

# STEEP-SLOPE ROOFING

## SECTION 3 - CONCRETE TILE ROOFING

### 3.1 DECKS

#### 3.1.1 General

- .1 The decking shall be minimum 10 mm (3/8") thick plywood or O.S.B. The surface of the plywood shall conform to a sheathing grade under C.S.A. standards.
- .2 The exterior edges of the deck sheathing shall be installed flush with the exterior face of the fascia board along both eave and rack edges.

#### 3.1.2 Strength

- .1 The roof framing and decking shall be designed of sufficient strength so that they will support the anticipated load such as construction loads. Roof decks shall be free of damaged, deteriorated or decayed wood.
- .2 When reroofing with concrete roof tiles, a letter from the designer shall be made available for the Regulatory Authority. The design shall be as specified in Part 2.3.4.2 of the National Building Code of Canada and the letter shall state that the roof will support the dead and live loads imposed, as required by Part 4 of the National Building Code of Canada.

#### 3.1.3 Surface

- .1 The surface of all roof decks to which a roofing system is to be applied shall be sufficiently clean and dry so that proper attachment can take place.
- .2 Roofing over existing roofing materials is not permitted, tear off old materials to expose the decking.
- .3 Repair damaged or deteriorated decking with similar materials prior to reroofing.

#### 3.1.4 Slope

- .1 For issuance of the Warranty Certificate the following minimum slope requirements apply:

4:12 (1:3) and Greater	Use standard tiling application
Less than 4:12 (1:3) To Min 2:12(1:6)	Use an ARCA accepted membrane below concrete tiles.

## **3.2 ROOFING MATERIALS**

### **3.2.1 General**

- .1 Concrete roofing tiles shall conform to the Canadian Standards Association CAN/CSA - A220.0 - M91.
- .2 Materials shall be adequately labeled so that proper identification of the materials can be made.

### **3.2.2 Protection and Storage**

- .1 All roofing materials that can be adversely affected by moisture shall be protected prior to application and only dry materials shall be applied.
- .2 Rolls of felt are to be stored on end, covered and out of danger of water penetration.

### **3.2.3 Application Limitations**

- .1 No roofing material is to be applied when the weather or the condition of its substrate is such that the required installation procedures could not be followed or which would jeopardize the performance of the roofing system.
- .2 No Warranty Certificate will be issued where the ground snow load exceeds 3.5 Kpa (75 lbs/ft<sup>2</sup>).

### **3.2.4 Nails**

- .1 Nails used for roofing shall conform to CSA Standard B111. Nail diameter and head size shall be selected to meet good roofing practices and the manufacturer's recommendations.
- .2 Nails and other fastening devices used above the underlayment shall be:
  - (a) hot dipped galvanized steel, copper alloy, aluminum alloy, or stainless steel; and,
  - (b) compatible with the material being fastened

### **3.2.5 Nail Length**

#### **3.2.5.1 Nailing Battens to Truss**

- .1 Nails for fastening battens shall be galvanized Ardox nails of sufficient length to penetrate a minimum distance of 25 mm (1") into the rafter or truss. If using screws to fasten battens they shall be of sufficient lengths to penetrate a minimum distance of 25 mm (1") into the rafter or truss.

#### **3.2.5.2 Nailing Tile to Batten**

- .1 Nails for fastening roof tiles shall penetrate a minimum of 19 mm (3/4") into the batten, but not long enough to penetrate the underlayment. Nails shall have a head diameter not less than 1.5 mm greater than the diameter of the top of the tile hole.

### **3.2.5.3 Nailing Accessories to Members**

- .1 Where nails are required for fastening accessories, nails shall penetrate a minimum of 25 mm (1") into the supporting member.

### **3.2.6 Battens**

#### **3.2.6.1 Counter Battens**

- .1 Counter batten size shall be minimum 10 mm x 40 mm (3/8" x 1-1/2") Spruce/Pine/Fir standard or better meeting the requirements of CSA Standard CAN3-0437.0 or O.S.B. installed parallel to the roof slope.

#### **3.2.6.2 Tile Battens**

- .1 Tile battens shall be minimum 25 mm x 40 mm (1" x 1-1/2") Spruce/Pine/Fir, Standard No. 4 or better, or structurally equal installed perpendicular to the roof slope.

## **3.3 FLASHING AT INTERSECTIONS**

### **3.3.1 Materials**

- .1 Sheet metal flashing shall consist of not less than:
  - (a) 0.41 mm (30 ga.) thick Z275 galvanized steel;
  - (b) 0.56 mm (16 oz.) thick copper;
  - (c) 15 kg/m<sup>2</sup> (3 P.S.F.) thick sheet lead
  - (d) or approved alternates

### **3.3.2 Valley Flashing**

- .1 The valley flashing shall be formed of sheet metal not less than 600 mm (2') wide; or not less than 450 mm (18") wide formed with a step not less than 19 mm (3/4") high along each side to form a channel.
- .2 At the eave line the sheet metal formed to fit the valley shall overhang the eave a minimum distance of 19 mm (3/4").
- .3 A lead saddle must be installed across the joint at the intersection of two valley heads.

