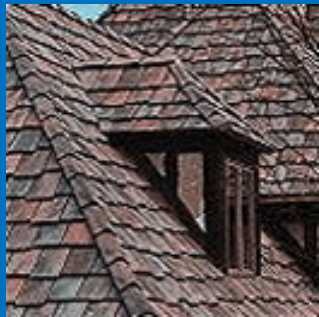


The Basics of Tile Roofing

Rooftop Quality Assurance

Tiles are used in all construction designs



Tile has been documented back centuries in Europe.

Resources



CAN/CSA-A220 Series-06
(approved November 2007)
Concrete roof tiles

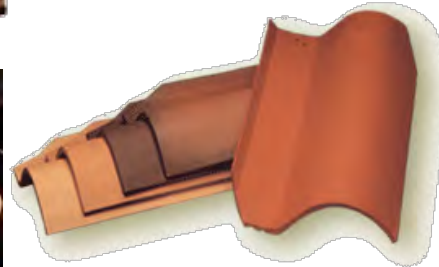


Concrete and Clay Tile Design Criteria for Cold and Snow Regions

*Developed by the Roof Tile Institute and the Western
States Roofing Contractors Association*

Tiles

Come in many styles



Roof Tile Profiles

Flat Profile



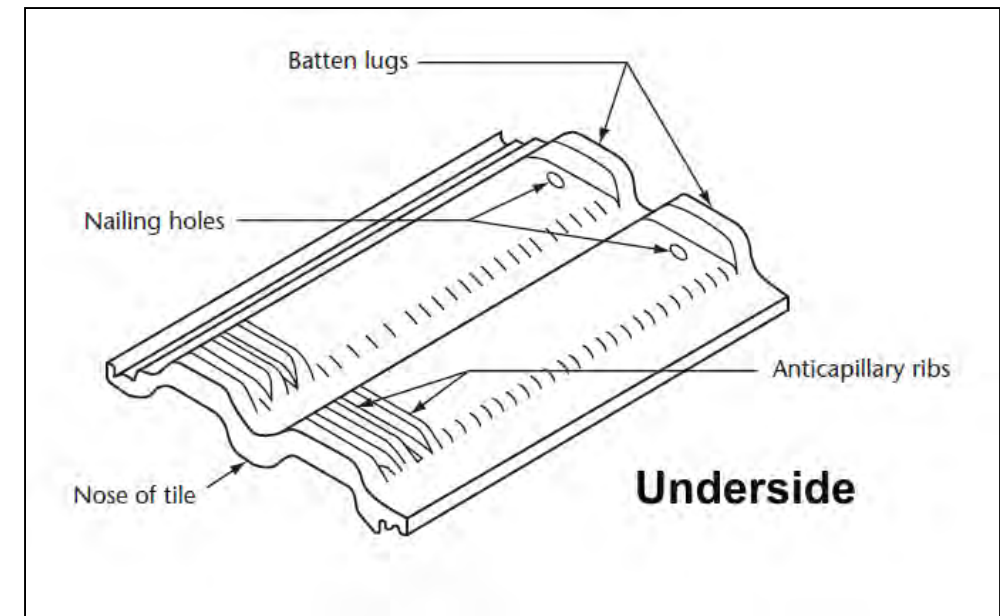
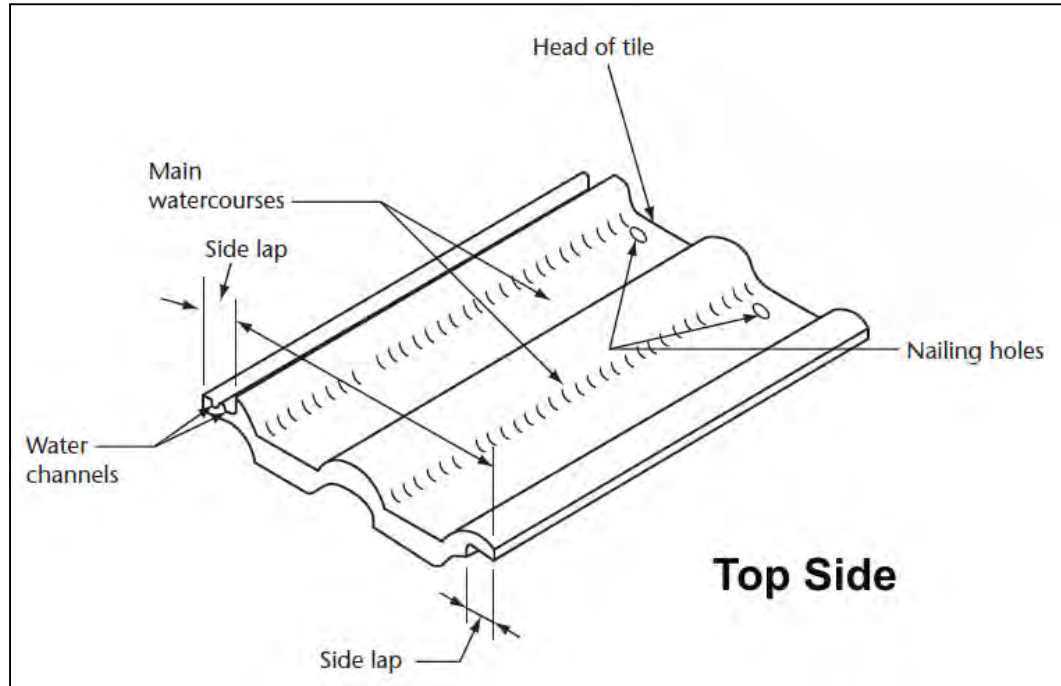
Low Profile



High Profile



Tile Features



History of Tile

- Concrete tile roofs date back over the last century.
- Originally found in Europe and Asia.
- Tiles originally made over a century ago by hand in Europe.



Features & Benefits

- Strength - permanent vs. disposable
- Fireproof - Class A fire rating
- Wind resistant - hurricane tested
- Hail resistant - lifetime warranty
- Appearance - Curb appeal, status
- Affordability - Low life cycle cost
- Energy efficient - Dead air space
- Seismic - USC testing

Misconceptions

- Clay tile = Concrete tile
- Unable to walk on tile roof
- Fiber cement tiles = Concrete tiles



Code Requirements

- CAN/CSA-A220.06, *Performance of concrete roof tiles*
- Physical Properties
 - Transverse strength
 - Water Permeability Water absorption
 - Freeze / thaw resistance Fire rating
- Installation guidelines

Engineering Criteria

- Dead Load - Roofing, sheathing , framing - permanent weight - static load
- Live Load - Same for all materials - accounts for short term loads such as foot traffic, rain (water absorption), wind
- Combined Load = Dead + Live Load
- Structure designed to support Combined Load

Unicrete Weights



TILE SPECIFICATIONS

Tile Type	Thickness	Weight per Tile (g)	Weight per Tile (lbs)	Tile per 100 Sq. Ft.	Installed weight per 100 sq.ft.	Installed weight lbs/sq ft	Installed weight Kg/m2
Estate Tile	11.5 mm body 25mm butt	4400 g	9.7	90/SQ 192/P	873 lbs	8.73	42.6
Estate Tile Lightweight	9.5 mm body 23 mm butt	3900 g	8.59 lbs	90/SQ 210/P	773 lbs	7.73	37.7
Slate Tile	16 mm body 31 mm butt	5400 g	11.89 lbs	90/SQ 192/P	1070 lbs	10.7	52.35
Split Shake Tile	16 mm body 31 mm butt	5400 g	11.89 lbs	90/SQ 192/P	1070 lbs	10.7	52.35

Note: All weights and measurements subject to allowable tolerances set out in CSA-A220.0-SERIES-06
Pallet weight approx. 40 lbs

Roof Deck



The Basics of Tile Roofing

1. BEDDING
2. CHIMNEY (CHASE)
3. RIDGE TILE
4. RIDGE BOARD
5. INTERSECTION OF VALLEY HEADS
6. ROOF TILE (FIELD TILE)
7. VENT PIPE (LEAD FLASHING)
8. RIDGE

