This document has been electronically signed and/or sealed in accordance with the applicable State Board of Professional Engineering requirements.

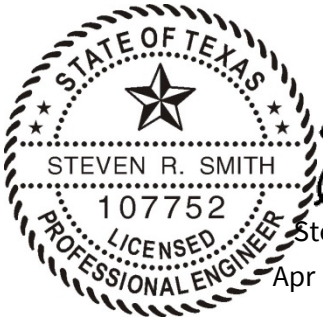
Laboratory Test Report

Bartile Roofs Inc.
Bartile ANSI/FM 4473 Tile Testing
Haag File: 51250008TX-196

Bartile Roofs Inc.
725 North 1000 West
Centerville, Utah 84014

Attention: Mike Evans

April 14, 2025



Steve Smith
Apr 14, 2025

IAS ACCREDITED TEST LAB TL-656

HAAG Research & Testing

Date Received:	March 24, 2025
Date of Testing:	April 3, 2025
Date of Report:	April 14, 2025
Lab:	Haag Research & Testing Co. 1410 Lakeside Parkway, Suite 100 Flower Mound, TX 75028 HaagResearchTesting.com 800.527.0168 214.614.6500 214.614.6501 fax IAS Accredited TL-656 Haag File: 51240033TX-196
Client:	Bartile Roofs Inc. 725 North 1000 West Centerville, Utah 84014 Attention: Mike Evans
Job Name:	Bartile ANSI/FM 4473 Tile Testing
Purpose of Work:	Test concrete roofing tiles for impact resistance
Accredited Standard Test:	ANSI/FM 4473 - *Test Standard for Impact Resistant Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls*

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 (refer to IAS Certificate of Accreditation appended as Attachment A). The accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated April 2017 and included as Attachment B).

This report has been written for your sole use and purpose, and only you have the authority to distribute this report to any other person, firm, or corporation. Haag Research & Testing Co. (HRT) and its agents and employees do not have and do disclaim any contractual relationship with, or duty or obligation to, any party other than the addressee of this report and the principals for whom the addressee is acting. Only the engineer who signed this document has the authority to change its contents and then only in writing to you. This report addresses the results of work completed to date. Should additional information become available, we reserve the right to amend, as warranted, any of our conclusions. This report shall not be reproduced except in full without approval of HRT.

Description

HRT received concrete roofing tiles in Flower Mound, Texas, on March 24, 2025. Tested roofing tiles were provided directly from the manufacturer, Bartile Roofs Inc. (Bartile). Test results presented in this report are applicable to the tested tiles as received.

Testing was conducted on Bartile Legendary Slate tiles. Tiles were flat profile. Tile attributes are provided in Table 1. Weights reported in Table 1 are the average weights of three tiles, including two tested tiles and one additional tile.

TABLE 1: TILE ATTRIBUTES

Product	Tile Profile	Average Weight (pounds)	Tile Length (inches)	Tile Width (inches)	Exposed Area (in^2)
Legendary Slate	Flat	14.7	16-1/4	16	172

Procedure and Findings

Products were tested to ANSI/FM 4473 - Class 4. Table C-1 in Attachment C provides details on test equipment used during test procedures outlined in this report. Tested tiles were maintained at laboratory temperatures in the range of 60ºF to 90ºF for at least 72 hours prior to testing. Laboratory temperature during these tests was 72ºF, and relative humidity was 47%.

Test panels were impacted with propelled ice balls measuring 2 inches in diameter in accordance with ANSI FM 4473. Each tested tile location was impacted twice, with both impacts separated by no more than 1/2 inch. Target ice ball attributes for ANSI/FM 4473 Class 4 are listed in Table 2. Ice ball weights, speeds, and computed kinetic energies for each impact made during testing are listed in Table D.1 in Attachment D.

TABLE 2: TARGET ICE BALL ATTRIBUTES

Class	Diameter (inches)	Mass (pound)	Free-Fall Speed (feet/sec)	Free-Fall Energy (ft·lbf)
4	2	0.1385	105.0	23.75

For a product to pass ANSI FM 4473, the product shall show no evidence of visible cracking or breakage such as splits, punctures, fractures, disengagement of lap elements, or exposure of materials not so intended.

Test panels were constructed by installing tiles in accordance with manufacturer instructions (Attachment E) and the TRI Alliance Installation Manual which can be obtained from https://tileroofing.org/industry/installation-guides/. Tiles were fastened to solid plywood with screws during testing for ease of installation and removal. Photographs of the tiles detailing test results are appended in Attachment F. All photographs taken during testing will be retained for

seven years and can be provided upon request. The specification sheet for Legendary Split Timber tiles is appended in Attachment G.

Legendary Slate tiles met the pass criteria for Class 4 impacts.

Conclusions

1. Legendary Slate tiles were subjected to 2-inch-diameter ice balls, propelled at velocities consistent with free-fall speeds of similar-size hail, developing impact kinetic energies in substantial conformance with ANSI/FM 4473.

2. Legendary Slate tiles successfully met the Class 4 requirements set forth in the *ANSI/FM 4473, January 2011, Test Standard for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls.*

Respectfully submitted,

HAAG RESEARCH & TESTING, LLC

Steven R. Smith, P.E. Apr 14, 2025
Texas License 107752
Director Research & Testing

Haag Research & Testing Co.
CA F-20657
Expires: 02/28/2026

Allen Swan Apr 14, 2025
Senior Laboratory Technician

SRS/AWS:af

ATTACHMENTS: This report is complete only when all attachments are included.

Attachment A – IAS Certificate and Scope of Accreditation

Attachment B – ISO-ILAC-IAF Communiqué

Attachment C – Equipment List

Attachment D – Ice Ball Impact Summary

Attachment E – Bartile Installation Guide

Attachments F – Testing Photographs

Attachment G – Product Specification Sheet

Lab Attachments

HAAG
Research & Testing

Lab Attachment A

CERTIFICATE OF ACCREDITATION

This is to attest that

HAAG RESEARCH & TESTING, LLC

1410 LAKESIDE PARKWAY, SUITE 100
FLOWER MOUND, TEXAS 75028, U.S.A.

Testing Laboratory TL-656

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date September 11, 2023

IAS ACCREDITED

President

Visit www.iasonline.org for current accreditation information.

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. | www.iasonline.org

HAAG RESEARCH & TESTING, LLC

www.haagresearchtesting.com

Contact Name Steven R. Smith **Contact Phone** +1-214-614-6500

Accredited to ISO/IEC 17025:2017 *Effective Date September 11, 2023*

Physical	
ANSI FM 4473	Impact resistance testing rigid roofing materials by impacting with freezer ice balls
ANSI/FM 4478	American National Standard for Roof Mounted Rigid Photovoltaic Modules (Appendix E – Determining the Susceptibility to Hail Damage of Rigid Photovoltaic Modules only)
ASTM D228	Standard Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing, Tear Strength Only
ASTM D3161/D3161M	Standard test method for wind-resistance of steep slope roofing products (fan-induced method)
ASTM D4977	Standard Test Method for Granule Adhesion to Mineral-Surfaced Roofing by Abrasion
ASTM D7281	Standard test method for determining water migration resistance through roof membranes
HAAG Internal Procedure	HRT roofing sample desaturation
IEC 61215-2	Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test Procedures (MQT 17 – Hail Test only, excluding clause 4.17.5b)
UL 2218	Standard for impact resistance of prepared roof covering materials
Structural	
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

HAAG- HAAG Global

Lab Attachment B

Joint ISO-ILAC-IAF Communique on the Management Systems Requirements of ISO/IEC 17025, General Requirements for the competence of testing and calibration laboratories

A laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and ***management system requirements*** *that are necessary for it to consistently deliver technically valid test results and calibrations. The* ***management system requirements*** *in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.*

ISO Acting Secretary General	ILAC Chair	IAF Chair

April 2017

Lab Attachment C

Table C-1. Impact Testing Equipment List

HAAG ASSET TAG	EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.
3753	Ice Ball Launcher	Haag Engineering Co.	IBL-7	99.001.4.00
3013	Chronograph	Shooting Chrony Inc.	Beta	NA
4999	Digital Level	Digi-Pas	DWL-200	S12E18522
6999	Freezer Temperature Control	Johnson Controls	A419	NA
3771	Thermometer	ACU-RITE	MAT 252015D	00592W2
3809	Thermometer Wireless Sensor	ACU-RITE	MAT 252015D	00592TX
3759	Precision Scale	A&D Company	FX3000i	15706278

Lab Attachment D

TABLE D.1: ICE BALL IMPACT DATA

Impact	Location	Diameter (in)	Mass (lbs)	Speed (fps)	KE (ft·lbf)
Legendary Slate					
1	Water Course	2	0.1401	105.30	24.14
1A	Water Course	2	0.1409	105.40	24.33
2	Butt Edge	2	0.1441	103.20	23.85
2A	Butt Edge	2	0.1460	103.30	24.21
3	Overlap	2	0.1397	104.90	23.89
3A	Overlap	2	0.1435	103.60	23.94
4	Corner	2	0.1408	104.40	23.85
4A	Corner	2	0.1400	104.50	23.76

Lab Attachment E

BARTILE®

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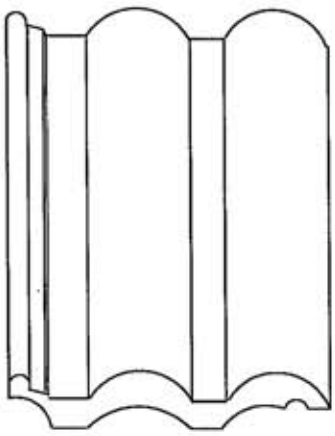
Installation Specifications and Guide

COMPLIES WITH 2006–IBC, 2006–IRC, 1997–UBC CODES
AND ICC EVALUATION REPORT ESR–2778 (JULY 2008)

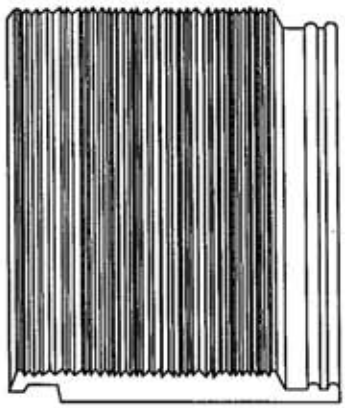
WORLD'S FINEST ROOFING TILE

ENDURES THROUGH GENERATIONS

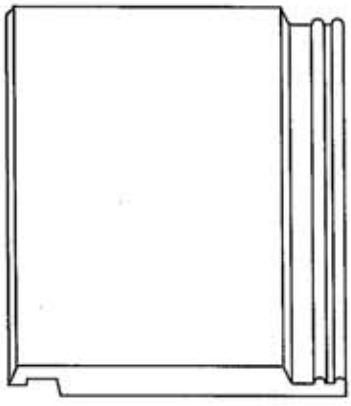
BARTILE STANDARD PROFILE OPTIONS



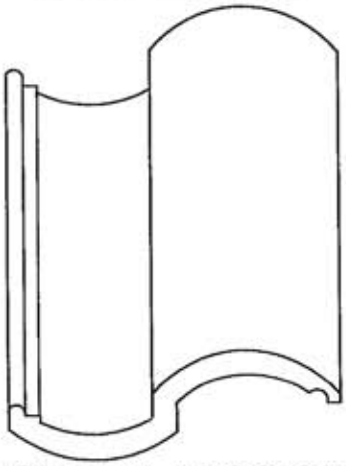
EUROPEAN



SPLIT-TIMBER



NEW ENGLAND SLATE



SIERRA MISSION

This Installation Aid is Intended to Inform the Installer of Various Options, and Factory Recommendations.
It is NOT INTENDED to Replace Local Codes and Practices, but Rather to Provide General Information.
Consult Your Local Building Inspector for Specific Information Relative to a Local Code Question.
The Installer Shall be Responsible for the Installation and Adhearence to the Code Requirements.

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

IMPORTANT NOTICE TO USER

This installation specification and guide has been produced to aid the specifier, owner/installer, and roofer in the installation of BARTILE products. Every effort has been made herein to adhere to general code requirements. However, it must be explicitly understood by the user that it is his responsibility to understand and comply with the "then current" building codes, local jurisdiction requirements and climatic conditions applicable to this project.

Within these pages are various alternative methods for the installation of BARTILE. The installer must choose which method is practical for each installation as he must be responsible for the performance of the system as a whole. Local practices vary and it should be understood that this booklet should not be interpreted to be the only "proper' way to install a BARTILE roof, but in fact contains various proven installation techniques. BARTILE does not certify nor warrant any particular installation method or process. The BARTILE product warranty is limited to the furnishing of replacement BARTILE shingles for those which in the course of normal use, decompose or wear out during a period of 75 years. Breakage, color variance, and acts of God and normal weathering are excluded. See the text of the printed BARTILE limited 75 year warranty for details.

This Installation Aid is Intended to Inform the Installer of Various Options, and Factory Recommendations. It is NOT INTENDED to Replace Local Codes and Practices, but Rather to Provide General Information. Consult Your Local Building Inspector for Specific Information Relative to a Local Code Question. The Installer Shall be Responsible for the Installation and Adhearence to the Code Requirements.

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

BARTILE

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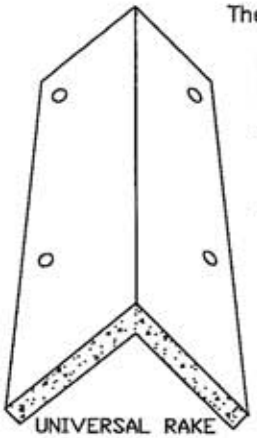
Installation Specifications and Guide

STANDARD TRIM UNITS

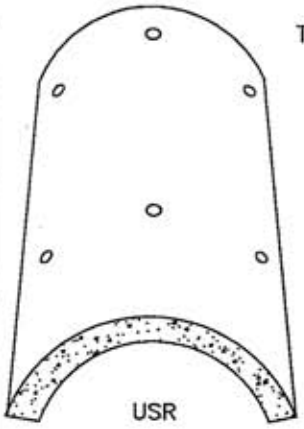
UNIVERSAL RAKE



The (UR) is the Standard Gable Finish for SPLIT–TIMBER, NEW ENGLAND SLATE, and EUROPEAN Profiles. Rakes Fasten on Either Side With Two Nails. The First and Last (UR) Must be Cut to Fit. Butt the Small End to Match Up With the Top Edge of Each Course of Field Tile.

NOTES:
Use 16d Galv. Nails.
Lap Rakes Approx. 3 in.
Tab Laps For High Wind (Over 80 MPH)

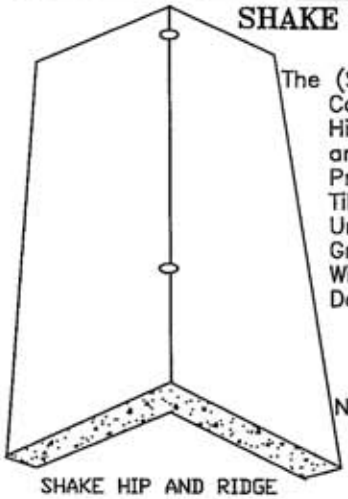
UNIVERSAL SPANISH RIDGE/RAKE/HIP



The (USR) is the Standard Gable and Ridge Finish for SIERRA MISSION Profile, and Ridge Finish for European Profile. Nail Through Top Holes When Used as a Ridge, and Through Side Holes When Used as a Rake. The First and Last Rake Must be Cut to Fit.

NOTES:
Use 16d Galv. Nails.
Lap Trim Approx 3 in.
Tab Laps For High Wind (Over 80 MPH)

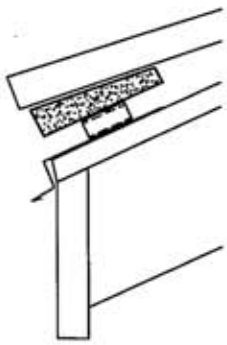
SHAKE HIP AND RIDGE



The (SH) is Normally Used to Cover Both Ridges and Hips, for SPLIT–TIMBER and NEW ENGLAND SLATE Profiles. The Cut Field Tile, Beneath the Hip Units, May either be Grouted, or be Covered With Flashing Tape if Desired. Use two Nails.

