2
30	-50.0	-83.9	-126.3
40	-53.1	-89.1	-134.1
50	-55.6	-93.4	-140.5
60	-57.7	-96.8	-145.7
70	-80.0	-125.5	-171.1
80	-82.7	-129.8	-176.9
90	-84.8	-133.0	-181.3
100	-86.1	-135.2	-184.3
120	-89.5	-140.6	-191.6
140	-93.0	-145.9	-198.9
160	-95.0	-149.1	-203.3
180	-97.8	-153.4	-209.1
200	-99.8	-156.7	-213.5
250	-104.6	-164.2	-223.7
300	-108.7	-170.6	-232.5
350	-112.1	-176.0	-239.8
400	-115.5	-181.3	-247.1
450	-118.3	-185.6	-253.0
500	-121.0	-189.9	-258.8

Building Category II, Exposure C - 140 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-50.3	-84.4	-127.1
20	-53.3	-89.4	-134.6
25	-55.7	-93.4	-140.6
30	-58.0	-97.4	-146.5
40	-61.6	-103.3	-155.5
50	-64.5	-108.3	-163.0
60	-66.9	-112.3	-169.0
70	-92.8	-145.6	-198.4
80	-95.9	-150.6	-205.2
90	-98.3	-154.3	-210.3
100	-99.9	-156.8	-213.7
120	-103.9	-163.0	-222.2
140	-107.8	-169.2	-230.6
160	-110.2	-173.0	-235.7
180	-113.4	-177.9	-242.5
200	-115.7	-181.7	-247.6
250	-121.3	-190.4	-259.5
300	-126.1	-197.9	-269.7
350	-130.0	-204.1	-278.1
400	-134.0	-210.3	-286.6
450	-137.2	-215.3	-293.4
500	-140.3	-220.3	-300.2

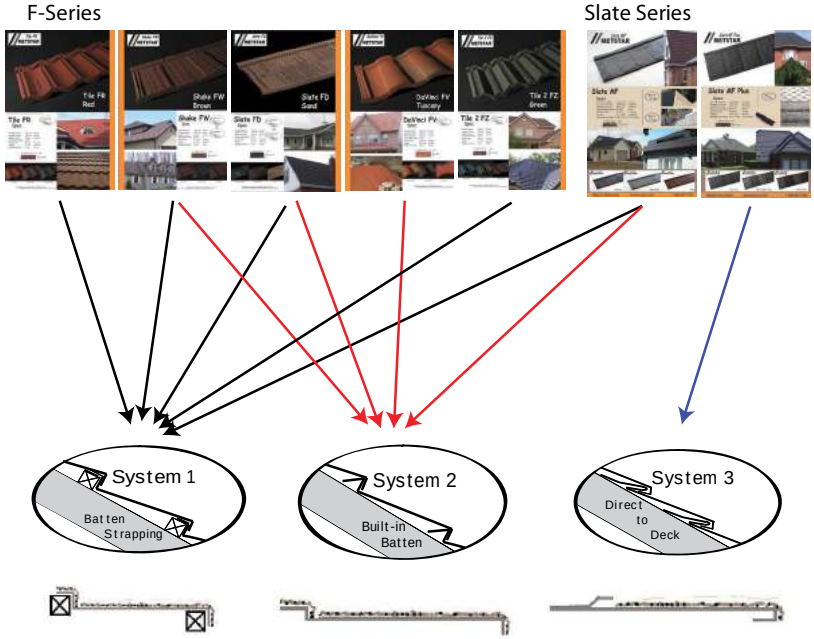
Building Category II, Exposure C -150 MPH Peak Gust Wind Zone

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
0 - 15	-57.8	-96.9	-145.9
20	-61.2	-102.6	-154.5
25	-63.9	-107.2	-161.3
30	-66.6	-111.8	-168.2
40	-70.7	-118.6	-178.5
50	-74.1	-124.3	-187.1
60	-76.8	-128.9	-194.0
70	-106.5	-167.1	-227.8
80	-110.1	-172.8	-235.6
90	-112.8	-177.1	-241.4
100	-114.7	-180.0	-245.3
120	-119.2	-187.1	-255.0
140	-123.8	-194.3	-264.8
160	-126.5	-198.6	-270.6
180	-130.1	-204.3	-278.4
200	-132.9	-208.6	-284.2
250	-139.2	-218.6	-297.9
300	-144.7	-227.1	-309.6
350	-149.3	-234.3	-319.3
400	-153.8	-241.4	-329.0
450	-157.4	-247.1	-336.8
500	-161.1	-252.8	-344.6

Exposure C applies to open terrain with scattered obstructions having heights generally less than 30 ft (9.1 m). This category includes flat open country, grasslands and all water surfaces in hurricane-prone regions. Exposure C shall apply for all cases where exposures B or D do not apply.

Metal Roofing Panels Installation Systems

There are many ways to install a multitude of metal roofing systems available on the market today. We at Metstar believe that the basics are simple and can be summed up in three basic systems.



System 1 -Batten Strapping - This most complicated of the three systems, requires battens also called strapping, usually wood 2x2's. It is so solid it can be installed over open rafters. With counter strapping this system combines light weight strength and incredible ventilation. It is also an easy and effective solution to straighten out existing roofs that have waved decks. System 1 should be installed by an experienced metal roofer.

System 2 -Built-in Batten- Same concept as System 1 except field area is installed using a Built-in Batten thus eliminating horizontal batten strapping. This is a simplification of the same panel used in System 1 but with a batten built into the panel. This system can only be installed on a solid deck not open rafters, most roofs in North America have a solid deck anyway. This makes the installation easier by not having to deal with the carpentry involved in System 1 and still gives you most of the strength, beauty and durability especially if no extra ventilation or structural repair is required. System 2 should be installed by a professional roofer with some experience in metal roofing.

System 3 -Direct to Deck- Same as System 2 except this is a hidden fastener system that can be combined with innovative flashing that are adaptable to each roofing contractor's preferred individual method. This system is easiest because it eliminates the need for bending or special tools and installs just as easily as siding. System 3 should be installed by a professional roofer.

All three systems can be installed right over most exisitng roofs without the extra expense of tear off and landfill waste.

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It is the responsibility of installer to check the website for update or changes in this instruction manual.