9. RAKE TILE
10. SKYLIGHT
11. ABUTMENTS
12. VALLEY
13. GABLE
14. UNDERLAYMENT
15. EAVE PROTECTION & VALLEY

16. FASCIA
17. COUNTER (BATTEN) STRAPPING
18. TILE (BATTEN) NAILING STRIP
19. HIP
20. HIP TILE
21. HIP BOARDS (2"x2")

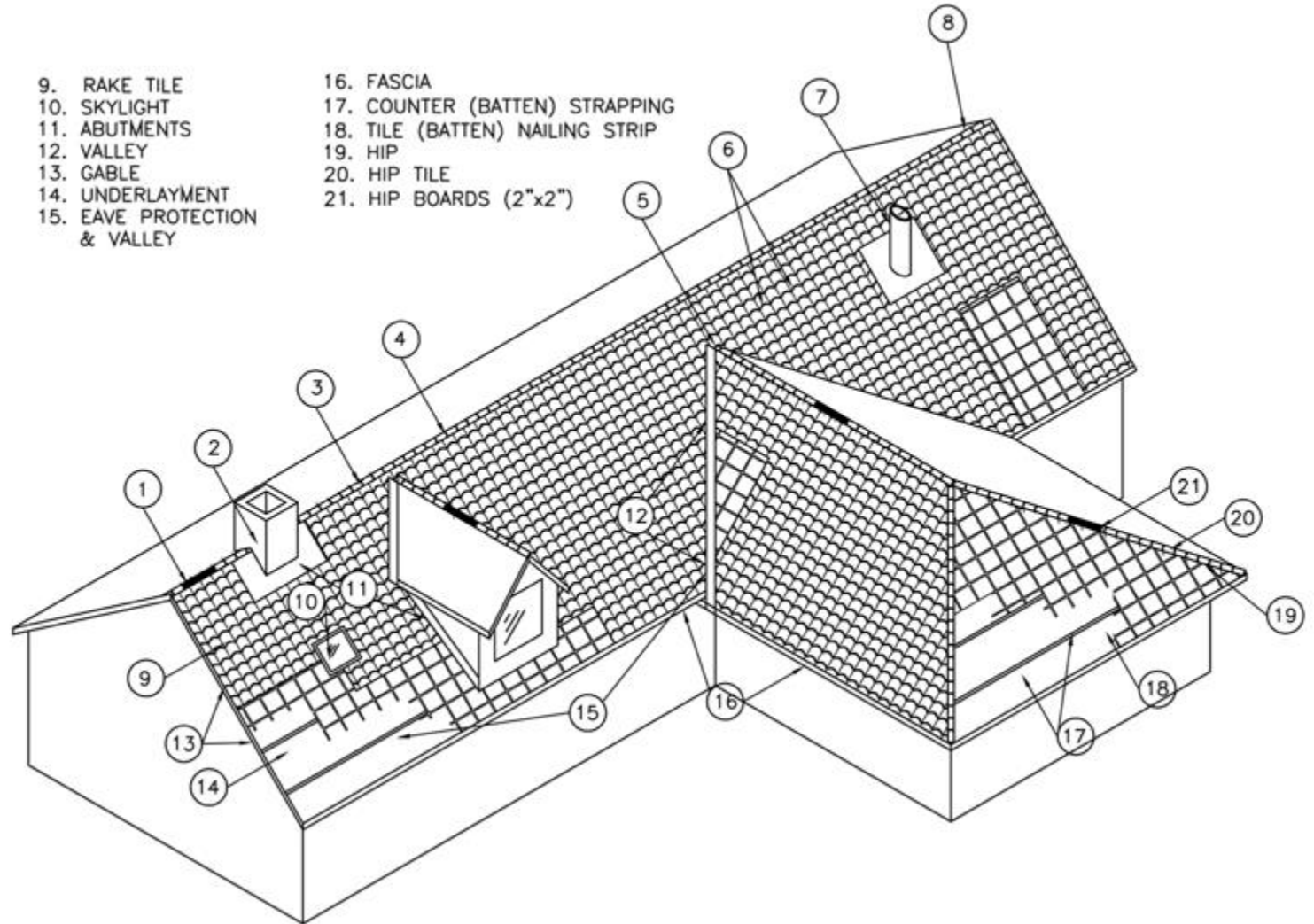


Table 1
Underlayment performance requirements

(See Clauses 4.4.2.1.1, 4.4.2.1.4, 4.4.2.1.5, 4.4.2.2, 4.4.5.2, 4.4.6.2, 4.4.6.4.2, 4.4.6.6.2, and 4.4.6.8.)

(a) For use throughout Canada

Test	Over solid sheathing		Under spaced sheathing	
	Clause	Eave and valley protection	Roll underlayment	Rigid underlayment
Rigidity	4.4.6.2	N/A	N/A	≤ 140 mm
Water permeability	4.4.6.3	No dampness permitted	No dripping permitted	No dripping permitted
Tensile				
Machine direction	4.4.6.4	3.5 kN/m	3.5 kN/m	12.0 kN/m
Cross direction	4.4.6.4	3.5 kN/m	3.5 kN/m	5.0 kN/m
Pliability	4.4.6.5	No cracking or delamination	No cracking or delamination	N/A
Puncture	4.4.6.6	≥ 0.34 J	≥ 0.34 J	≥ 0.34 J
Long-term sag	4.4.6.7	N/A	N/A	≤ 5%
Linear dimensional changes	4.4.6.8	≤ 3%	≤ 3%	N/A

(b) For use in areas having 3500 degree days or less below 18 °C*

Test	Under spaced sheathing			
	Clause	Eave and valley protection	Roll underlayment	Rigid underlayment
Rigidity	4.4.6.2	N/A	N/A	≤ 140 mm
Water permeability	4.4.6.3	No dampness permitted	No dripping permitted	No dripping permitted
Tensile				
Machine direction	4.4.6.4	12.0 kN/m	12.0 kN/m	12.0 kN/m
Cross direction	4.4.6.4	5.0 kN/m	5.0 kN/m	5.0 kN/m
Pliability	4.4.6.5	No cracking or delamination	No cracking or delamination	N/A
Puncture	4.4.6.6	≥ 0.34 J	≥ 0.34 J	≥ 0.34 J
Long-term sag	4.4.6.7	≤ 5%	≤ 5%	≤ 5%
Linear dimensional changes	4.4.6.8	≤ 3%	≤ 3%	N/A

*As defined in the NBCC.

Note: N/A = not applicable.