NOTES:
Use 16d Galv. Nails.
Lap Trim Approx. 3 in.
Tab Laps For High Wind (Over 80 MPH)

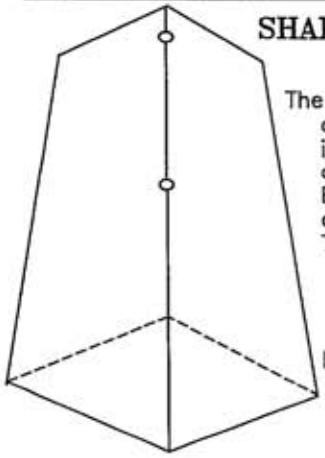
EAVE TILE RISER



The Eave Tile Riser is the Premium Option to Properly Elevate the 1st (Starter) Course of any of Our Flat Tile Profiles. It Includes 12" of Ventilated Batten to Support the Tile. Each Tile Riser Covers 12" of Eave. Eave Tile Risers are made in Colors and Styles to Match the Field Tile and Trim Tile Ordered.

NOTES:
Use Two 8d Galv. Nails, Fastened Through Tile Riser and Ventilated Batten to Roof Sheathing.

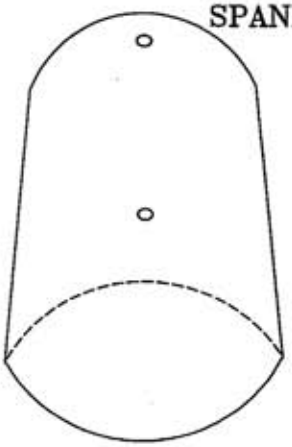
SHAKE HIP STARTER



The (SS) is Normally Used as the First Hip Unit in Each Hip Unit Line, at the Eave Edge. The Bull Nose Design Provides a Desirable Finish to The Hip Trim Unit Line.

NOTES:
Use 16d Galv. Nails.
Lap Trim Approx. 3 in.
Tab Laps For High Wind (Over 80 MPH)

SPANISH OVAL HIP STARTER



The (UOS) is Designed to be Used as the First Hip Unit in Each Hip Line, at the Eave Edge Starting Point. The Bull Nose Design Provides a Desirable Finish to the Hip Trim Unit Line.

NOTES:
Use 16d Galv. Nails.
Lap Trim Approx. 3 in.
Tab Laps For High Wind (Over 80 MPH)

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

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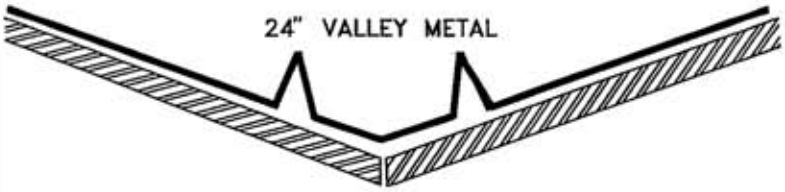
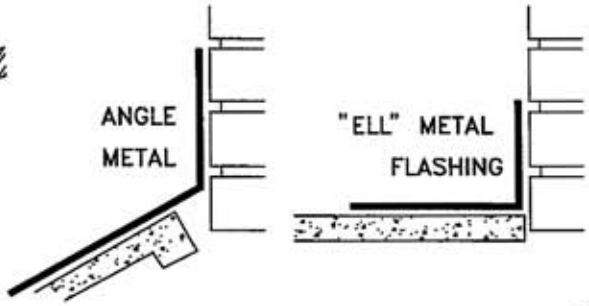
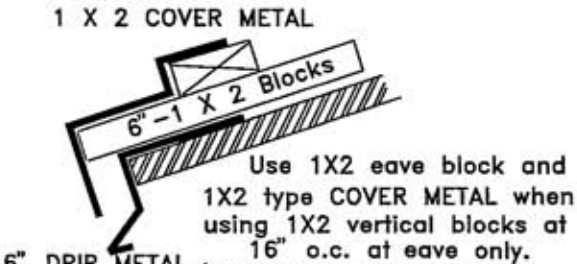
Installation Specifications and Guide

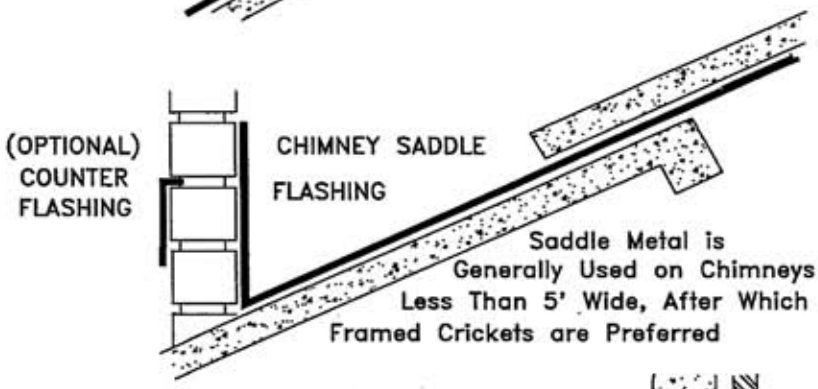
STANDARD BARTILE SHEET METAL PRODUCTS



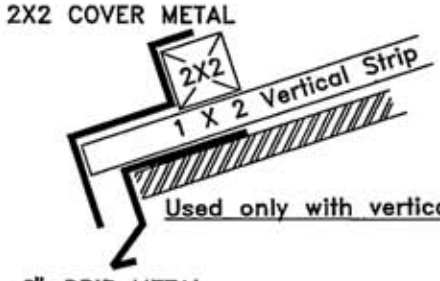


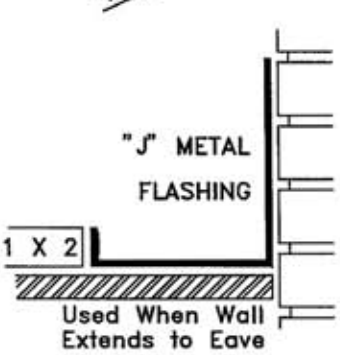


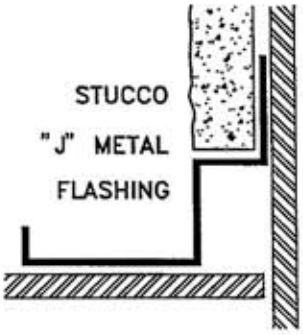
Use 1X2 eave block and 1X2 type COVER METAL when using 1X2 vertical blocks at 16" o.c. at eave only. (VENTILATED BATTENS MAY SUBSTITUTE FOR WOOD BLOCKS)

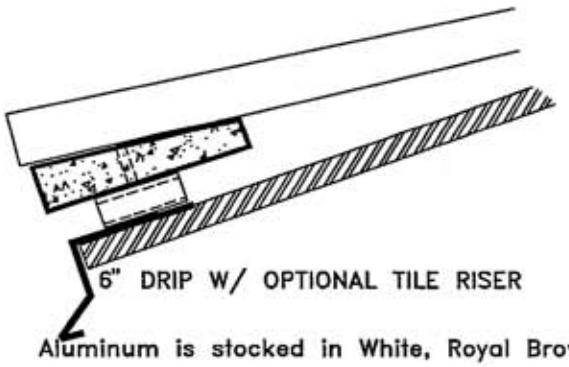


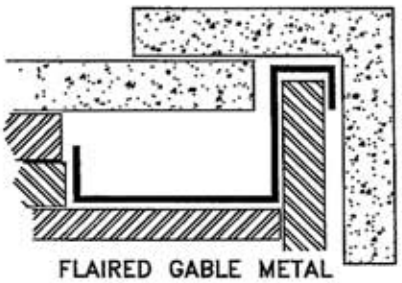
Saddle Metal is Generally Used on Chimneys Less Than 5' Wide, After Which Framed Crickets are Preferred



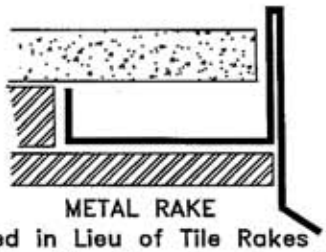








FLAIRED GABLE METAL (vertical strips shown)



Used in Lieu of Tile Rakes (horizontal strip only shown)

Aluminum is stocked in White, Royal Brown, and Classic Cream. Lead is available in 2.5 lb. sheet.

The Standard Metal is Galvanized Iron. Optional Colored Metal is Readily Available, as Well as Copper. Aluminum is stocked in White, Musket Brown, Bronze, Charcoal, Pebblestone & Royal Brown. 2.5# Lead also Stocked. BARTILE also fabricates custon shapes for unique situations and special needs.

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

BARTILE®

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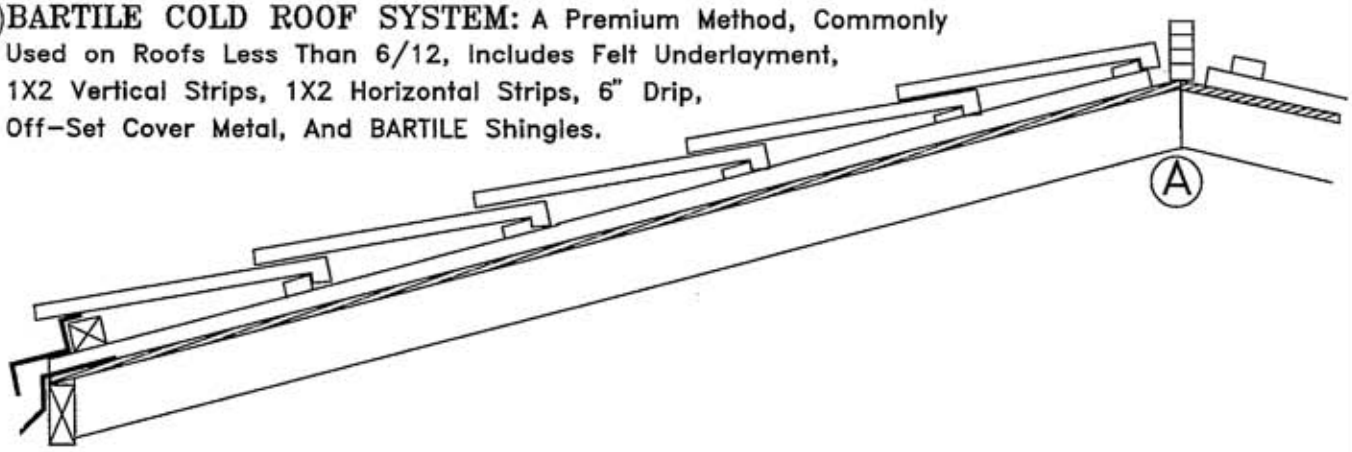
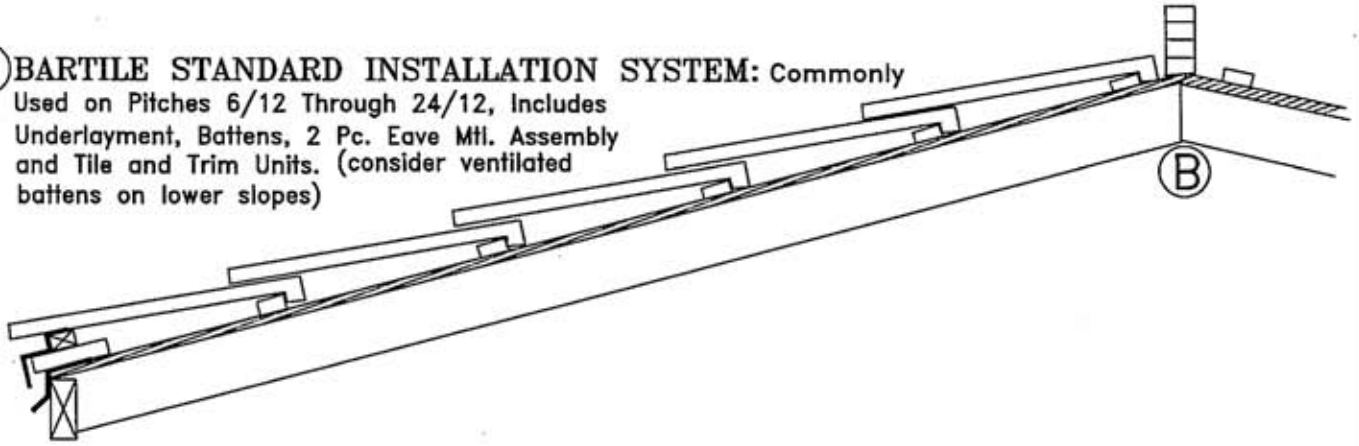
Installation Specifications and Guide

BASIC FIELD TILE INSTALLATION OPTIONS

(A) BARTILE COLD ROOF SYSTEM: A Premium Method, Commonly Used on Roofs Less Than 6/12, Includes Felt Underlayment, 1X2 Vertical Strips, 1X2 Horizontal Strips, 6" Drip, Off-Set Cover Metal, And BARTILE Shingles.

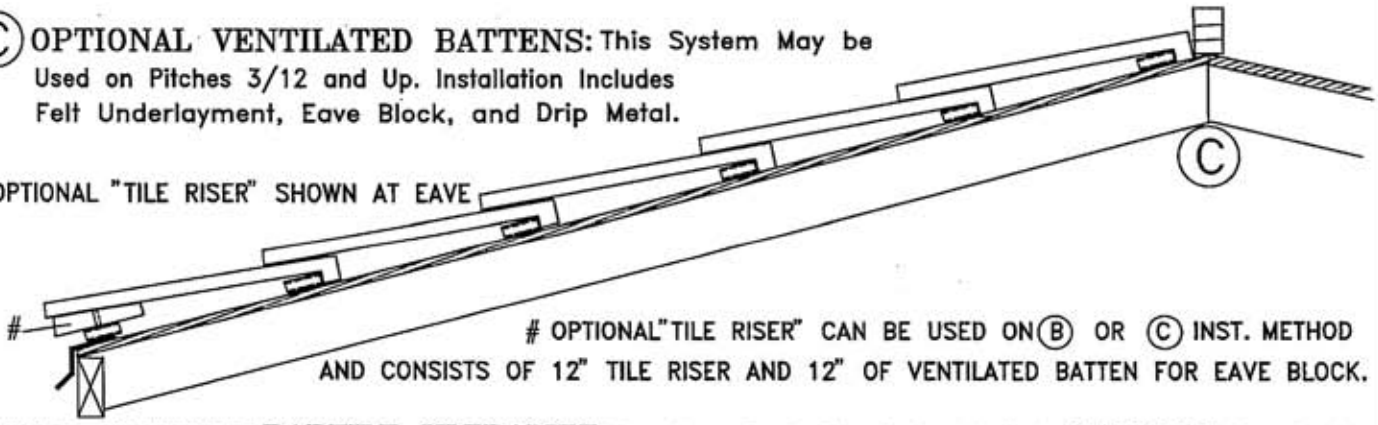


(B) BARTILE STANDARD INSTALLATION SYSTEM: Commonly Used on Pitches 6/12 Through 24/12, Includes Underlayment, Battens, 2 Pc. Eave Mtl. Assembly and Tile and Trim Units. (consider ventilated battens on lower slopes)



(C) OPTIONAL VENTILATED BATTENS: This System May be Used on Pitches 3/12 and Up. Installation Includes Felt Underlayment, Eave Block, and Drip Metal.

#OPTIONAL "TILE RISER" SHOWN AT EAVE



OPTIONAL "TILE RISER" CAN BE USED ON (B) OR (C) INST. METHOD AND CONSISTS OF 12" TILE RISER AND 12" OF VENTILATED BATTEN FOR EAVE BLOCK.

NOTES ON NAILING: BARTILE ULTRALITE Requires Each Tile to be Nailed. BARTILE Standard Wt. Requires (3 TILE) Periphery Nailing. (Includes Hips, Ridges, Rakes, and Eaves). On Pitches 2/12 To 5/12 (No Field Nailing Required), 6/12 To 9/12 (Nail 50%), 10/12 up (Nail each tile) The Nailing Requirements Under Severe Weather Conditions May Call For Additional Fastening.