Underlayment

Roof Slope 2 ½ /12 to 4 /12

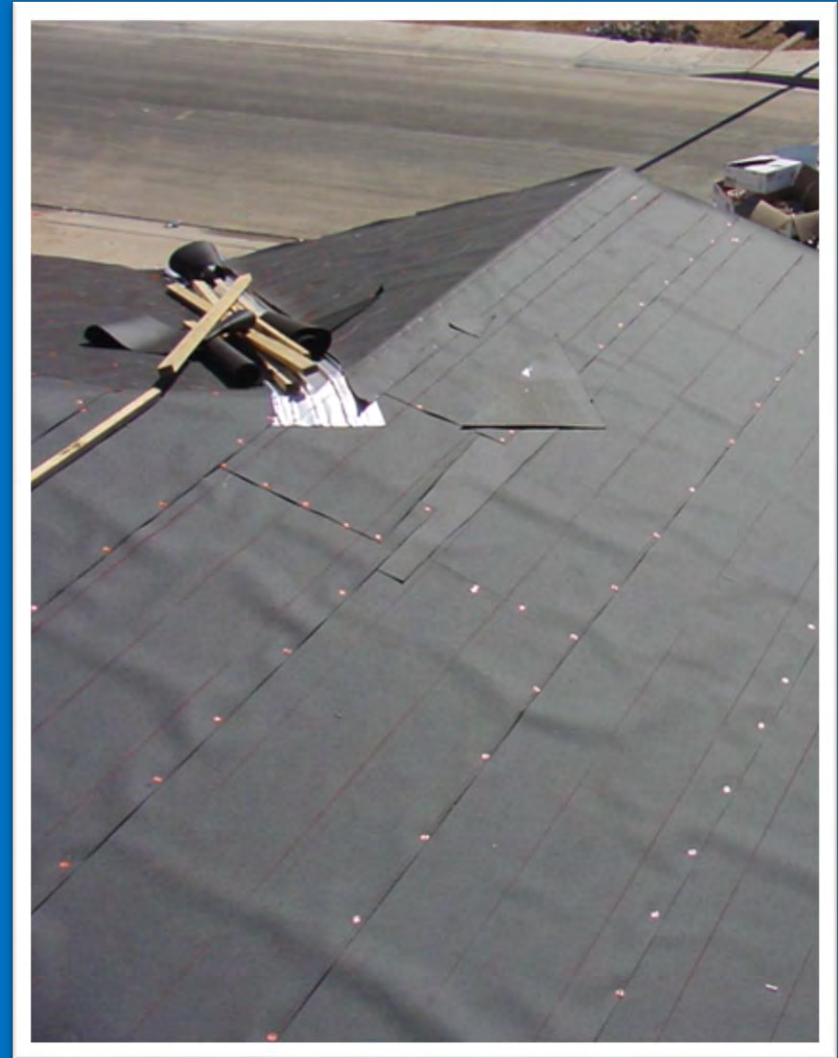
- minimum self adhesive membrane over entire roof; or full approved low slope roofing system installed under the tile.



Underlayment

Roof Slope 4 in 12 and up

- main roof underlay
 - min. #30 felt as per CSA 123.3
- or approved upgrades
 - polypropylene,
 - base sheet,
 - peel and stick



Battens



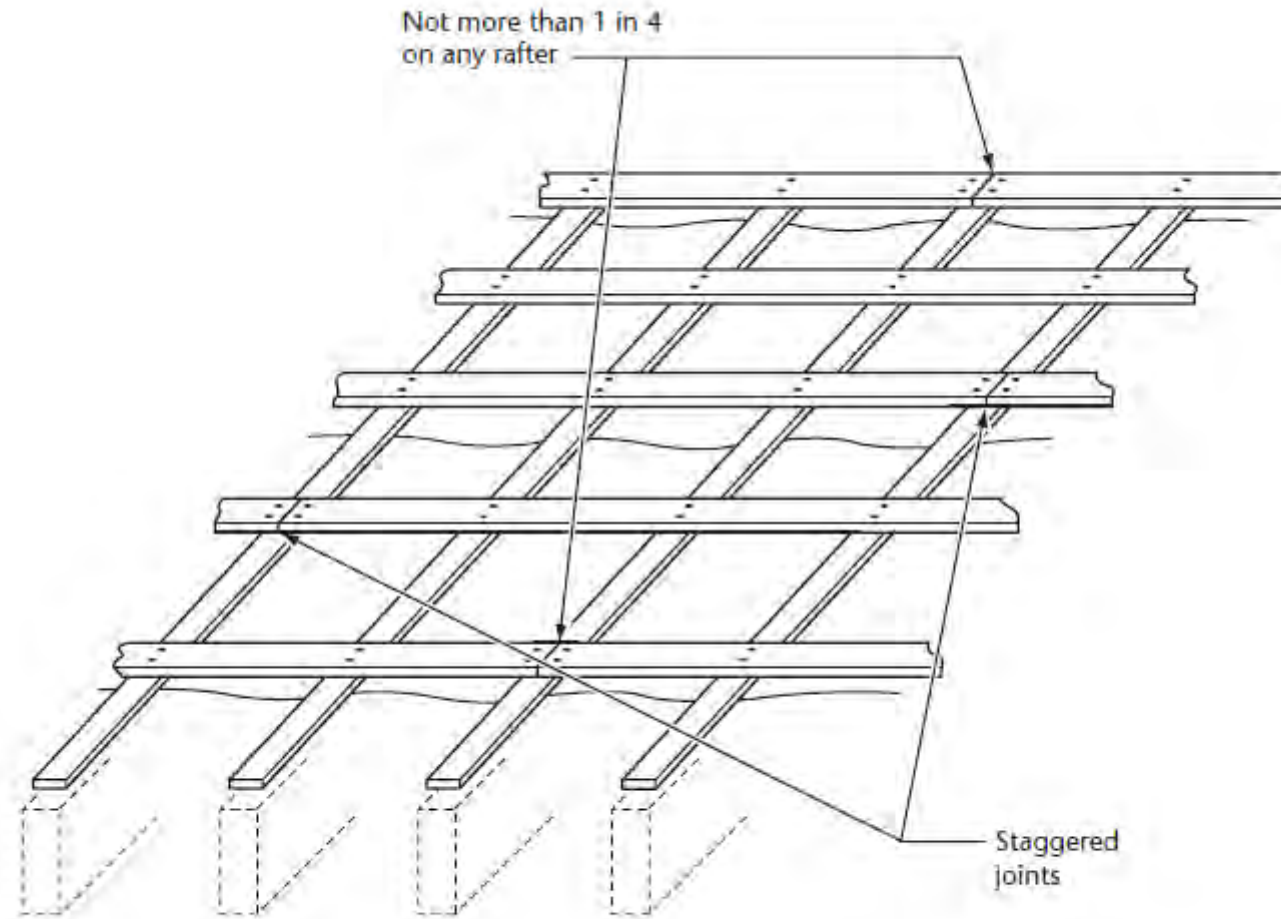
Battens



Counter Battens



Counter Battens



Batten alignment

Fasteners

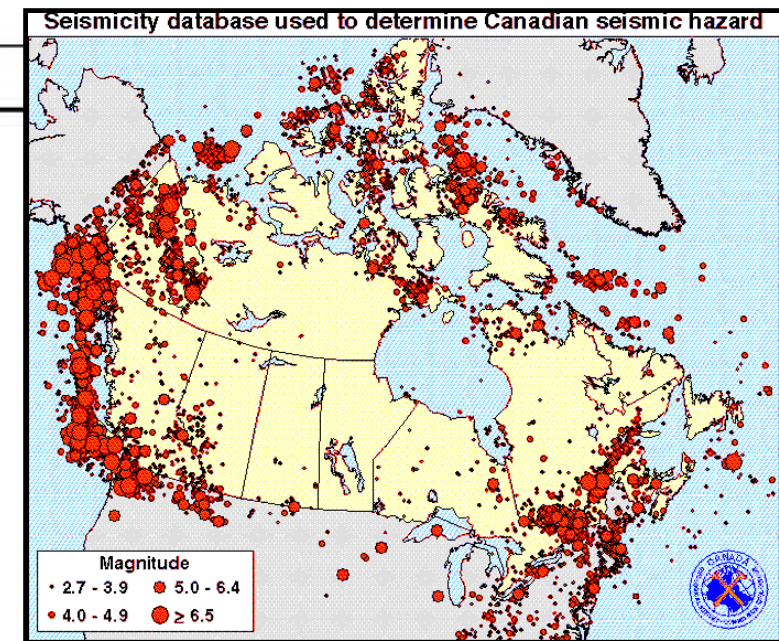
Fastening required for standard weight tiles Standard conditions

Roof slope	Fastening for tile	Perimeter fastening at eaves, gables, hips, and ridges
$\geq 1.3 \leq 1:1.7$	Nail or clip tiles every third course	Nail or clip
$> 1:1.7 \leq 1:1$	Nail or clip tiles every second course	(a) first two courses along eaves; (b) first two courses or tiles each side of hips or ridges; and (c) first two rows in from gables
$> 1:1 \leq 1.25:1$	Nail or clip every tile	Nail or clip every tile
$> 1.25:1$	Nail or clip every tile	Nail or clip every tile

Fasteners

Fastening required for standard weight tiles Seismic zone 4 or greater

Roof slope	Fastening for tile	Perimeter fastening at eaves, gables, hips, and ridges
$\geq 1:3 \leq 1:1.7$	Nail or clip tiles every third course	Nail or clip
$> 1:1.7 \leq 1:1$	Nail or clip tiles every second course	(a) first three courses along eaves; (b) first three courses or tiles each side of hips or ridges; and (c) first three rows in from gables
$> 1:1$	Nail and clip every tile	Nail and clip every tile



Fasteners

Fastening for standard weight tiles — High wind areas

Roof slope	Fastening for tile	Perimeter fastening at eaves, gables, hips, and ridges
$\geq 1:3 \leq 1:1.7$	Nail and clip tiles every third course	Nail and clip
$> 1:1.7 \leq 1:1$	Nail and clip tiles every second course	(a) first three courses along eaves; (b) first three courses or tiles each side of hips or ridges; and (c) first three rows in from gables
$> 1:1$	Nail and clip every tile	Nail and clip every tile

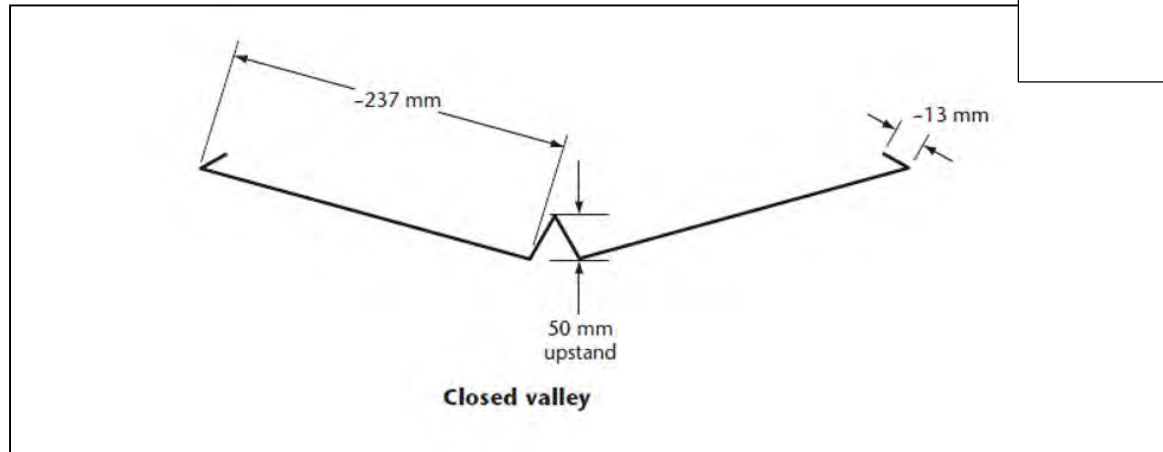
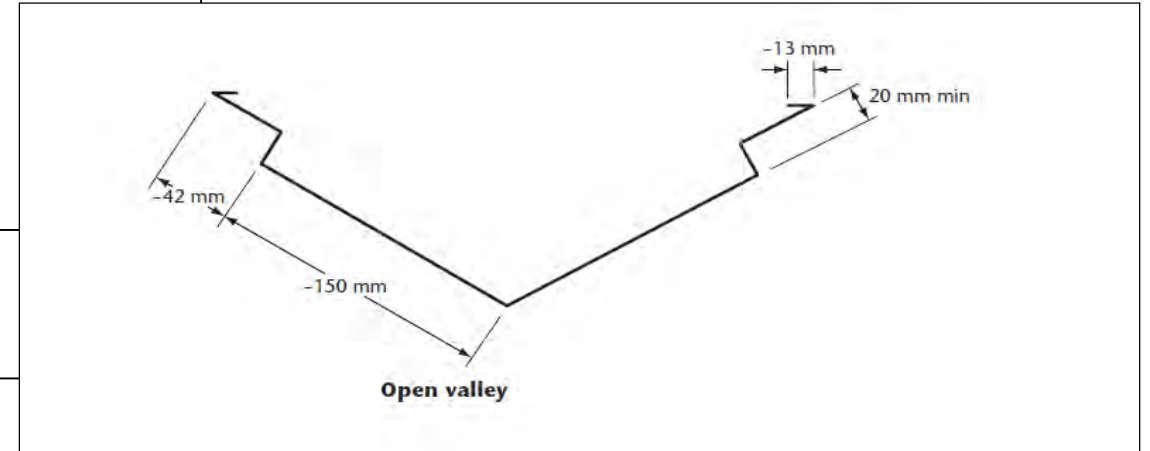
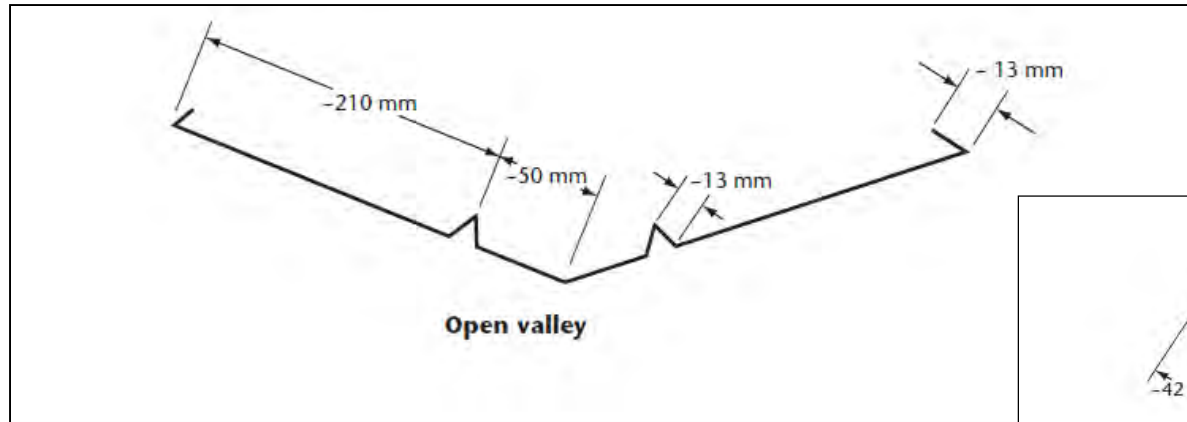
Flashings

- Minimum of 30 ga. galvanized Z275 (G90) metal, pre-painted preferred
- Over-lapped a minimum of 150 mm (6")
- A flashings are counter-flashed by the cladding material or a second caulked counter-flashing