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

BARTILE BATTEN LAYOUT

* 1. Begin With 6" 1x2 Eave Blocks (On 16" Centers), Eave Strip, Ridge Nailer, and 1st and Last Strip.
2. Measure Distance (in Inches) Between 1st and Last Batten, Then Divide by 12 (for 3" Headlap).
3. If the Resulting Number is not Even, ROUND UP, and Divide into the same total distance (in inches)
4. The Number Generated by This Formula is the Average Dimension Between Each Strip.(round to 1/8")
5. If Preferred, an Alternate SWING TAPE Method can be used. (use 12" Spacing on Swing Tape).

* First course is measured From Front of Eave Block to Back of 1st Strip

NOTE: 1st. Course for SHAKE and SLATE is 13 1/2, EUROPEAN (13 1/4"), and SIERRA MISSION (12 1/2") Last Course is 1 1/4" Below Ridge Board.
*(Shown is the Preferred Eave Detail, Which uses a 1x2 cover metal, mounted over a 1x2 strip, which bridges over 6 in. 1x2 blocks. Eave Tile Risers May be Used at the Eave, if desired as an Option).

CONSIDER VENTILATED BATTENS

* PREFERRED EAVE DETAIL
6 in. Drip Metal
1x2 Cover Metal Mounted Over 1x2 strip, Over 1x2 6 in. Blocks (Alternate to 12" DRIP over 2x2)
See Page 4 for Eave Options.

‡ ADDITIONAL NOTE:
Some "RENAISSANCE" Profiles Require a Maximum Spacing of 10 1/2" per Course
IE: COTTAGE (STAGGER), OLD MISSION MANCHESTER AND NEWCASTLE

NOTE:
A Chalk Line Should Always be Used To Place Batten Strips Straight.

GENERAL CONSIDERATIONS:
A. Each Slope Should be Calculated Independently.
B. Maximum Course Dimension is 12 1/4" ‡ See Notes
C. On a Hip End (HIPS CONVERGING AT TOP) Use 12 1/4" After The Standard First Course Dimension.
D. ALWAYS USE TOP EDGE OF STRIP FOR PLACEMENT ON LINE.

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BARTILE

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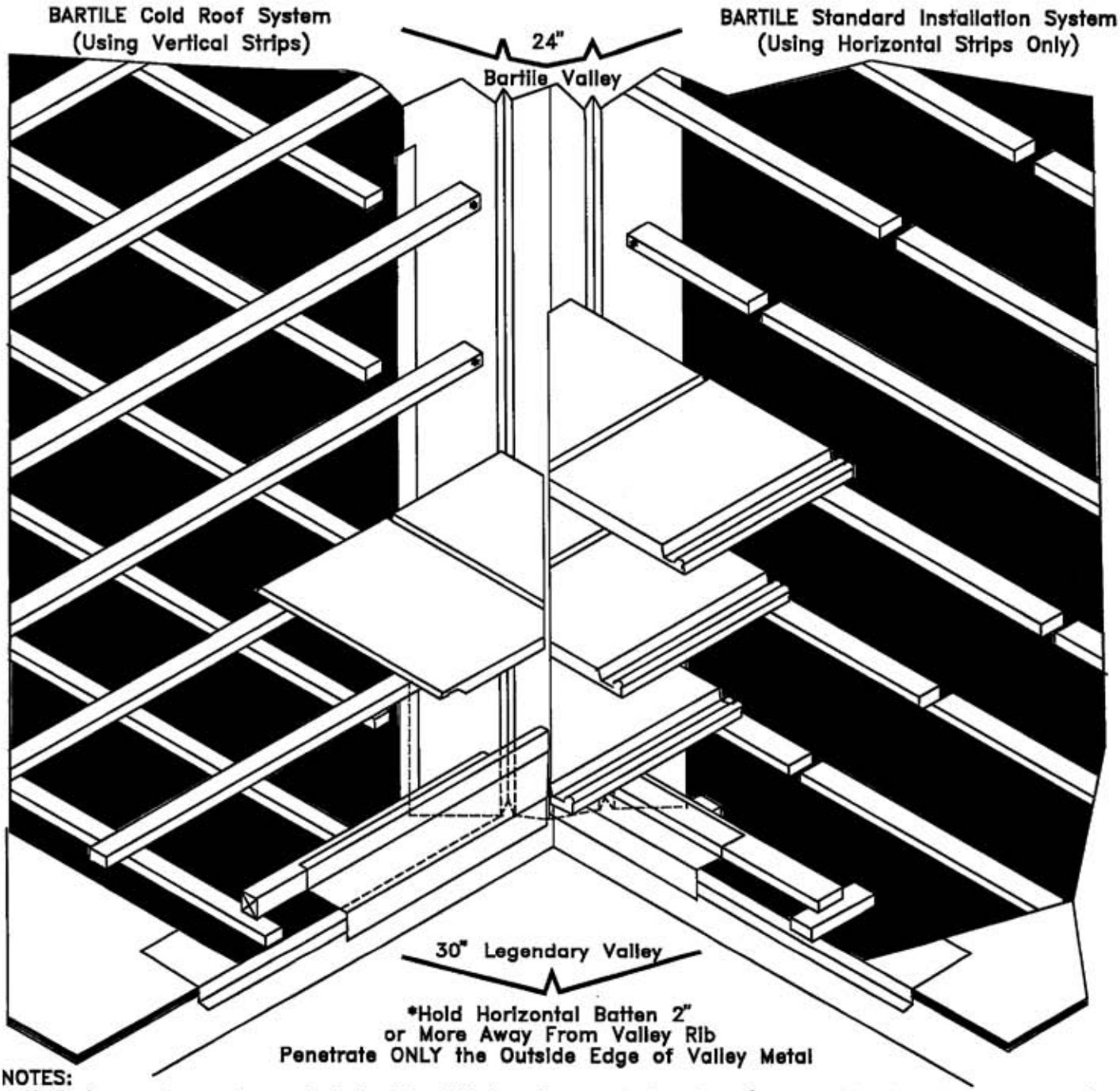
Installation Specifications and Guide

VALLEY METAL AND INSTALLATION



NOTES:

Underlayment may be sealed to drip Metal and woven at valley. (or run bleeder sheet at valley) In ice and snow climates, valley metal should be set in mastic. Lap valley metal sections 6" min. Use code approved underlayment, according to the climatic conditions applicable to the job. Avoid penetrating valley metal while nailing tile. (use mastic instead) Avoid using small pieces. BARTILE recommends a closed valley (as shown), but an open valley is acceptable. (where deamed appropriate). Do not block valley metal channel, nor drainage next to ribs in any way.

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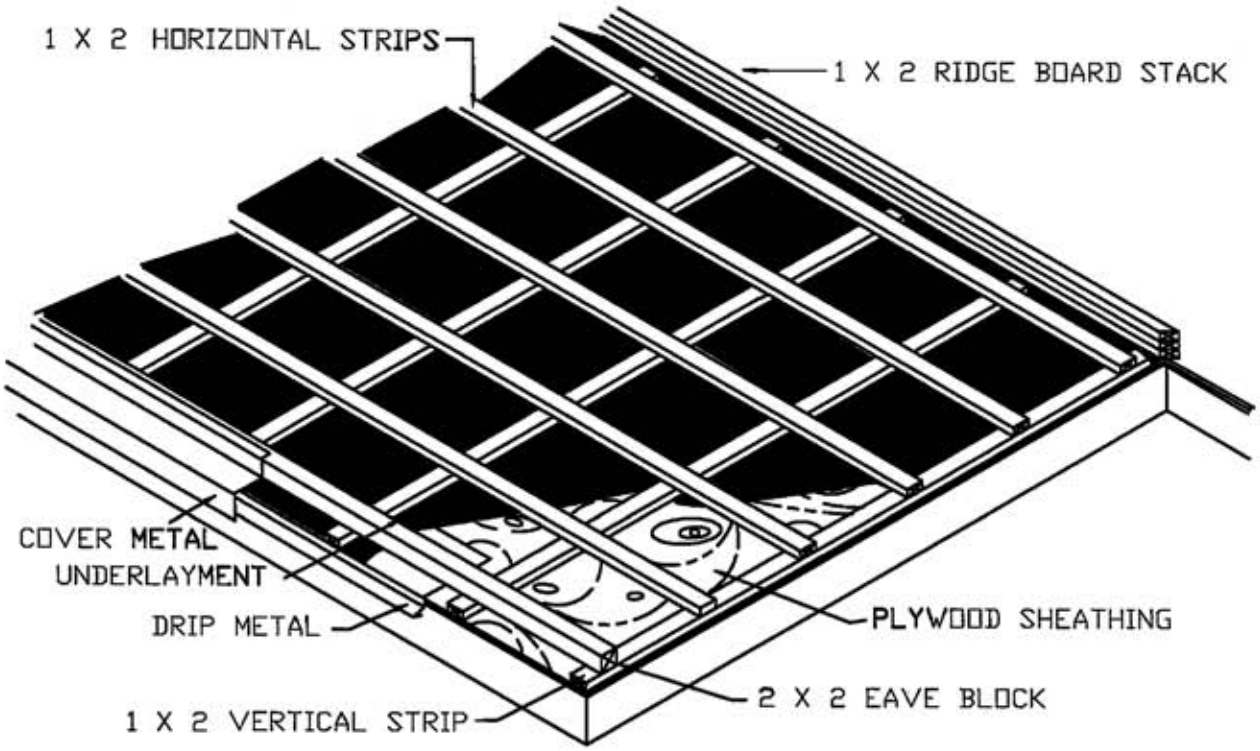
BARTILE Exclusive Cold Roof System



The BARTILE COLD ROOF SYSTEM Incorporates Both Vertical and Horizontal Strips, an Eave Cold Air Intake, and a Ridge (Warm Air) Exhaust. The Underlayment Area Stays Cooler in the Summer, and Reduces Ice Buildup at the Eave Area in the Winter by Disipating Attic Heat Below the Tile, and Exhausting it Through The Ridge Vent. The Tile Surface Therefore Remains Cooler, Which Reduces Snow Melt and Eave Ice Buildup Below the Heated Zone. The Vertical Strip System also Prevents Potential Underlayment Moisture From Collecting Behind the Horizontal Strips. The BARTILE COLD ROOF SYSTEM is Recommended for Slopes Under 6/12 and in Areas of Heavy Snow Buildup , and is Considered the Highest Functional Achievement in Tile Roofing.

NOTE The use of Ventilated Horizontal Battens will provide similar benefits. Use 1X2 Cover Mtl,6" blocks W/bridging 1X2 @ eave, not 2X2 as shown

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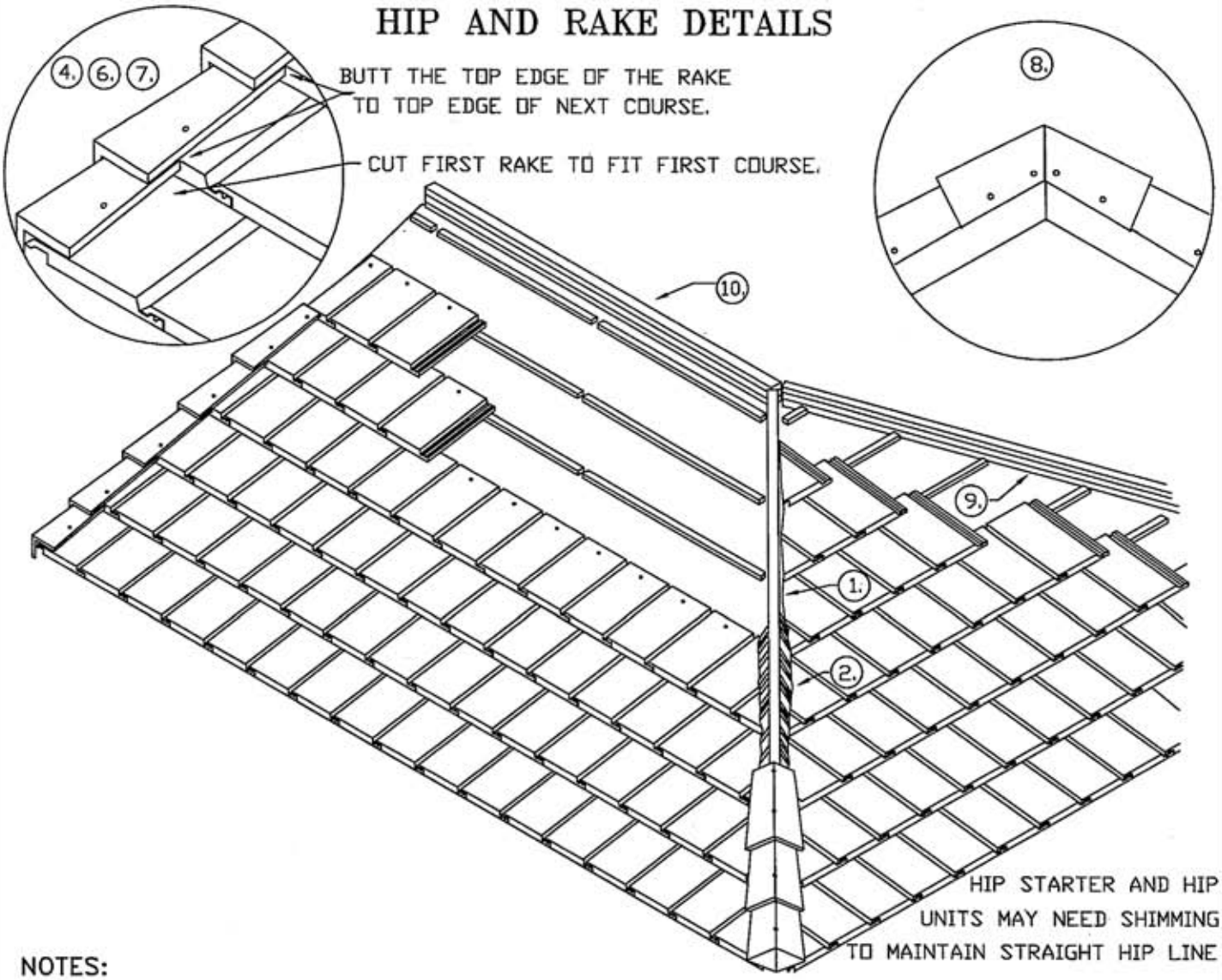
HIP AND RAKE DETAILS



NOTES:

1. The Field Tile Must be Cut, (Mitered) to Fit Against the Hip Nailer Board.
2. Hip Cuts may be Grouted (Shown), or Covered With Flashing Tape, if Desired.
3. Hip Units are Nailed With Two 16d Galv. Nails. (One Nail is Exposed)
4. For Flat Tile, Every Other Course Must Start With a Cut Half Tile. (Half Bond)
5. Universal Rake Units Cover Either Side, Nail Through Either Side. (Not Top Hole)
6. First Rake Must be Cut to Fit the First Course of Tile. (Drill as Required)
7. Each Rake Covers One Course of Tile. Butt into Top Edge of Next Course.
8. The Last Rake Units at Crown Must be Mitered Together. (Drill as Required)
9. Hip Nailer Boards are Usually a Stack of 1x2 Strips 4 or 5 High, as Required.
10. Ridge Nailer Boards are Usually 3 to 5 Strips High, as Required.

****EUROPEAN AND SIERRA MISSION TILE ARE LAID STRAIGHT BOND, NOT OFF-SET.****
(Lay 5 Tile Wide, From Eave to Ridge, Verify Straight, Then Repeat)

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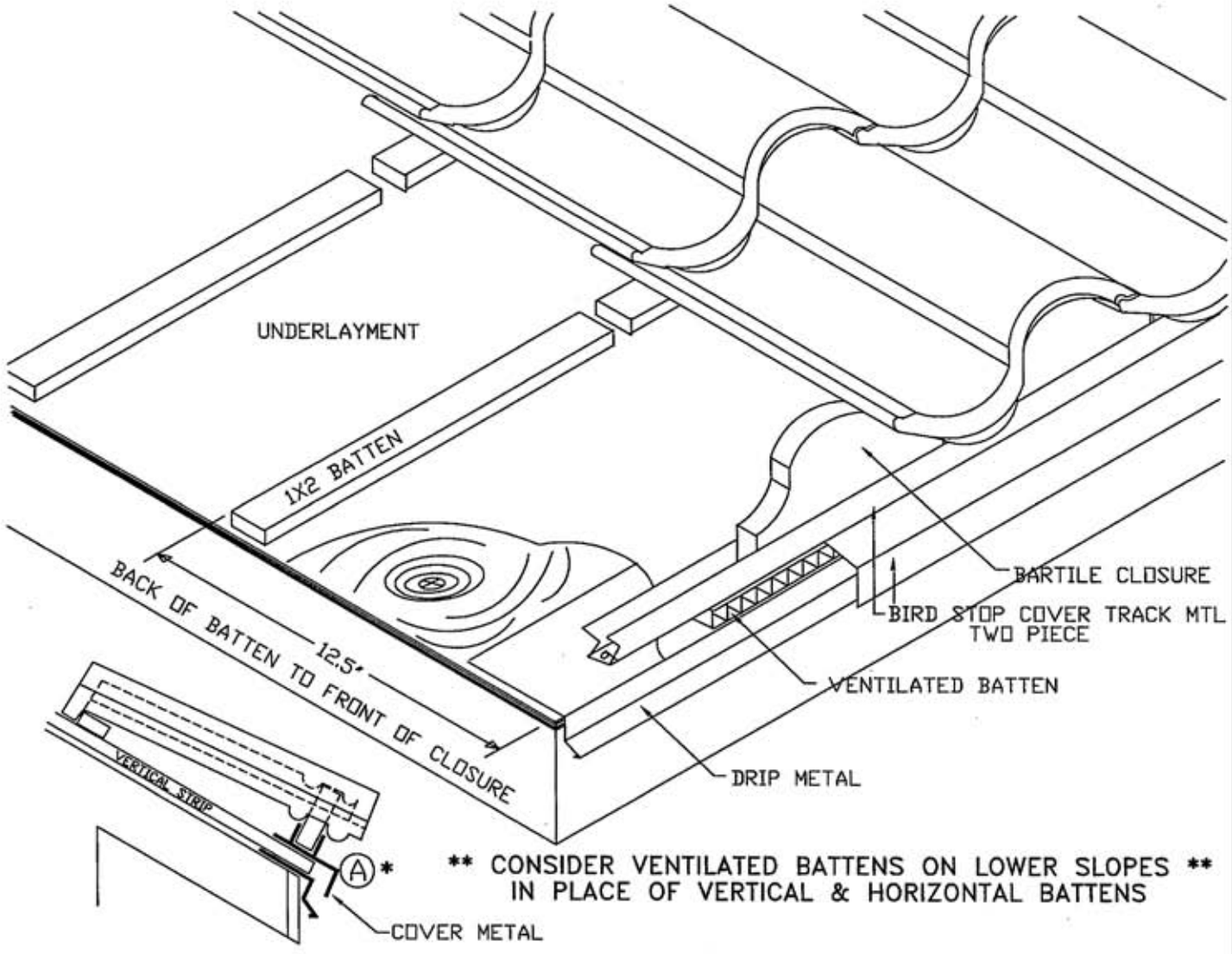
SIERRA MISSION PROFILE EAVE DETAIL



** CONSIDER VENTILATED BATTENS ON LOWER SLOPES **
IN PLACE OF VERTICAL & HORIZONTAL BATTENS

Ⓐ * If 1x2 Vertical Strips are Used, a Cover Track Metal (A) is Installed, at the Eave, on Top of the Verticals, With a Space as Shown.

NOTES:

The Eave Closure Will Lock Between The Tile and Closure Track.
On Steeper Pitches, Cement the Closure into the Track With Adhesive.
DO NOT Block the Valley Drainage with the Closure Assembly, Leave Open.
The Closures are Furnished to Match The Tile Color, The Track is Galvanized or Optional Colored Metal, Copper, etc to Match Eave Metal.

* OLD MISSION Profile Requires 11" 1st Course With Balance at 10.5" Maximum.
SIERRA MISSION, OLD MISSION & EUROPEAN are Laid in Straight Vertical Rows Lay 5 Tile Wide, From Eave to Ridge, Verify Straight, Then Repeat

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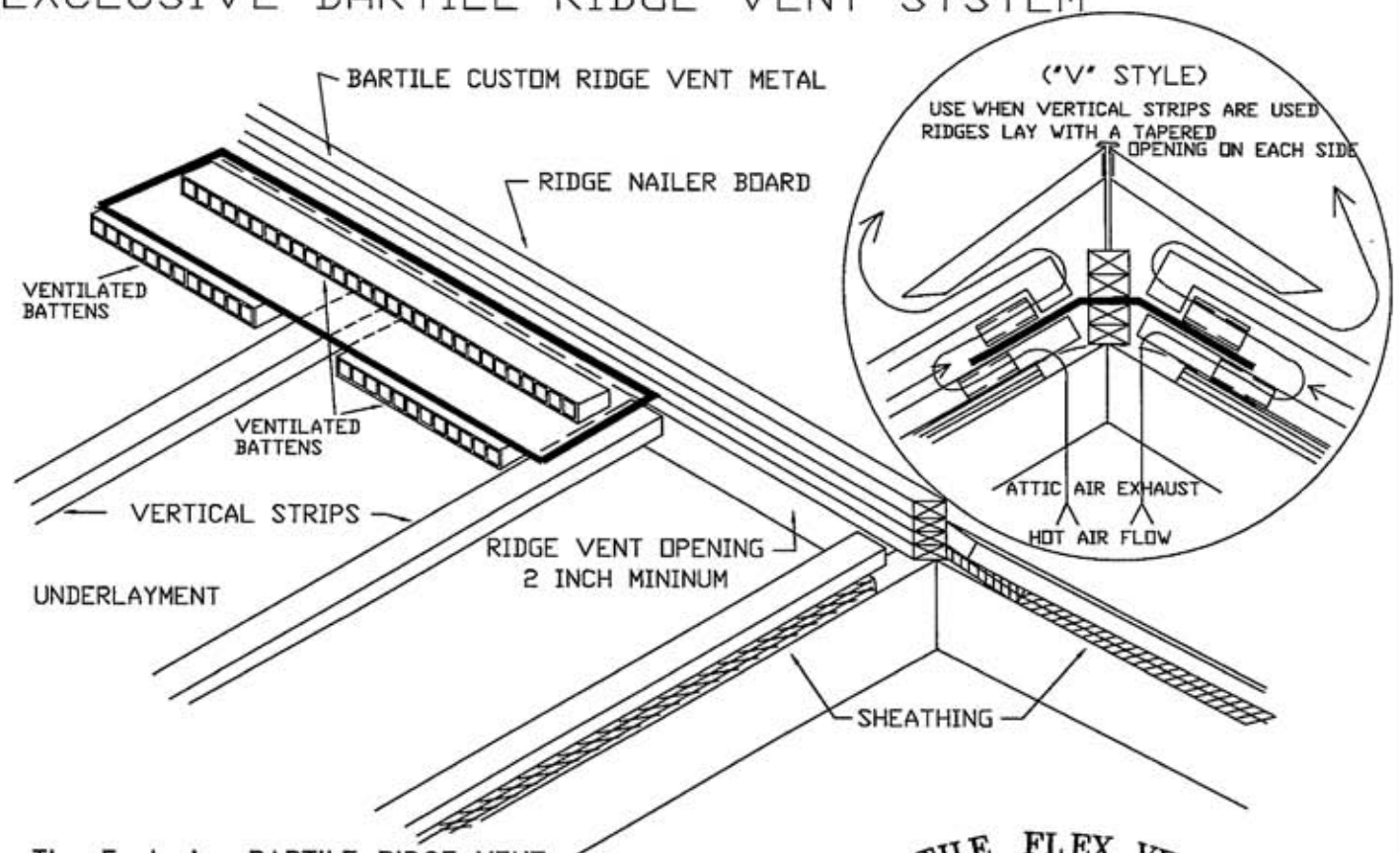
Installation Specifications and Guide

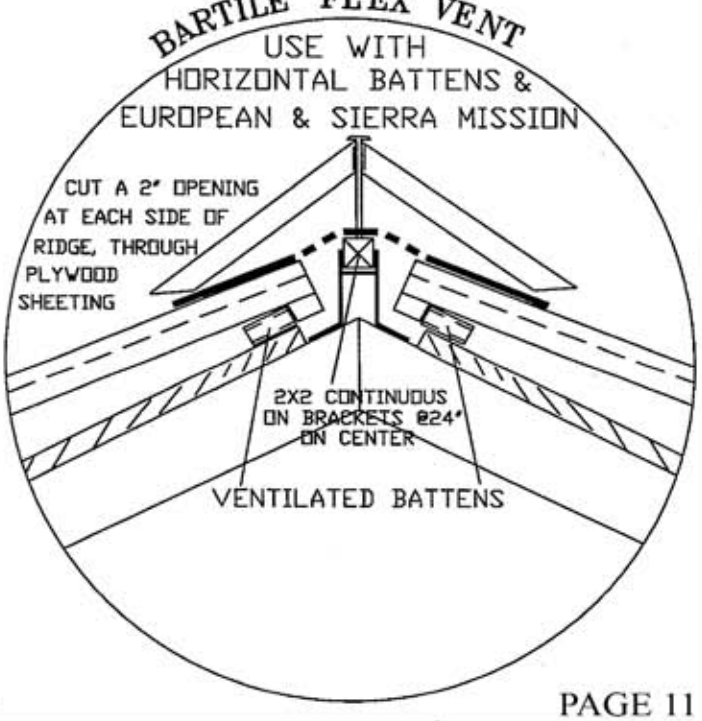
EXCLUSIVE BARTILE RIDGE VENT SYSTEM



The Exclusive BARTILE RIDGE VENT Consists of a 2" Slot or Opening at the Ridge, Covered by a Metal Shield, Which Prevents Intrusion by Water or Blowing Snow.

BARTILE COLD ROOF SYSTEM

Escaping Warm Attic Air Rises Naturally and Draws Cooler Air Through Soffit Vents into the Attic. The Air Moving Through the Air Space Below the Tile, in a Venturi Effect, Draws Cool Air Through the Eave Intake and Cools the Tile and Underlayment. This Reduces Ice Buildup in Winter and Keeps the Attic Cooler in the Summertime. The Process is Self-Initiating and Self Sustaining and Needs no Power. An Optional Screen May Be Secured Under the Vertical Strips and Ridge Nailer. Do not Block Ridge Openings.



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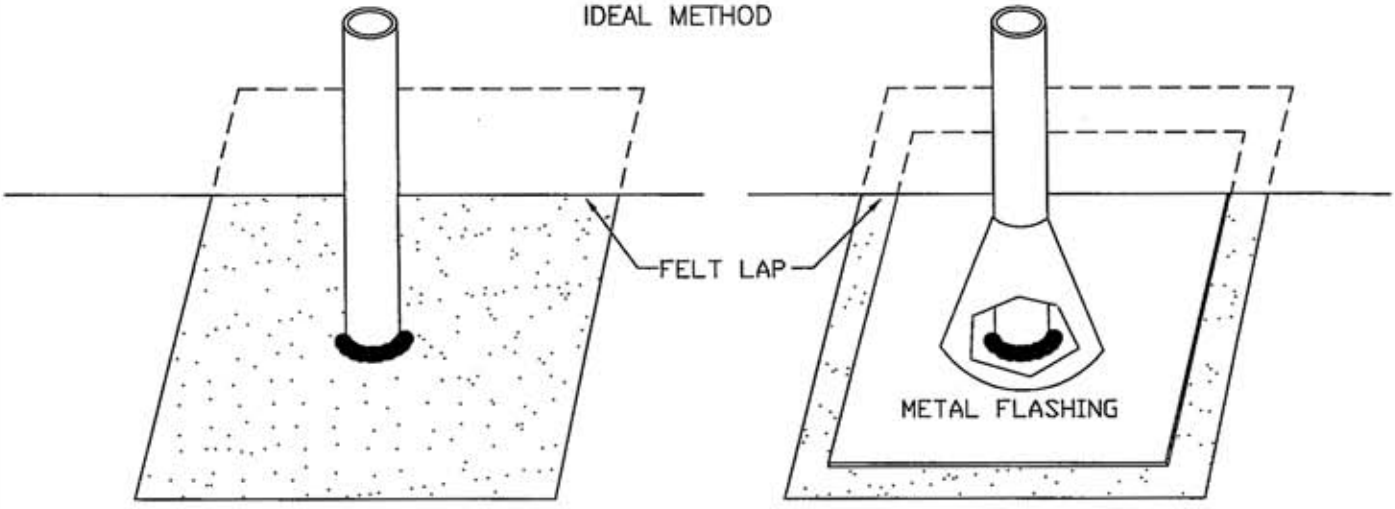
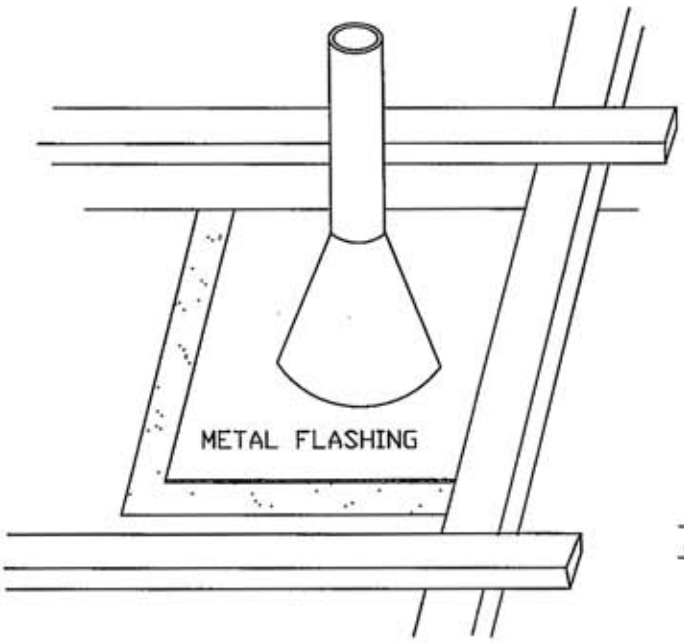
PIPE FLASHING DETAILS

IDEAL METHOD

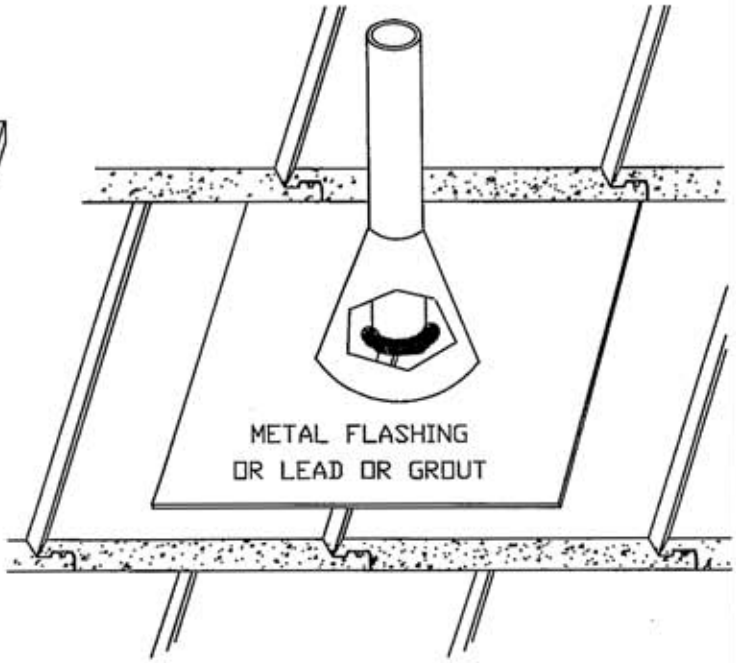


1. Hammer–fit a Felt Gasket to Pipe. Seal Gasket to Pipe With Mastic.

2. (Optional) Install a Base Flashing Lap Under Horizontal Felt Lap, and Seal.



3. Set Vertical and Horizontal Battens as per Normal Layout for Tile. Pipe May Interrupt Batten, if so Shim or Block as Needed.



4. Cut Tile to Fit Around Pipe; Mastic the Space Around Pipe; Then Set the Pipe Flashing in a Bead of Mastic. Be Certain to Lap Flashing With Tile. Use Lead Flashing or Grout for Round Tile.