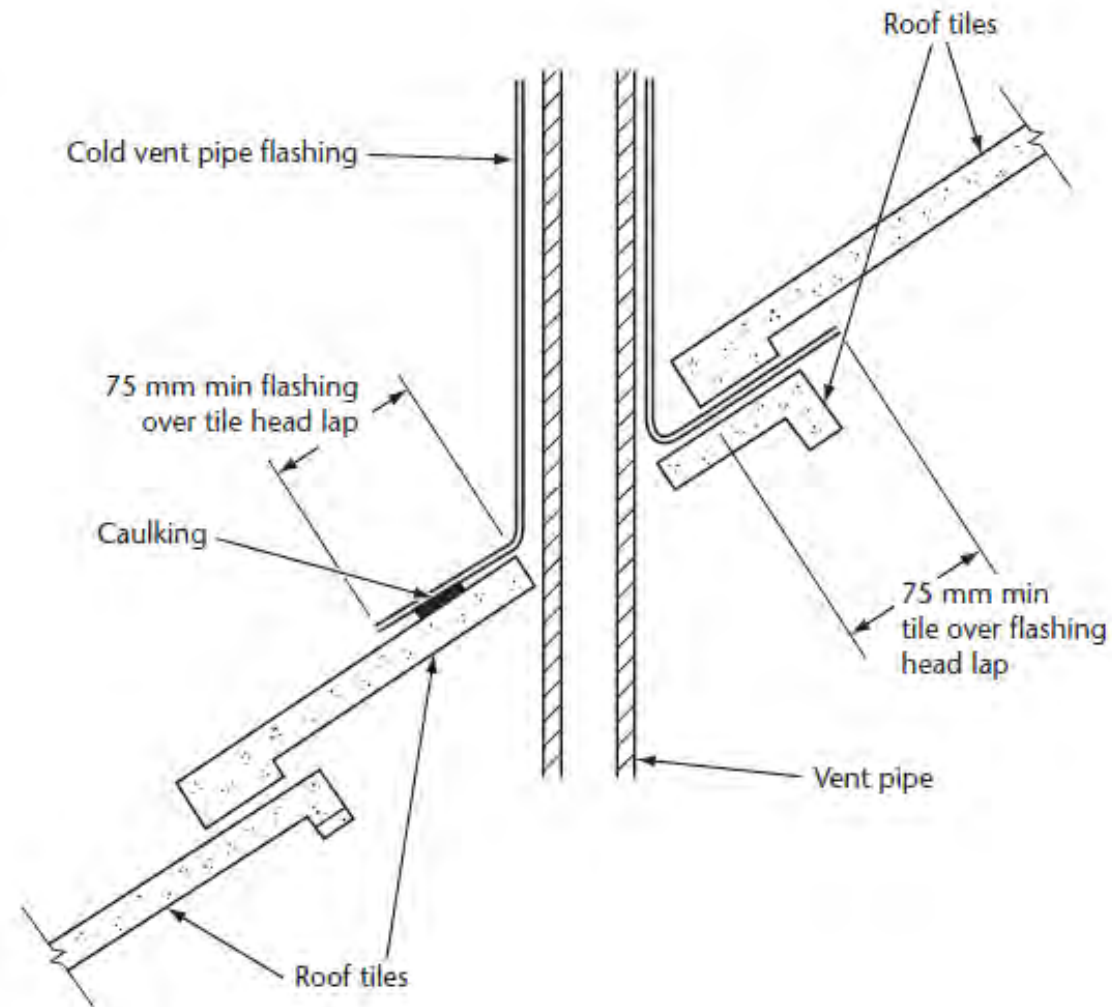
Ribbed Valley Metal

- Best all-purpose valley metal design
- Elevates battens and tiles
- Allows for uninhibited water flow
- Controls water flow and prevent lateral diversion
- Makes closed valley application feasible
- Available for tile pan as well