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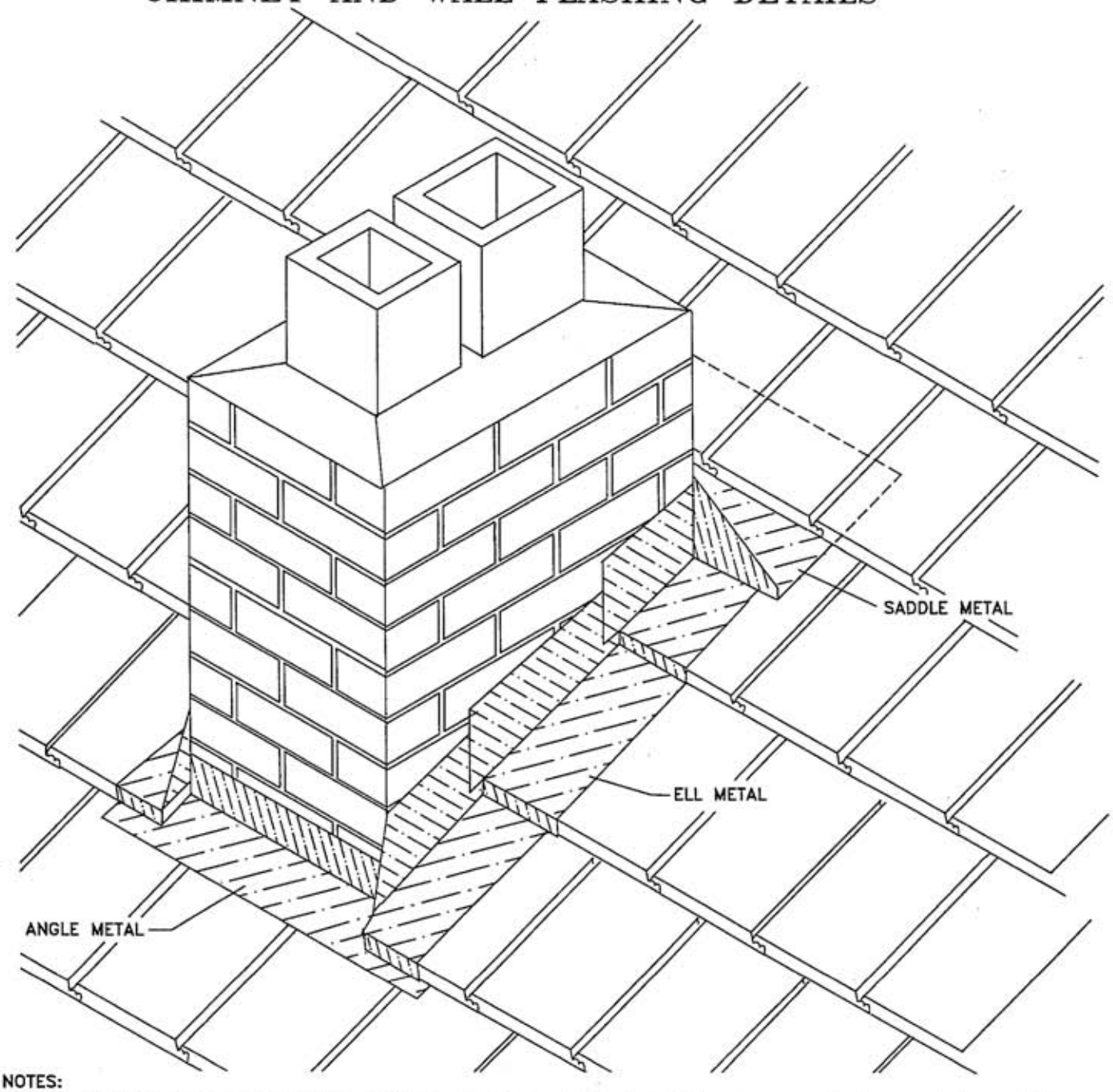
CHIMNEY AND WALL FLASHING DETAILS



NOTES:
Roll the Underlayment up the wall about 6" on all sides. Seal water tight. Leave a 2"–4" space between Battens and walls, for drainage. Install metal as shown, attaching only to wall, and seal. Counterflashing may be used. When wall terminates at or near eave, "J" METAL may be the preferred side wall flashing. Cut the sidewall tile within 1/2" of wall and seal with mastic. The EUROPEAN and SIERRA MISSION Profiles may require lead or grout flashings at the tile level, with metal underneath the tile. It is recommended that the "L" METAL be cut into 16" lengths, and the bottom 1" be cut and bent to cover the bottom edge of the tile.(as shown) Note how ANGLE METAL extends 3" beyond wall and SADDLE METAL extends 6" beyond wall on each side, then is bent over at flange.

See page 4 for metal details and options.

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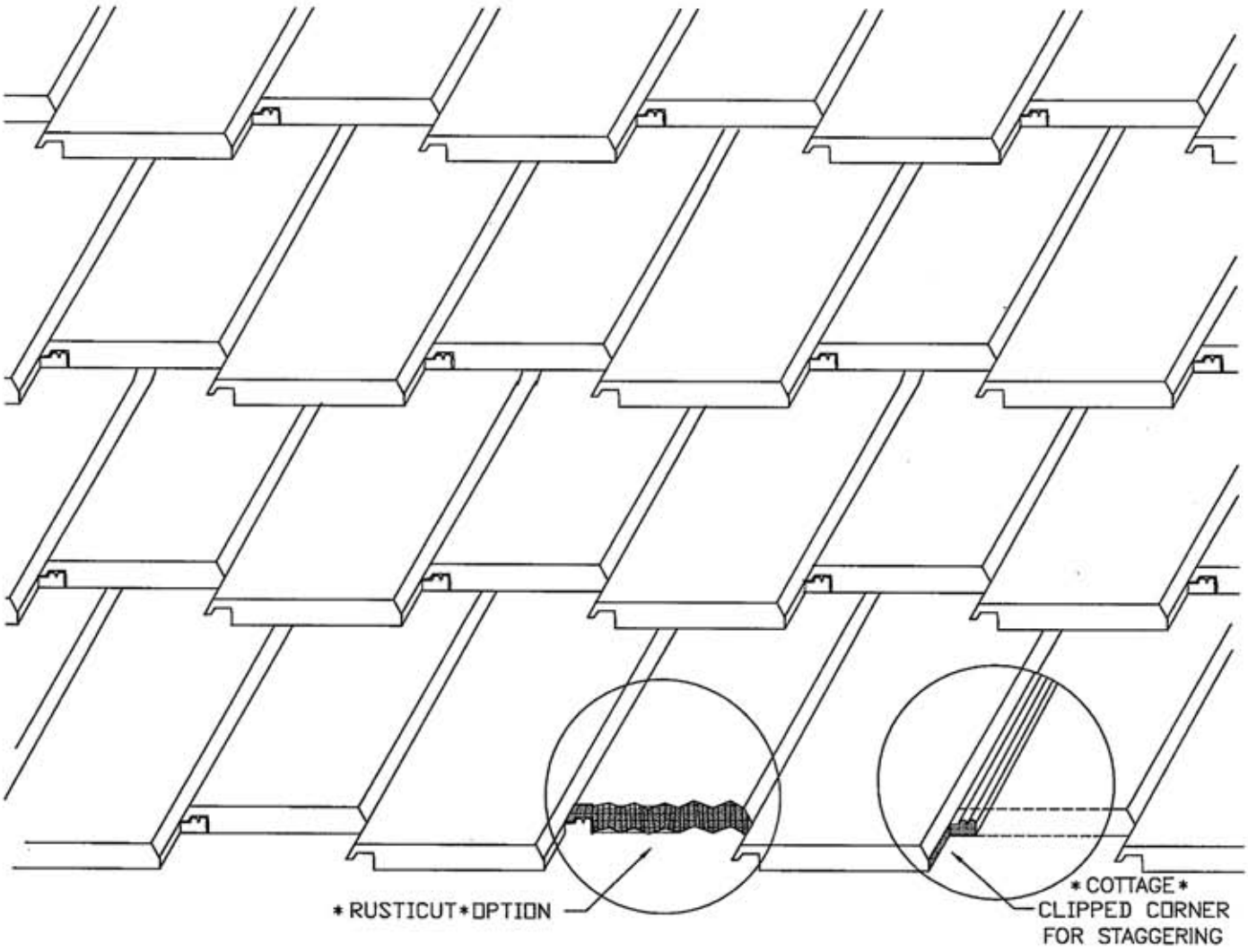
STAGGERED INSTALLATION DETAILS (COTTAGE and RUSTICUT OPTIONS)



BARTILE "OLD WORLD VINTAGE", "SPLIT–TIMBER", & "NEW ENGLAND SLATE" are Available With Modifications of Holes and Corners (COTTAGE) Option, and an Irregular Edge (RUSTICUT) or "RUFF–CUT" Option. These Options Simplify the Installation for a Uniquely Beautiful Roof.

NOTES:

A. For COTTAGE Installation, 1st Batten is 12.5", Balance are 10.5" Maximum.
B. Every Other Field Tile is Raised 1.75" Above the Batten and Nailed to the Batten. (Unnotched)
C. The COTTAGE SERIES Tile are Ready to Install Without Further Modification.
D. The COTTAGE SERIES Requires 12% addl. Tile & Horiz. Battens & Adds Aprox. 12% Weight.
E. The RUSTICUT Option Does Not Alter the Spacing or Weight.
F. The RENAISSANCE SERIES Offers a Virtually Unlimited Range of Colors, Blends, and Textures.
G. Trim Units, Underlayment, and Metal are Generally Unaffected by Staggering of Field Tile.

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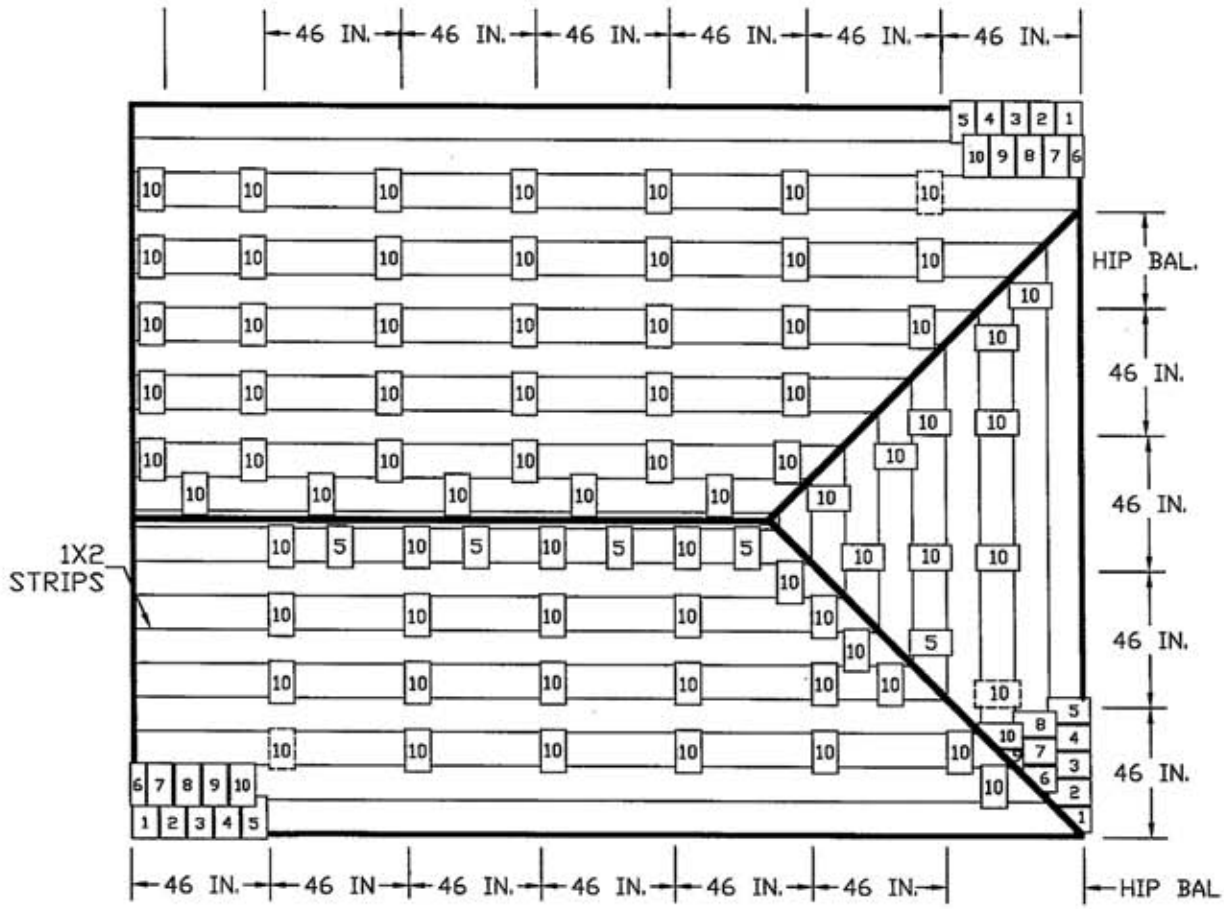
Installation Specifications and Guide

RECOMMENDED ROOF STOCKING LAYOUT



SAFETY *NOTICE* BARTILE IS SHIPPED STRETCH WRAPPED, ON SINGLE SIDED PALLETS * NEVER STAND ON ELEVATED SHIPPING PALLET * NEVER LIFT PALLET ABOVE PEOPLE * NEVER UNLOAD A SUSPENDED PALLET * ALWAYS UNLOAD OUTSIDE AND TOP ROWS FIRST, KEEP PALLET LOAD BALANCED AND IN CENTER * NEVER STACK TILE IN AN UNSECURE MANNER ON THE ROOF * THE CUSTOMER MUST ACCEPT RESPONSIBILITY FOR THE SAFE HANDLING OF PALLETS AND TILE

4. Illustrated, is the SPLIT–TIMBER/NEW ENGLAND SLATE Stacking Procedure, the

NOTES ON STACKING BARTILE:

1. The Tile are Generally Stocked in Stacks of 10 Pieces per Stack.
2. Each Stack of 10 Tile Will Cover Two Courses, Five Tile Wide.
3. Skipping the First Strip, Place Each (10 Tile) Stack on Every Two Strips.
4. Illustrated, is the "SPLIT–TIMBER"/"NEW ENGLAND SLATE" Stacking Procedure, the SIERRA MISSION and EUROPEAN Designs Lay in the Opposite Direction.
5. Stack Extra Tile at Hips, Valleys, and Rakes to Allow For Cut Tile and Waste.
6. Place the Stacks in Vertical Rows, Unless Interrupted by Pipes, Hips and Valleys.

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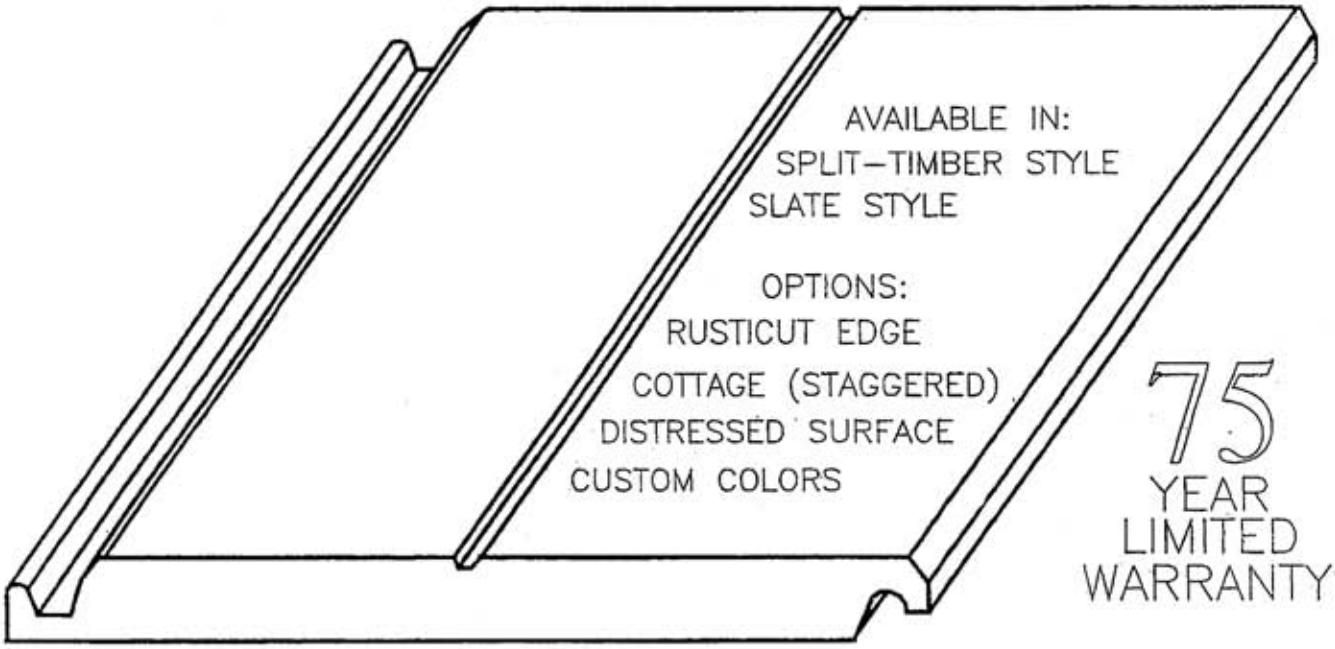
U.S.PATENT NO. 6,233,895

The Strongest–Most Durable –Easiest to Install Flat Concrete Roof Tile on the Market. Excedes CODE Requirements by a Wide Margin



LEGENDARY PROFILE

A Beautiful Roof Tile, so INNOVATIVE, so SIMPLE and INEXPENSIVE to Install, That Ordinary Roofing Products Pale by Comparison.