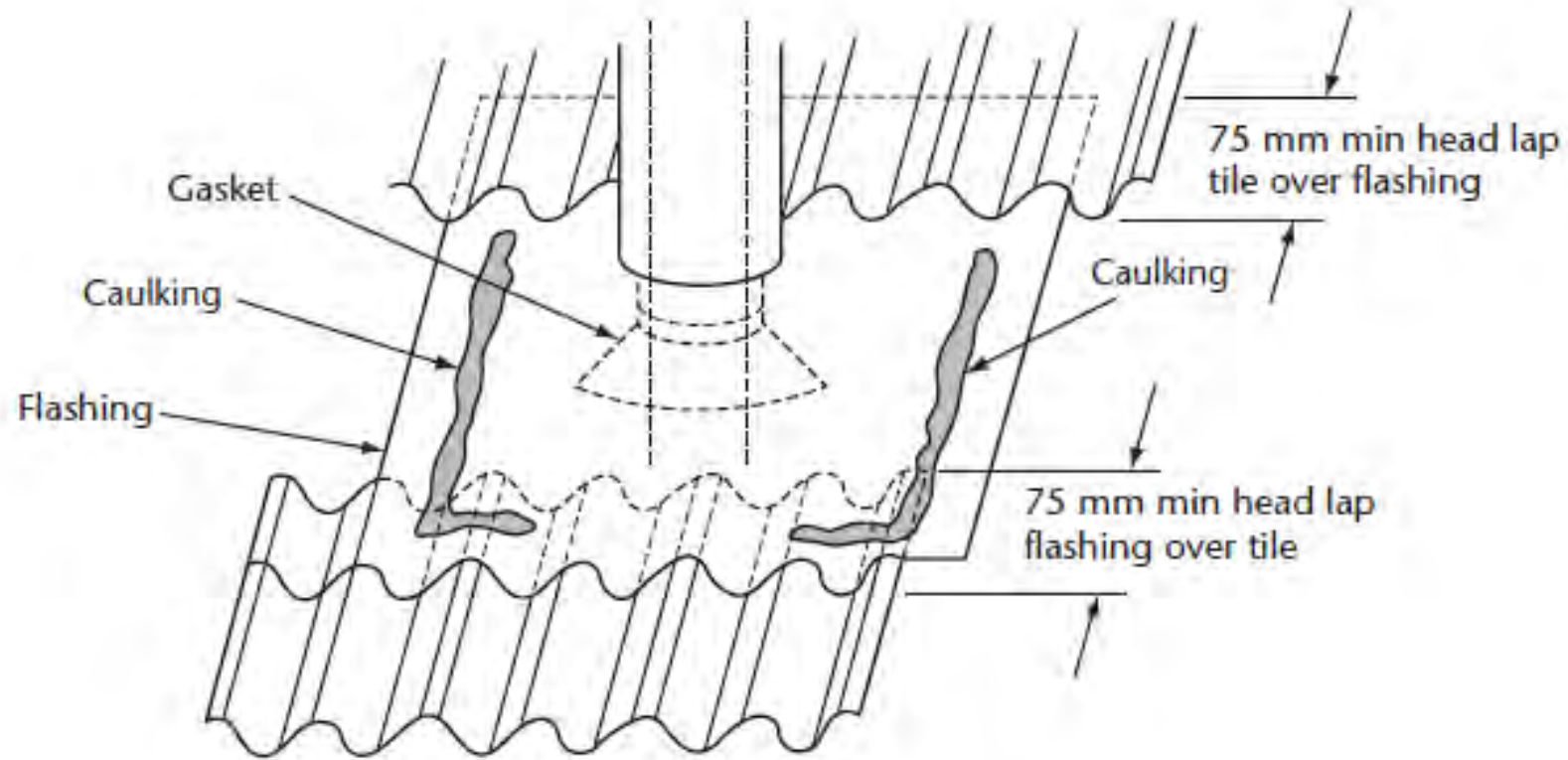
Valleys



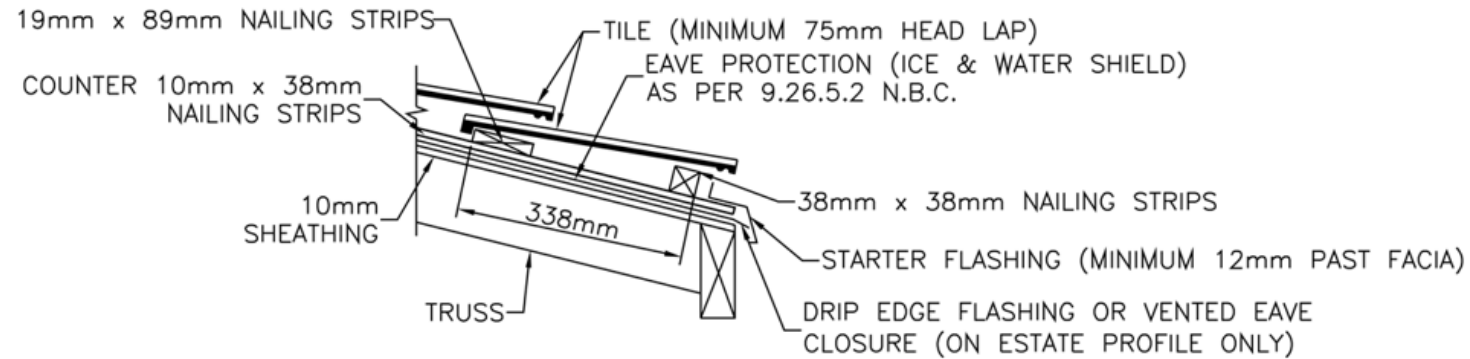
Pipe Flashings



Pipe Flashings



First Strap



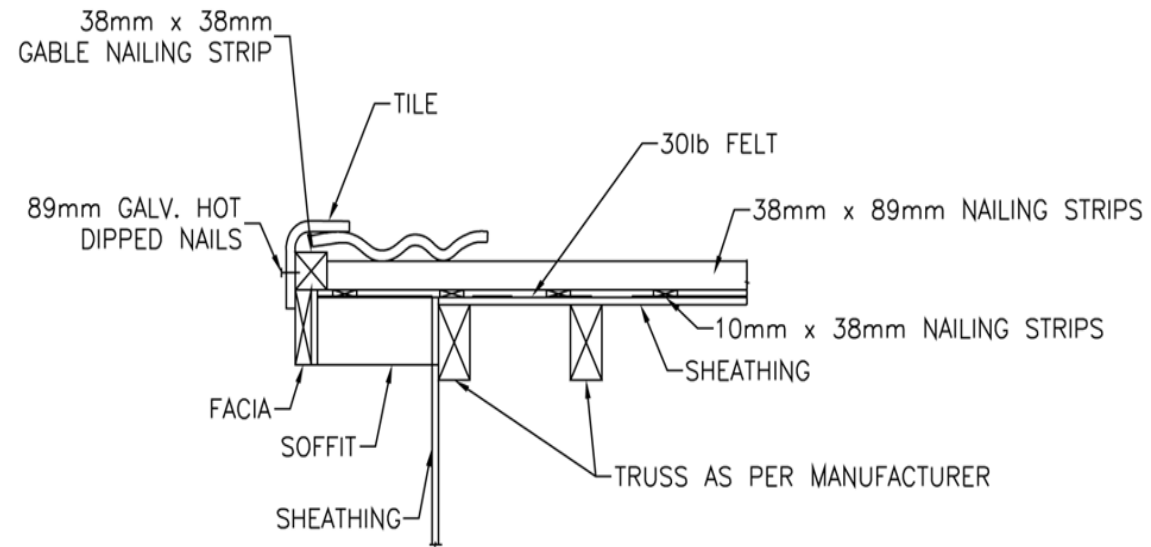
FIRST STRAP DETAIL

SCALE 1:10

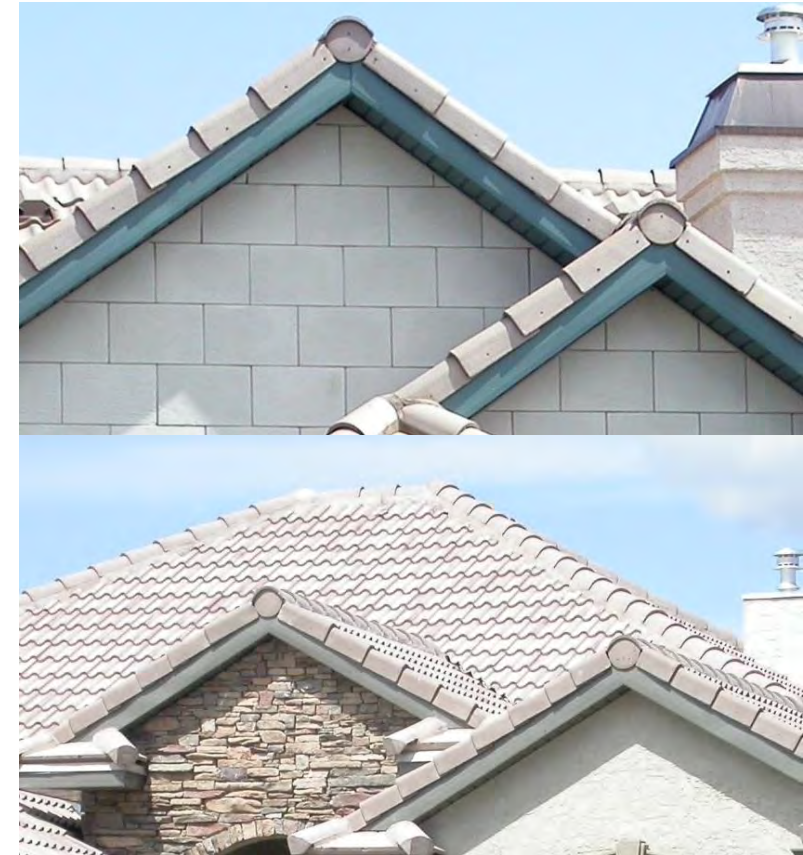
Closure Strip



Gables, Rakes



GABLE, RAKE DETAIL
SCALE 1:10



Field Tile

- 75 mm (3") minimum head (tiles are 420 mm [16.5"long])
- Flat tiles laid in either a staggered course or a random spacing pattern.

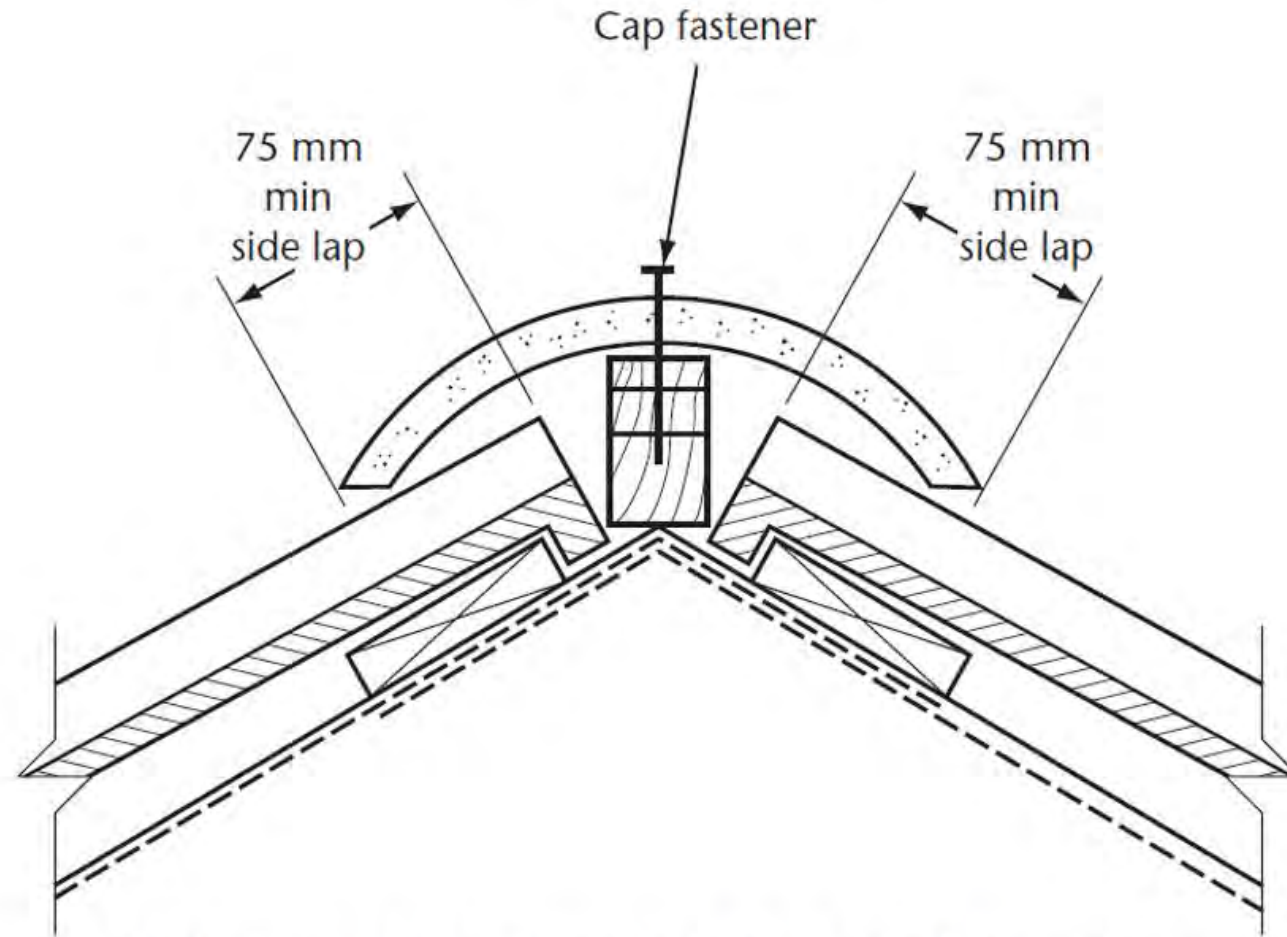


Field Tile

S-profile tiles are usually laid in a direct bond, soldier course fashion with rain seals all lined up.