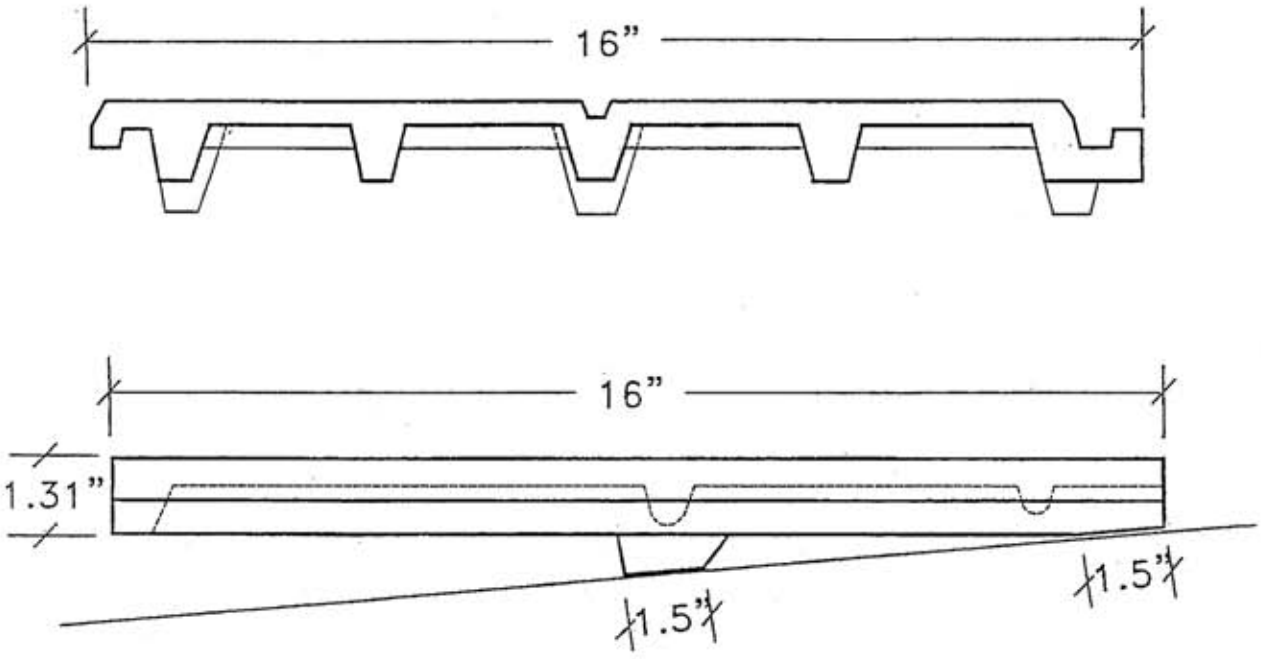
IDEAL FOR CHURCHES, HOTELS, RESTAURANTS, SHOPPING CENTERS, SKI RESORTS, APARTMENTS, COMMERCIAL BUILDINGS CONDOMINIUMS, HOMES, SEVERE CLIMATE INSTALLATIONS, ETC

APPROX. INSTALLED WT.:ULTRALITE 7.5 LBS/SQ.FT.–STD WT.10.5 LBS/SQ.FT.

 BARTILE ROOFS INC. 725 NO. 1000 W. CENTERVILLE, UT 84014 PHONE (801) 295-3443

LEGENDARY ULTIMATE ROOF TILE

The HIGH–STRENGTH Tile With a COLD ROOF SYSTEM Built in.



LEGENDARY ULTIMATE ROOF TILE has FREE AIR FLOW, Eave to Ridge, Between the Tile and Underlayment, to Remove HEAT BUILDUP Naturally, Through Convection Air Movement. This Important Innovation Reduces Ice Buildup in Winter, and Keeps the Building Cooler in the Summer.

Note that there are 8 Deck Bearing Points on each tile, to Distribute the Live Load, and Reduce Underlayment Scuffing.

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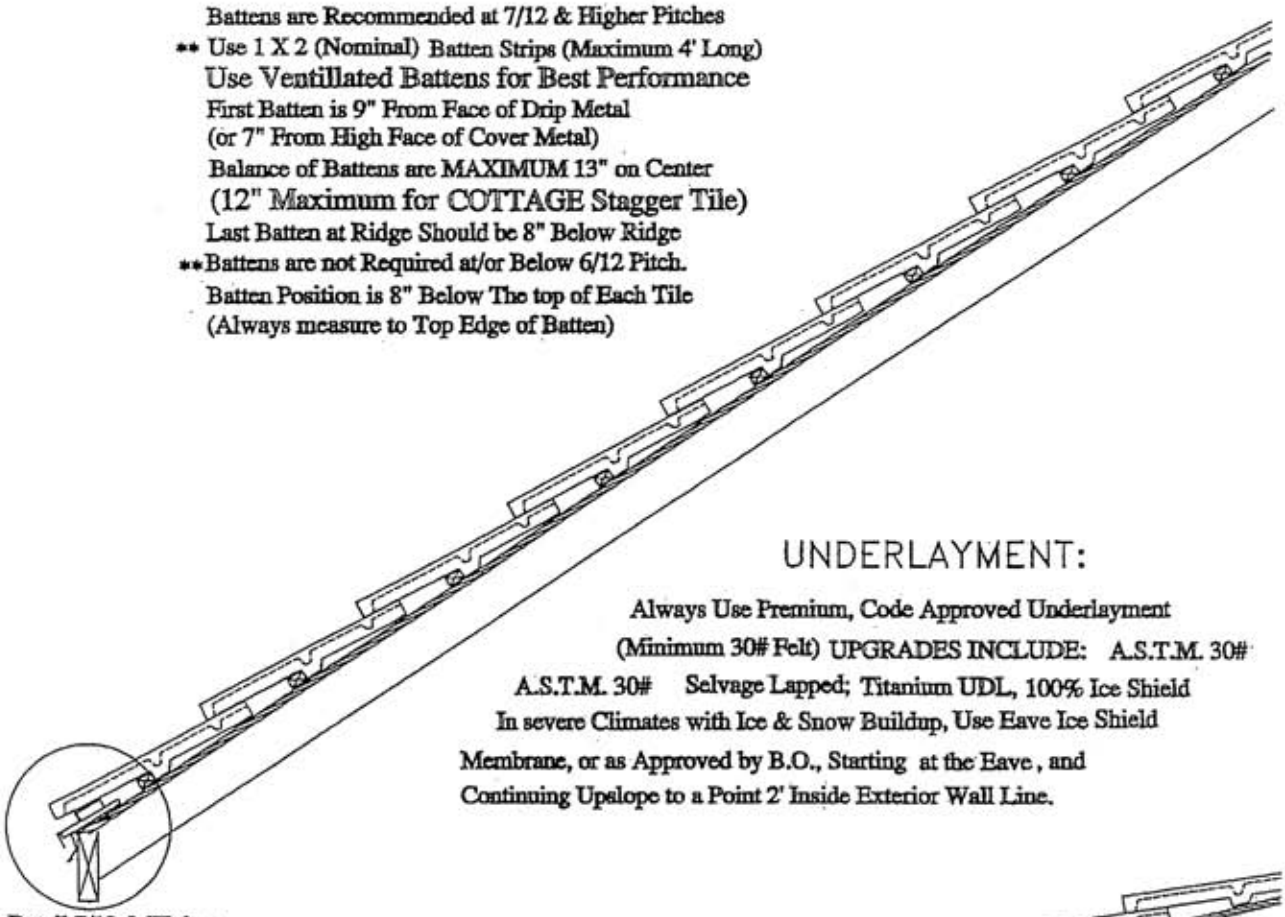
WHEN TO USE BATTEN STRIPS:

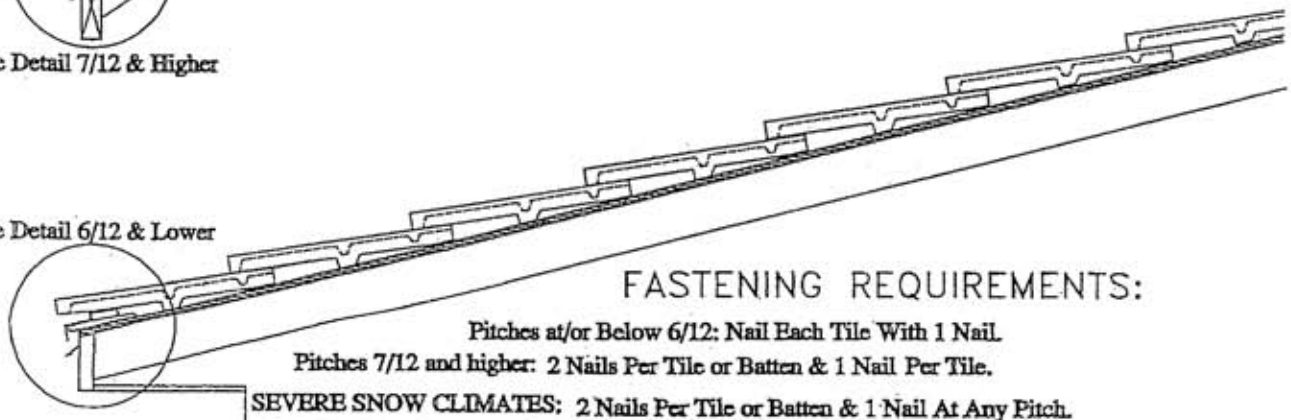
Battens are Recommended at 7/12 & Higher Pitches
** Use 1 X 2 (Nominal) Batten Strips (Maximum 4' Long)
Use Ventillated Battens for Best Performance
First Batten is 9" From Face of Drip Metal
(or 7" From High Face of Cover Metal)
Balance of Battens are MAXIMUM 13" on Center
(12" Maximum for COTTAGE Stagger Tile)
Last Batten at Ridge Should be 8" Below Ridge
**Battens are not Required at/or Below 6/12 Pitch.
Batten Position is 8" Below The top of Each Tile
(Always measure to Top Edge of Batten)



Eave Detail 7/12 & Higher

UNDERLAYMENT:

Always Use Premium, Code Approved Underlayment
(Minimum 30# Felt) UPGRADES INCLUDE: A.S.T.M. 30#
A.S.T.M. 30# Selvage Lapped; Titanium UDL, 100% Ice Shield
In severe Climates with Ice & Snow Buildup, Use Eave Ice Shield
Membrane, or as Approved by B.O., Starting at the Eave, and
Continuing Upslope to a Point 2' Inside Exterior Wall Line.



Eave Detail 6/12 & Lower

FASTENING REQUIREMENTS:

Pitches at/or Below 6/12: Nail Each Tile With 1 Nail.
Pitches 7/12 and higher: 2 Nails Per Tile or Batten & 1 Nail Per Tile.
SEVERE SNOW CLIMATES: 2 Nails Per Tile or Batten & 1 Nail At Any Pitch.
Nails Shall be Per UBC 15-D-1/2, 2 1/2" in Length.
In Designated High Wind Areas: Fasten Nose of Eave Tile With Wind Clip.
Fasten Standard Weight & Light Weight Tile in The Same Manner.

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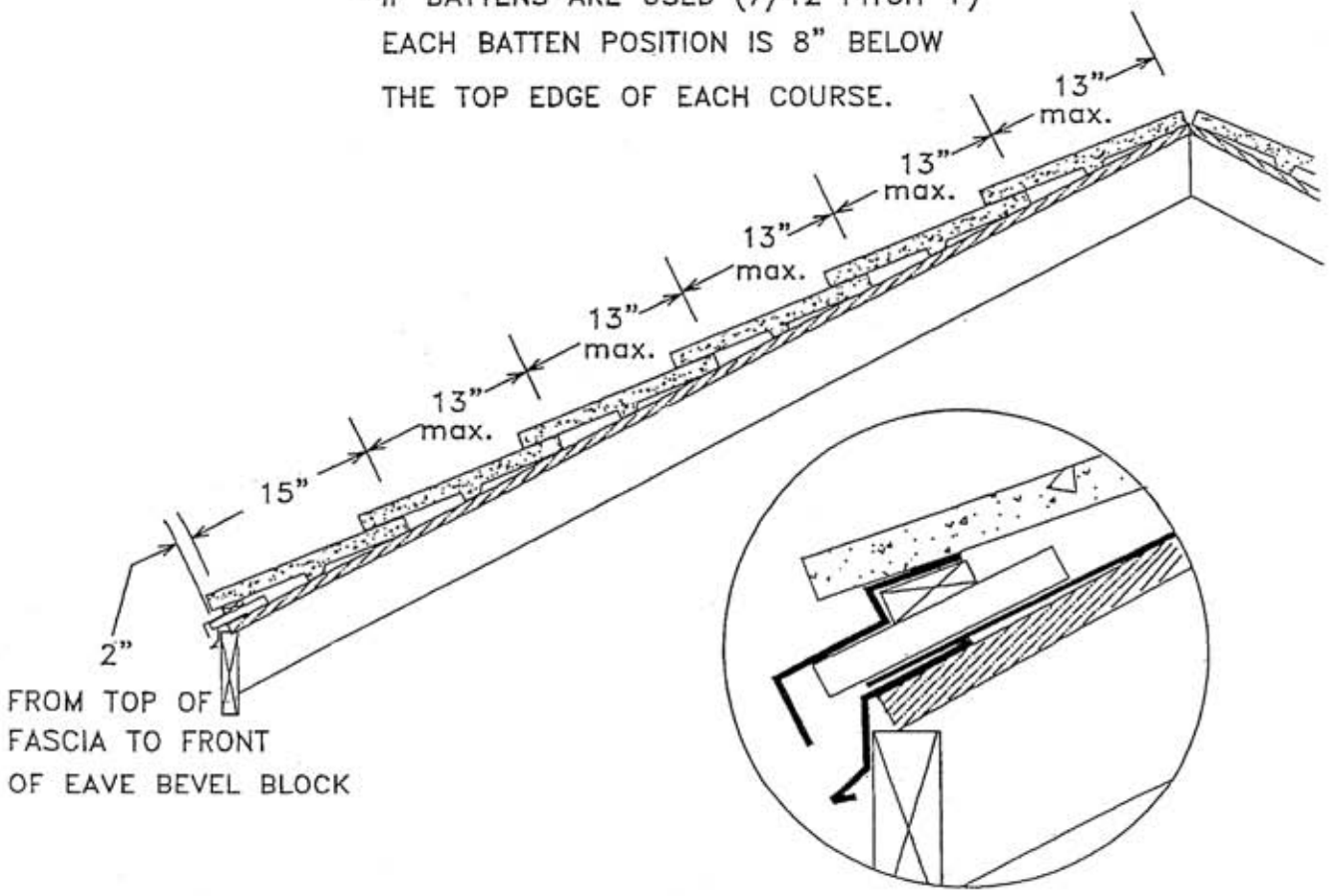
TILE COURSE LAYOUT

TILE SHOULD BE LAID IN STRAIGHT, UNIFORM COURSES (MAXIMUM 13") ON CENTER, LAID TO A CHALK LINE FOR EACH COURSE.