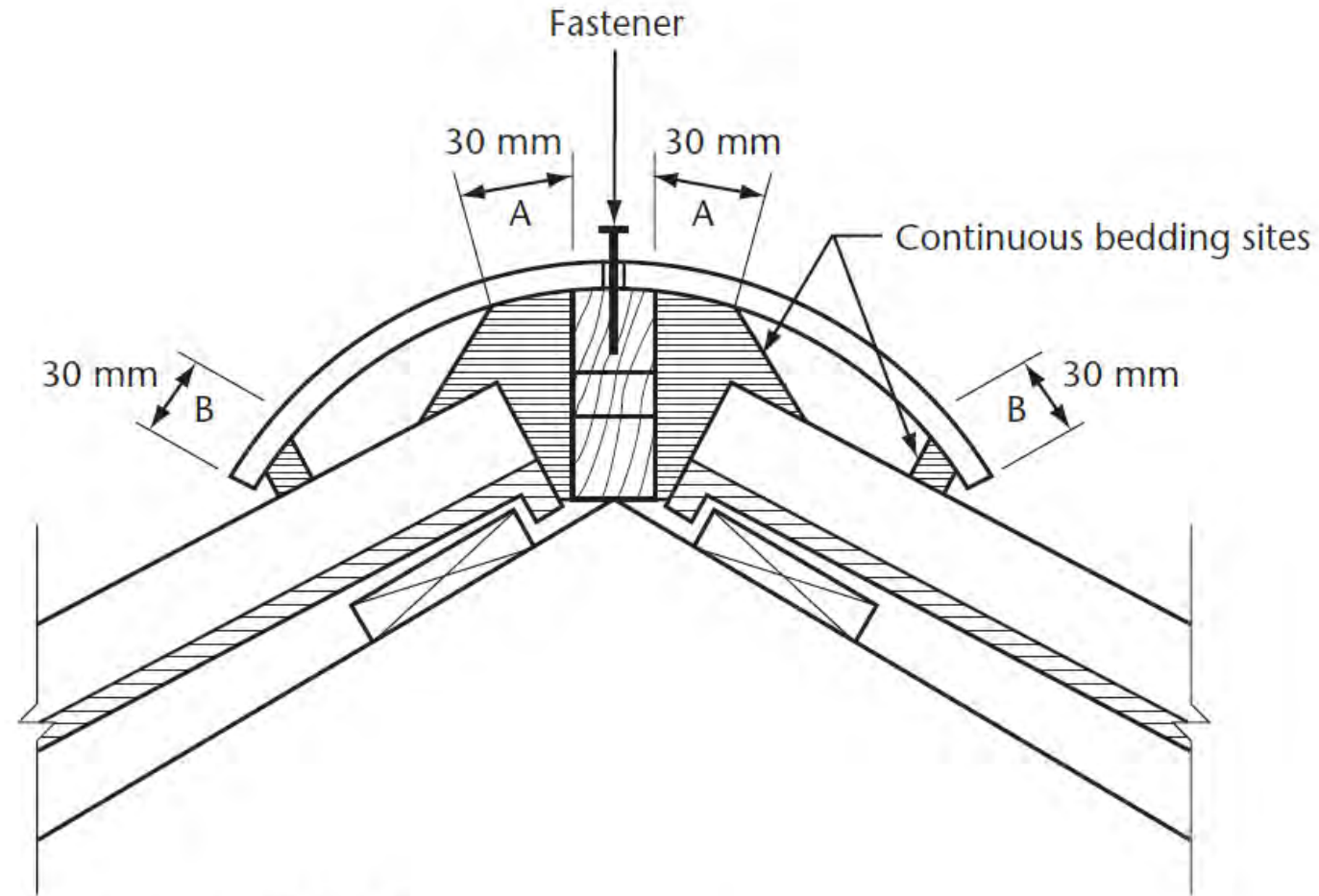


Tile Fittings



Ridge and hip board size and location

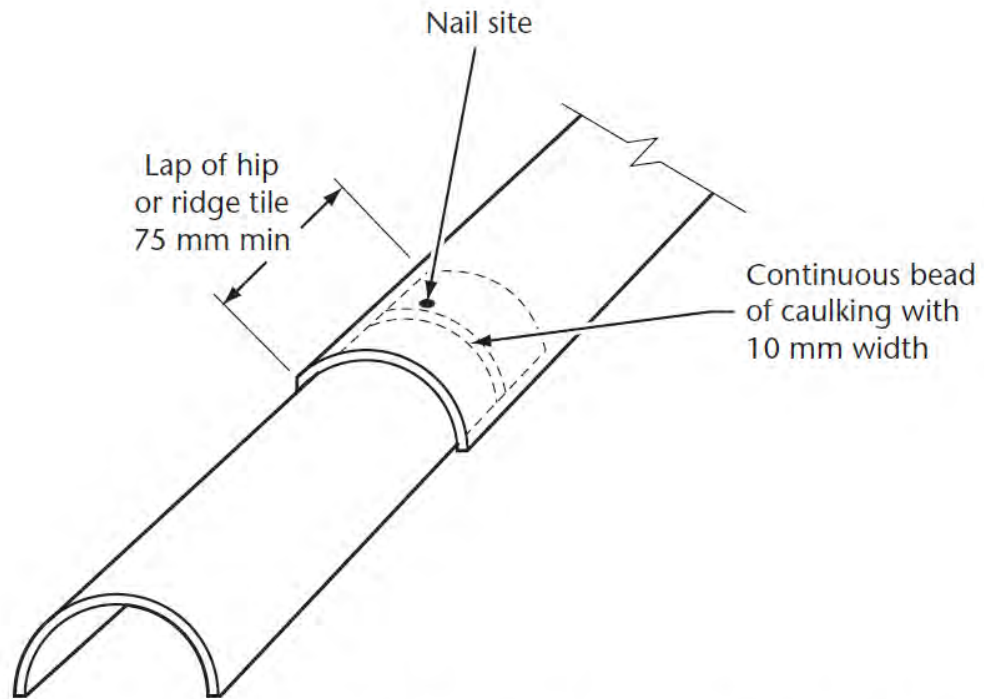
Bedding, Caulking, & Closures



Note: Bedding may be applied at site A or B.