**IF BATTENS ARE USED (7/12 PITCH +) EACH BATTEN POSITION IS 8" BELOW THE TOP EDGE OF EACH COURSE.



** COTTAGE CUT TILE REQUIRE 12" MAXIMUM PER COURSE LAYOUT TO MAINTAIN MINIMUM 3" COURSE OVERLAP

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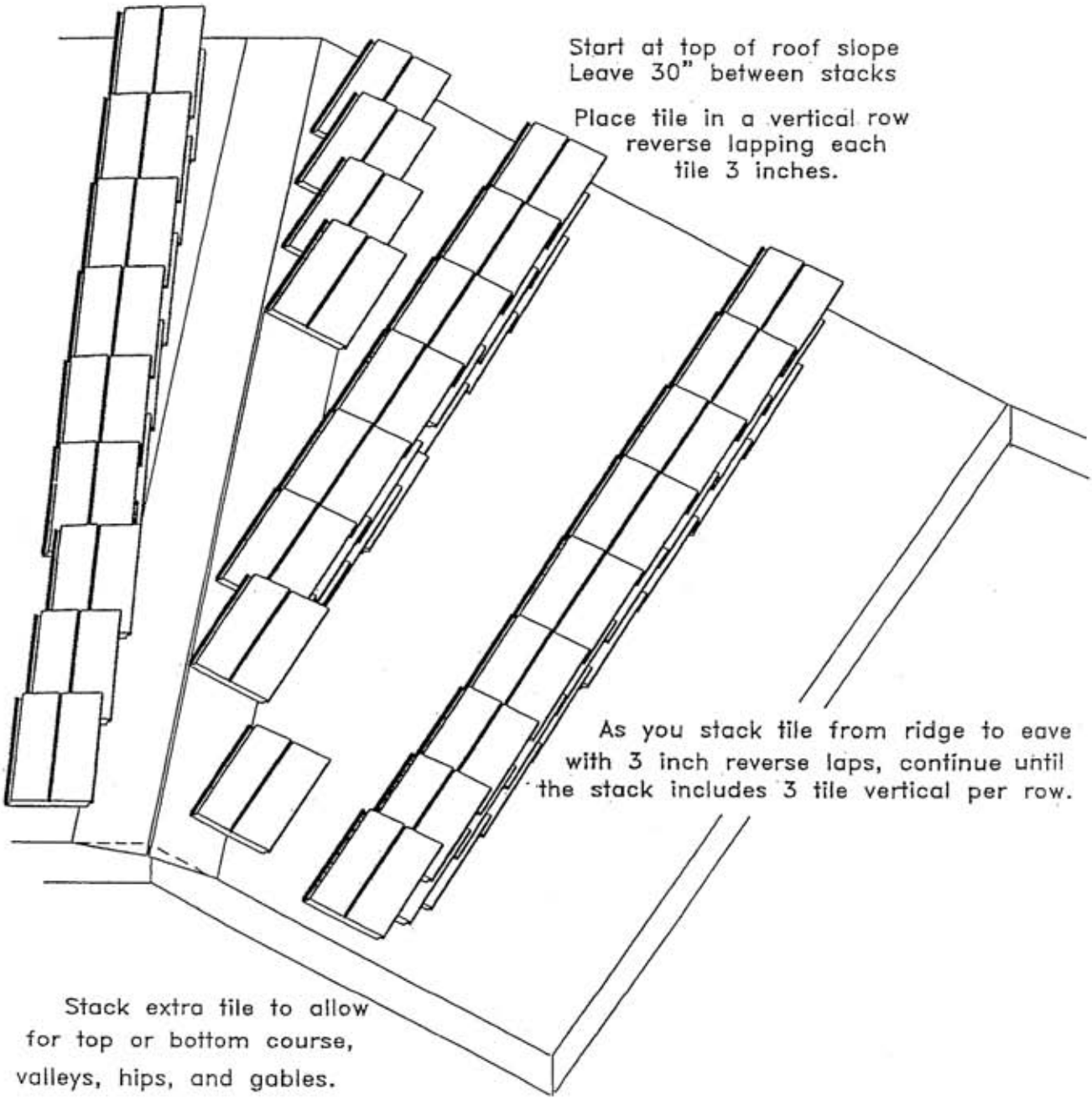
U.S.PATENT NO. 6,233,895

LEGENDARY TILE STACKING LAYOUT



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Attachment F

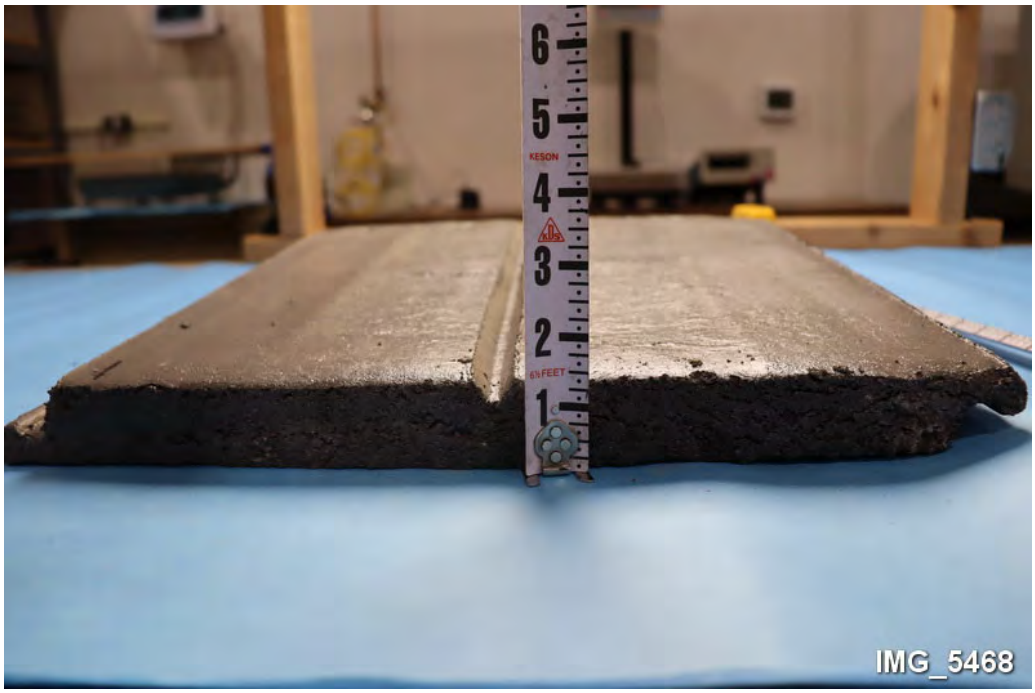
Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

F1. Top of Legendary Slate Tile.

F2. Top of Legendary Slate Tile.

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

F3. Bottom of Legendary Slate Tile



F4. Edge of Legendary Slate Tile

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

F5. Overview of test setup with Haag IBL-7 ice ball launcher.

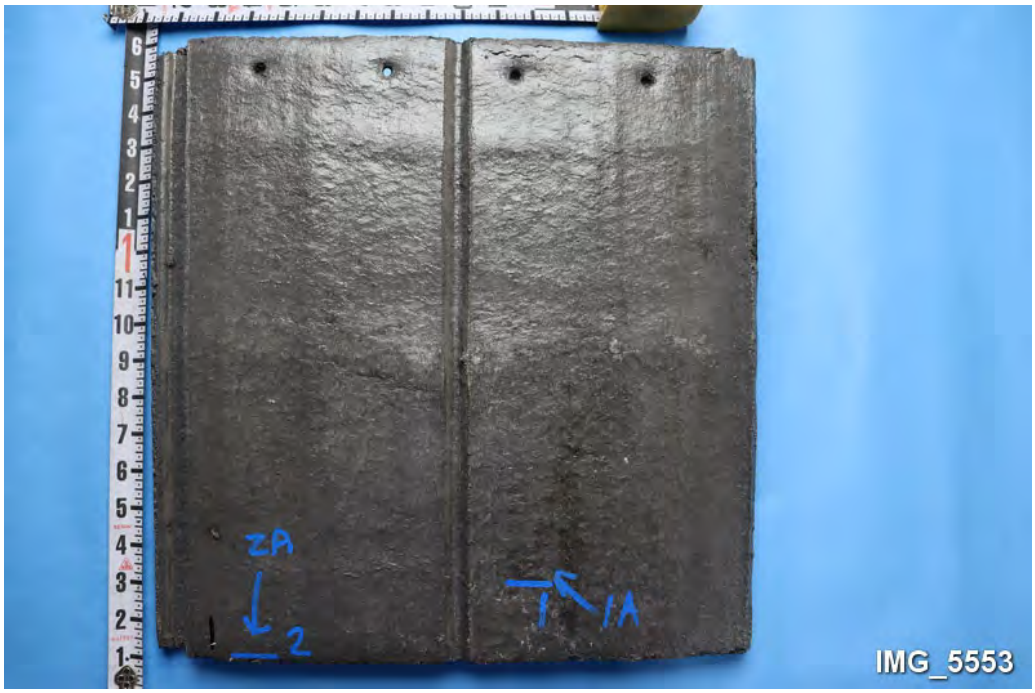
F6. Overview of test panel before impact testing.

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

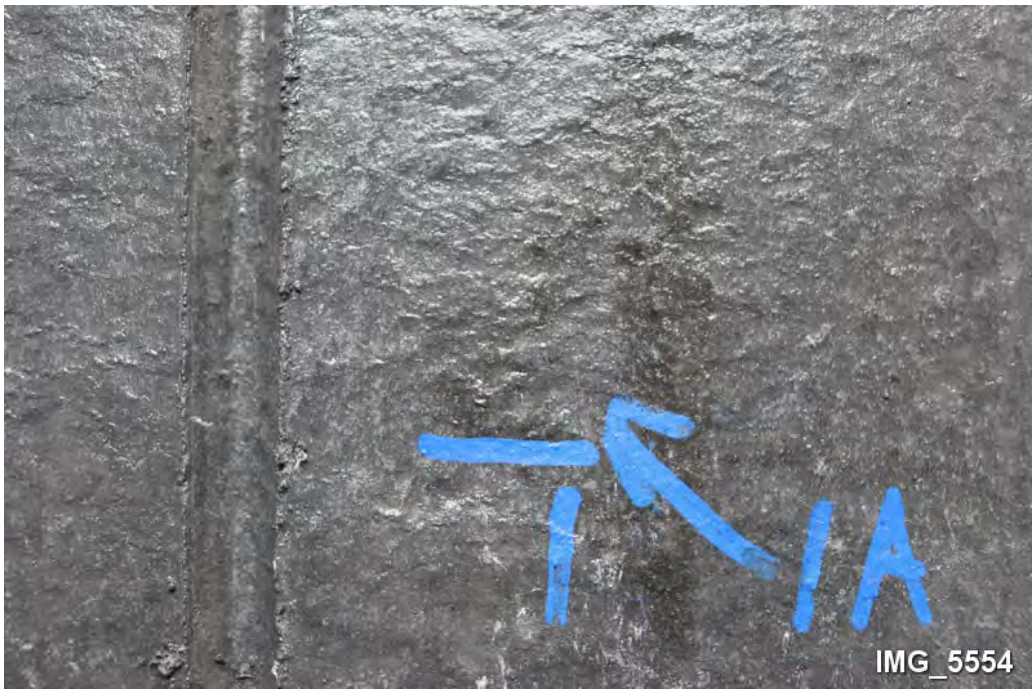
F7. Overview of test panel after impact testing.

F8. Top of Tile 1 before impact testing.

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

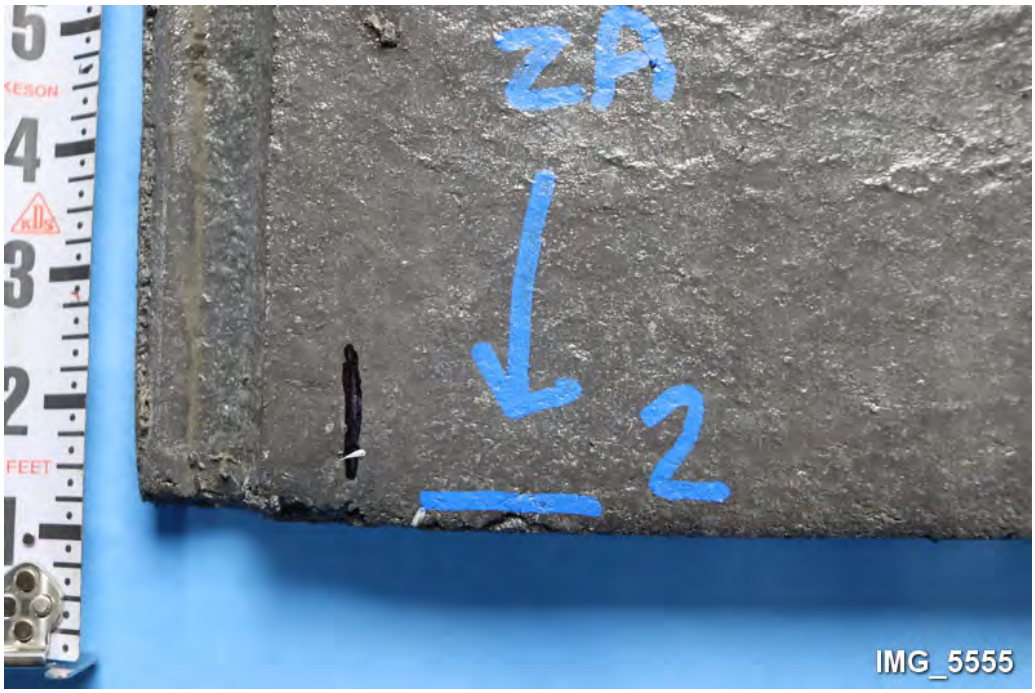


F9. Top of Tile 1 after impact testing. (Note 4 impact locations marked with paint.)

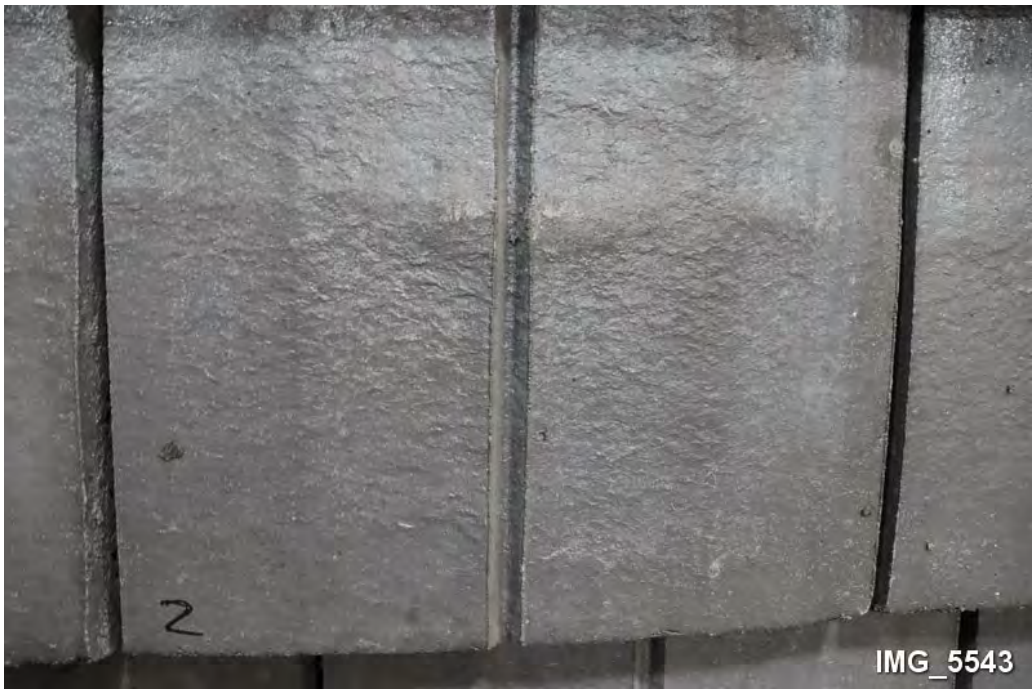


F10. Close-up of Impacts 1 and 1A.