Bedding of roof tiles and hip and ridge tiles

Bedding, Caulking, & Closures



Hip and ridge tile lap and caulking



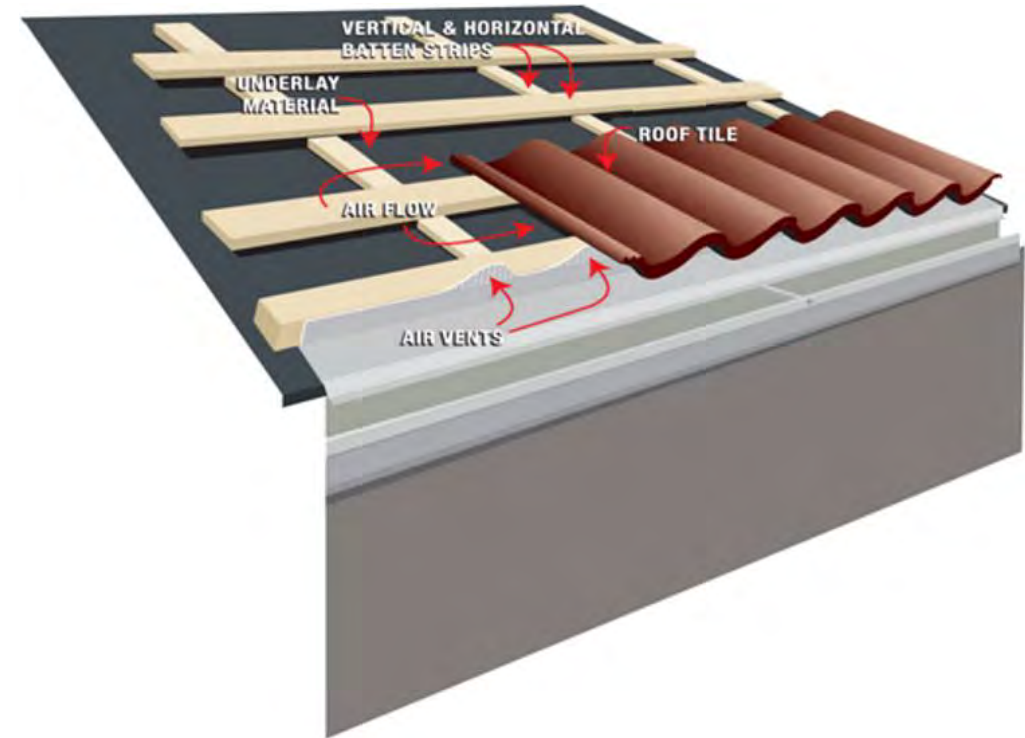
Ventilation

Not Vented



Vented

Ventilation

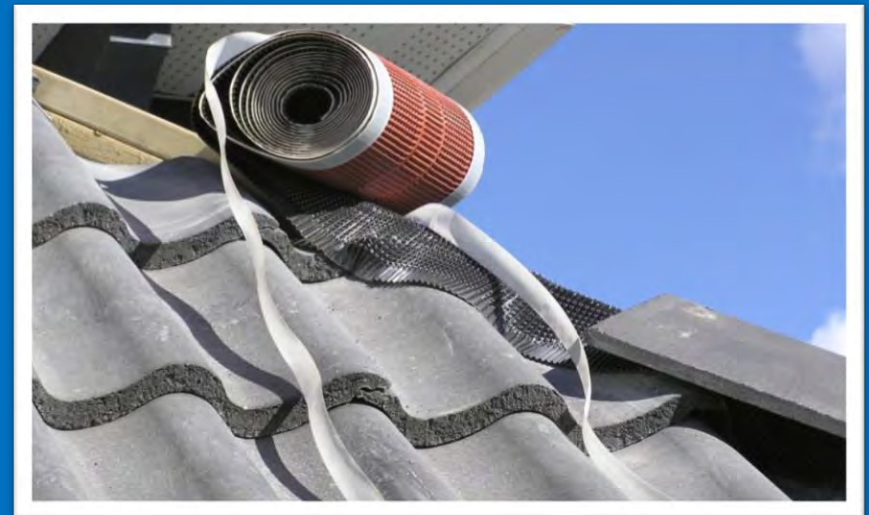


Snow Retention

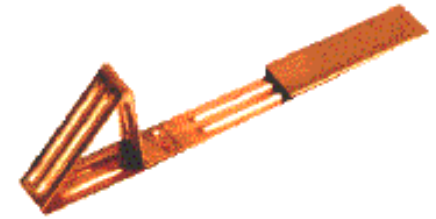


Weatherblocking

- Prevents water flow beneath tile.
- Provides finished appearance.
- Protects underlayment and flashings.
- Increases overall life and performance.
- Mortar, mastic, pre-formed plastic or metal, pressure-sensitive roll adhesives, polyurethane foamed.



Snow Retention



Snow Bracket

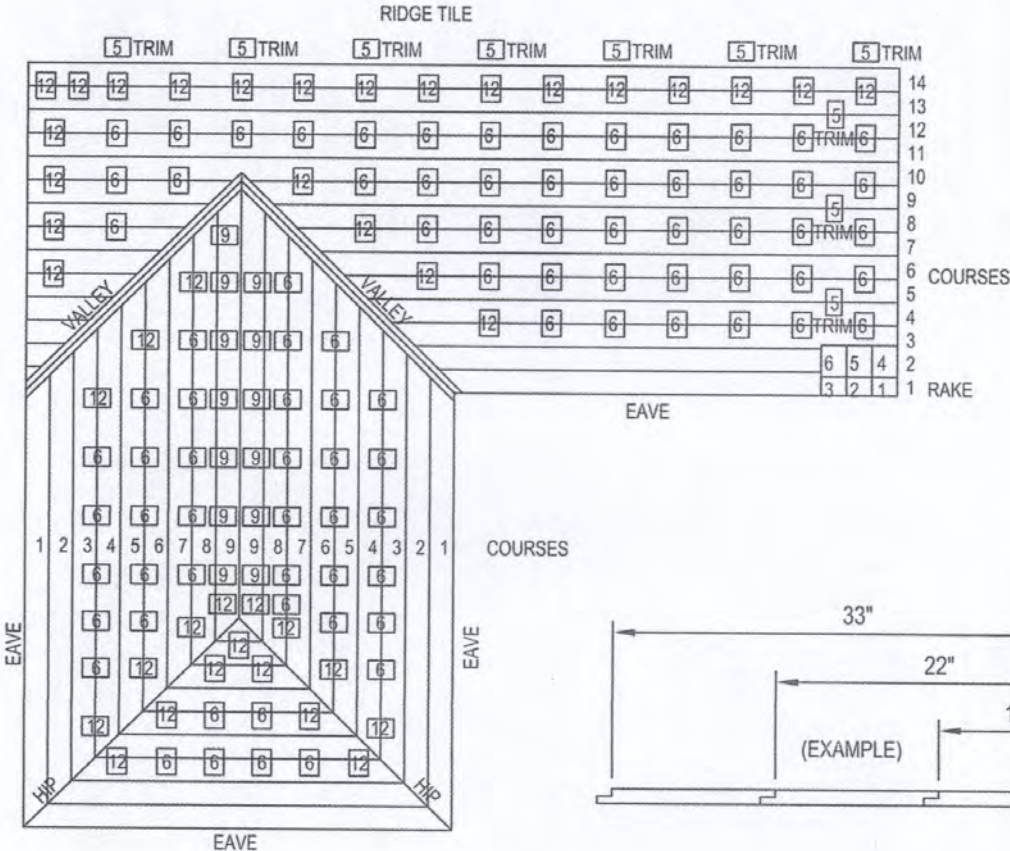
Roof Loading



SUGGESTED LOADING GUIDE

MC-09

The method of roof loading shown on this page represents the method of tile placement for efficient application but is not intended to suggest that this is the only method that will work. Each applicator will have personal preferences for the stack location and spacing. The important aspect of the tile loading is to spread the load evenly across the roof while using the proper increments that assure that the proper amount of tile is loaded on roof.



Job Specification

- Match components to task
- Consider slope, complexity and climate
- Spell out requirements
- Specify size, type, brand name
- Confirm compliance
- Pre-job meetings, inspections, sign-offs

Total Roof System

- Underlayment suitable for climate
- Elevated batten system
- Ribbed tile pan and valley metal
- Venting
- Weatherblocking

Where can we find more information?

- www.tilerroofing.org
- Source of all new information and technical bulletins
- Technical Seminars



Questions and Discussion