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196



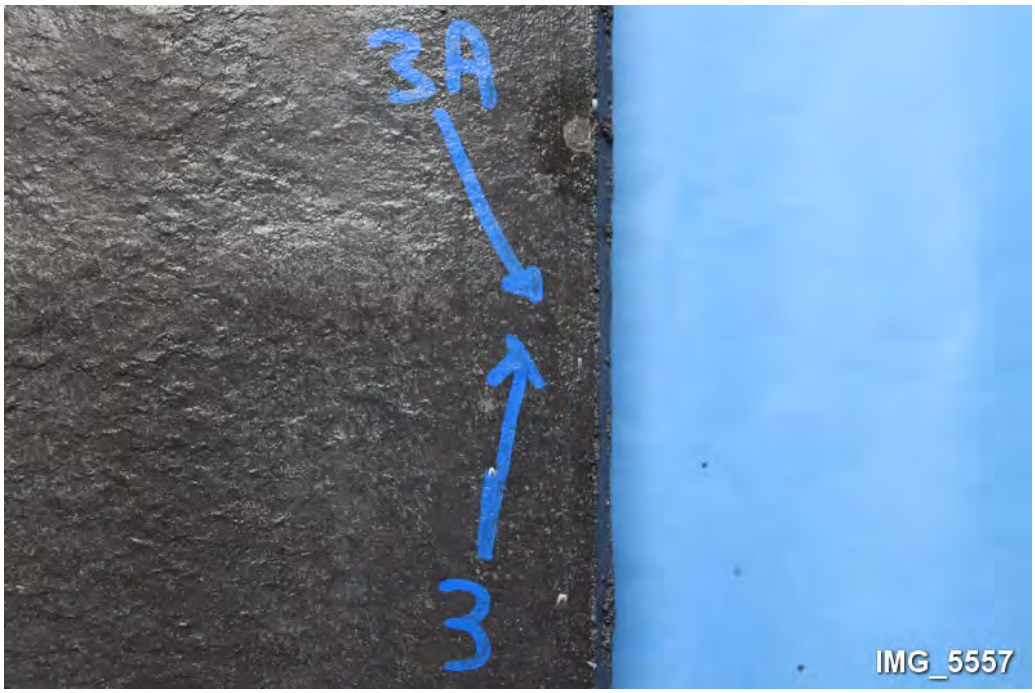
F11. Close-up of Impacts 2 and 2A.



F12. Top of Tile 2 before impact testing.

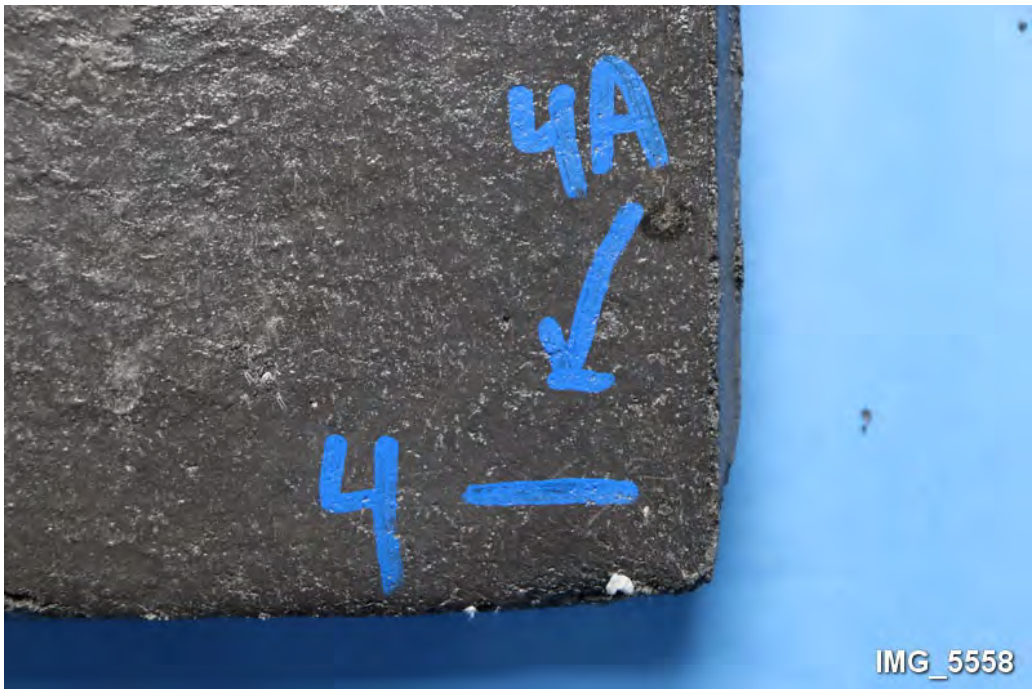
Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196

F13. Top of Tile 1 after impact testing. (Note 4 impact locations marked with paint.)



F14. Close-up of Impacts 3 and 3A.

Bartile ANSI/FM 4473 Tile Testing : Impact Testing
Lab Attachment F - Legendary Slate 1 Photographs
Haag File No: 51250008TX-196



F15. Close-up of Impacts 4 and 4A.

Lab Attachment G

SECTION 073216 - CONCRETE ROOF TILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Concrete roof tiles.
2. Tile accessories
3. Self-adhering sheet underlayment.
4. Ridge Ventilation System
5. Drip Metal at Eave

B. Related Sections include the following:

1. Division 06 Section "Rough Carpentry" for wood Decking, Blocking, and Fascia’s.
2. Division 07 Section "Sheet Metal Flashing and Trim" for metal not part of this Section.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079, glossaries in RTI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS:

A. Samples for Initial Selection: For each type of concrete tile and concrete tile accessory indicated.

1. Include similar Samples of trim involving color selection.

B. Samples for Verification: For the following products, of sizes indicated, to verify color selected.

1. Concrete Tile: Full size.
2. Concrete Tile Accessories: Full size.
3. Fasteners: Stainless Steel, or Hot Dipped Galvanized, Ring Shak
4. Self-Adhering Underlayment: 12 inches square.

C. Material Test Reports: For each type of tile.

D. Research/Evaluation Reports: For concrete tiles, fasteners, and fastener systems.

E. Maintenance Data: For concrete tile roofing to include in maintenance manuals.

F. Warranties: Special warranties specified at the end of this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain concrete tiles and concrete tile accessories through one source from a the manufacturer.

B. Fire-Test-Response Characteristics: Provide concrete tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class **A**; UL 790 or ASTM E 108 for application and roof slopes indicated.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution, if requested.

1. Approval of mockups is also for material and construction qualities specifically approved by Architect in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.

1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress. Stack Rolls on Ends only.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.

1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

A. Special Concrete Roof Tile Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace tile that fails in materials within specified warranty period. Material failures include manufacturing defects that result in leaks.

1. Material Warranty Period: 50 years from date of Substantial Completion.

B. Special Roofing Installer's Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of concrete tile roofing that fail in materials or workmanship within the following warranty period:

1. Warranty Period of Installer: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but may not be limited to, products specified.
2. Products: Subject to compliance with requirements, provide the products specified.
3. Manufacturers: Subject to compliance with requirements, provide products by of the manufacturers specified.

2.2 CONCRETE TILE

A. Products:

1. Bartile Roofs Inc; Legendary Roof Tile: Slate or Shake Design.

B. Concrete Tile: ASTM C 1492, extruded-concrete roof tile units of shape and configuration indicated, with integral color, and free of surface imperfections. Provide with fastening holes predrilled at factory when manufactured.

1. Weight: Standard weight.
   Low-Profile Shape: Flat Style Interlocking Concrete Roof Tile
2. Side Configuration: Interlocking
3. Size: 16” x 16”

4. Colors, Blends, and Textures: As selected by Architect from manufacturer's Standard Color Selection in either Legendary Slate or Shake Profiles.

ACCESSORIES

C. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

E. Elastomeric Sealant: Polyurethane based joint sealant; of Grade NS, Class 25, Use NT related to exposure, and, as applicable to joint substrates indicated.

F. Roofing Asphalt: DO NOT USE.

G. Cold-Applied Adhesive: DO NOT USE.

H. Foam Adhesive: Two-component polyurethane expanding adhesive as recommended for application by tile manufacturer.

I. Mortar: Synthetic Mortar**,** similar color to selected tile, for concealed-from-view mortar.

J. Eave Closure, Tile Riser: Manufacturer's standard eave closure/Booster formed to shape of tile.

K. Ridges and Hips: Use Manufacturer's standard Ridge/Hip tile, and Hip Starter Tile.

L. Ventilating Battens**:** Synthetic Ventilating Battens by Battens Plus.

M. Hip and Ridge Storm-block Rolls: 9” by 25’ Self Adhesive Butyl Adhesive Backed Colored Aluminum corrugated 25’ Rolls.

2.3 FASTENERS

A. Roofing Nails: ASTM F 1667, Hot-dipped galvanized steel, or Stainless Steel, sharp-pointed, roofing nails with barbed shanks; minimum 7/16-inch diameter head; and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or sheathing.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing, or Stainless Steel.

B. Self-adheared Underlayment Nails: None normally needed, otherwise use (A) roofing nails.

C. Ventilating Batten Fasteners: ASTM F 1667, Minimum ½" Crown steel wire staples, gun driven.

D. Wire Ties: For supporting small Valley cut tile pieces, use Stainless Steel if required..

E. Twisted-Wire-Tie System: Continuously twisted two-wire unit with loops formed 6 inches apart, minimum diameter stainless-steel wire and 0.037-inch diameter stainless steel tie wires with matching-metal folding clip anchors if required

1. Tile Wire Products:

a. Newport Fastener Company, Inc.; Twisted Wire Tyle Tye.
b. Wire Works, Inc. (The); Twisted Wire Works System.

F. Storm Clips: Stainless steel strap-type, 0.04-by-1/2-inch (1.0-by-13-mm) L-shaped retainer clips designed to secure side edges of tiles. Provide with two fastener holes in base flange.

1. Hurricane resistive Products:

a. Newport Fastener Company, Inc.; Storm Lock Side Clips.
b. Wire Works, Inc. (The); Grip McClips.

2.4 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40 mils thick, or greater; slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Products:

a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; WIP-300HT

2.5 SHEET METAL FLASHING AND TRIM

B. Sheet Metal Flashing and Trim: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

1. Sheet Metal: Stainless Steel, or by Architect..

C. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

1. Apron Flashings: Fabricate with lower flange extending a minimum of 6 inches over and 4 inches beyond each side of downslope tile roofing and[**6 inches** up the vertical surface.
2. Step Flashings: Fabricate with a 3-inch (75-mm) headlap extending a minimum of 4 inches 5 inches over the underlying tile roofing and 4 inches up the vertical surface.

3. Channel Flashings: Fabricate with vertical surface extending a minimum of 4 inches above the tile and 6 inches beneath the tile roofing and with a 1-inch high vertical return to form a runoff channel.Retain subparagraph below for metal pan or channel flashings acting as an internal gutter at rake edge fasciae. Revise dimensions to suit Project.

4. Chimney Saddle Flashings: Fabricate with concealed flange extending a minimum of 18" beneath upslope tile roofing, 4 inches beyond each side of chimney or skylight, and 6 inches above the roof plane.
5. Closed-Valley Flashings: Fabricate in lengths not exceeding 10 feet, with 1-inch-or more high, inverted-V Rib at center of valley and with equal flange widths of 16 inches.
6. Drip Edges: Fabricate in lengths not exceeding 10 feet , with 6-inch (50-mm) roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.

D. Vent-Pipe Flashings: Stainless Steel or Lead Type L51121, at least 1/16 inch (1.6 mm) thick. Provide sleeve sized to slip over or turn down into pipe, soldered to skirt at slope of roof and extending at least 6 inches beyond pipe onto roof (FHA Rated).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through roof.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayments according to tile manufacturer's written recommendations

1. Cover **ridge** and/or **hip** wood nailers with underlayment strips.

B. Single-Layer Roof Self Adhearing Membrane Underlayment: Install perpendicular to roof slope in parallel courses. Lap sides a minimum of 3-1/2 inches or to Manufacturers marked line, over underlying course. Lap ends a minimum of 6 inches. Stagger end laps between succeeding courses at least 4'. Verify that underlayment is sealed to deck.

C. Self-Adhering Sheet Underlayment: Install wrinkle free, complying with low-temperature installation restrictions of underlayment manufacturer if applicable. Install on entire roof

surface, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm), staggered 24 inches (600 mm) between succeeding courses. Roll laps with roller. Cover underlayment with tile within thirty days.

1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
2. Install self-adhering sheet underlayment over entire roof deck.

D. Metal-Flashed Closed Valley Underlayment: Install 1 additional layer of 36-inch- (914-mm-) wide self-adhering underlayment centered in valley. Stagger end laps between layers at least 72 inches (1830 mm). Lap ends of each layer at least 12 inches (300 mm) in direction to shed water.

1. Lap roof-deck underlayment over previously installed layer of valley underlayment at least 6 inches.

3.3 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

1. Install metal flashings according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.

C. Step Flashings: Install with 3-inch headlap extending over the underlying tile and up the vertical surface. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.

D. Chimney or Cricket Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.

E. Closed Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches (200 mm) in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.

1. Secure hemmed flange edges with metal cleats spaced 18 inches apart and fastened to roof deck.
2. Adhere 18 wide strips of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.

F. Channel Flashings: Install over underlayment and fasten to roof deck.

G. Rake Drip Edges: Install over underlayment and fasten to roof deck.

H. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.

I. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.

J. Ridge Ventilation System: Install centrally and mechanically fasten to ridge. Adhere each side to roof tile in elastomeric sealant.

1. Install Ridge Vent fabric mesh over roof deck air ventilation gaps to prevent insect entry.

3.4 BATTENS

A. Install 2x wood nailers at ridges and hips, and securely fasten to roof deck.

B. Install Ventilated Battens at Eave (tile riser) course, and on all roof slopes 7/12 and higher.

3.5 CONCRETE TILE INSTALLATION

A. General: Install roof tiles according to manufacturer's written instructions and recommendations in RTI/WSRCA's "Concrete Roof Tile Design requirements.

1. Maintain uniform exposure and coursing of tiles throughout roof.
2. Extend tiles 1-2 inches (50 mm) over eave fasciae.
3. Nail Fastening: Hand fasten nails to clear the tile so the tile hangs from the nail and is not drawn up.

    a. Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck, such as at valleys, and fasten to nails driven into deck.
4. Install storm clips to capture edges of longitudinal sides of tiles and securely fasten to roof deck, if directed by Architect for high winds.

5. Cut and fit tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with synthetic mortar.
6. Install tiles with color blend approved by Architect.

Legendary Flat Tile Installation:

1. Maintain minimum 3-inch head lap between succeeding tile courses.
2. Offset joints in succeeding courses according to manufacturer’s guidelines.
3. Extend tiles 1 inch minimum over fascia, at eaves.
4. Install ridge tiles in V-ridge configuration with laps facing away from prevailing wind.

5. Install Hip and Ridge tiles in a V-ridge configuration. Anchor each Ridge tile with 2 fasteners to Ridge nailer boards.

6. Install Legendary tile with a one-quarter tile offset on each succeeding course. Each Legendary tile has the appearance of TWO tile in each tile individual piece.

7. Install L-shaped gable Rake tile on Gables..

C. Closed Valleys: Cut tiles at valleys to form straight lines, trimming upper concealed corners of tiles. Maintain uniform gap of 1/4 to 3/4 inch at centerline of valley.

1. Drill or notch cut valley tiles and wire tie to fastener placed clear of valley metal flashing. Do not nail tiles to metal flashing.

3.6 ADJUSTING AND CLEANING

A. Remove and replace damaged or broken tiles.

B. Remove excess tile and debris from Project site.

3.7 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period, of

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. lightning;
b. peak gust wind speed exceeding 100 mph;
c. fire;
d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;

f. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this ____ day of _____Month, 20__ __.

1. Authorized Signature:
2. Full Name:
3. Title:

END OF SECTION 073216

End of Lab Report

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