### **3.3.3 Wall Flashing**

- .1 The horizontal intersection of a wall and a sloping roof shall be flashed with not less than one layer of sheet metal. The metal is to provide not less than 150 mm (6") upstand and 100 mm (4") overlap onto the tiles. The wall flashing shall be lead formed to fit the tile; or other metals brought to the line of the tile and the space between the flashing and tile sealed.

## **3.4 CHANNELS, STEP FLASHING AND LEAD FLASHINGS**

### **3.4.1**

- .1 Channels, step flashings, or lead flashings shall be used at junctions between the sloping roof and vertical walls; chimneys; and skylights.

### **3.4.2**

- .1 Except as provided in Clause 3.4.3 flashings shall be wide enough to extend 150mm (6") out beneath the tile, not less than 150 mm (6") up the abutment, and behind the vertical sheathing paper, where installed. The flashing is to be provided with a 12.5 mm (1/2") wide return lip at the edge under the tile.
- .2 Where installed, the vertical sheathing paper shall overlap the flashing not less than 75 mm (3").

### **3.4.3**

- .1 If a trough of not less than 19 mm (3/4") depth is provided at the abutment, then the flashing is to extend not less than 75 mm (3") out from the wall and provide not less than 25 mm (1") of lap beneath the tile.

### **3.4.4**

- .1 Where a channel or valley does not drain directly into an eaves trough but onto the top of another roof, lead sheet shall be installed at the lip of the channel and extend not less than 150 mm (6") onto the roof to ensure proper drainage. Support is needed beneath the lead.

## **3.5 PROTRUSIONS**

### **3.5.1 Vent Pipes**

- .1 All penetrations shall be sealed at both the tile and underlayment levels.
- .2 Vent pipe penetrations shall be curbed or shall be sealed with a neoprene gasket installed over the pipe, fastened to the sheathing, and sealed to the underlayment with caulking. After tile is laid, a lead flashing shall be installed over the vent pipe and fitted to the surface of the tile with a head lap of not less than 75 mm (3") to the adjacent tiles; or a proprietary device providing equivalent protection.

### **3.5.2 Chimneys and Skylights**

#### **3.5.2.1 Back Pan Flashing**

- .1 A sheet metal flashing, not less than 450 mm (18") wide, shall be installed across the full width of chimneys or skylights and shall extend not less than 150 mm (6") on either side.

- .2 The flashing shall extend 150 mm (6") up the chimney and 100 mm (4") up the skylight and shall extend up the roof under the tile not less than the greater of first tile batten; and the height of upstand at the chimney or skylight and be canted at the base a minimum of 100 mm (4"). Back pan flashing shall meet the requirements of Article 9.26.4.7 of the National Building Code.

### **3.5.2.2 Front and Side Flashing**

- .1 The front flashing shall be installed in accordance with Clause 3.3.3. The chimney and skylight side abutment flashing are to be installed in accordance with Clause 3.4.

### **3.5.2.3 Circular Chimneys**

- .1 A lead flashing shall be installed over the chimney pipe and fitted to the surface of the tile with a head lap of not less than 75 mm (3").

## **3.6 EAVE & VALLEY PROTECTION AND ANGLE FLASHINGS**

### **3.6.1 Eave & Valley Protection**

- .1 Eave protection shall extend from the roof edge a minimum distance of 900 mm (3') up the roof slope to a line not less than 300 mm (1') inside the inner face of the exterior wall. (See ARCA Technical Bulletin on Ice Dam protection.)
- .2 Valley protection shall extend not less than 450 mm from each side of the valley centre line.

### **3.6.2 Materials**

- .1 Eave and valley protection shall consist of one of the following:
  - (a) No. 15 asphalt-saturated felt laid in two plies lapped 480 mm (19") and cemented together with lap cement
  - (b) No. 25 glass fiber coated base sheet.
  - (c) self adhering S.B.S. modified bituminous membrane.
  - (d) or approved CSA alternates.

### **3.6.3 Drip Edge Flashing**

- .1 The installation shall include prefinished or galvanized sheet metal eave edge drip flashings.
- .2 The deck flange shall extend a minimum distance of 75 mm (3") onto the roof decking and shall be nailed to rafters prior to the application of the eave protection or tiles. Space the 25 mm (1") long vertical flange at a minimum distance of 6 mm (1/4") from fascia face.

### **3.6.4 Eave Batten Closure Flashing**

- .1 A galvanized or prefinished batten closure flashing shall continuously protect eave edge beneath tiles. Flashing shall cover the vertical face of the starter batten, run down deck slope and shall conceal the drip edge flashing flange. Fasten eave batten closure flashing at each roof rafter location using galvanized roofing nails.

### **3.7 UNDERLAYMENT**

#### **3.7.1 Materials**

- .1 Underlayment shall consist of not less than:
  - (a) No. 15 asphalt saturated plain felt laid in two plies lapped 480 mm (19").
  - (b) No. 25 glass fibre coated base sheet.
  - (c) CSA No. 25 asphalt saturated plain felt laid in a one ply application.
  - (d) Self-adhering S.B.S. modified bituminous membrane

#### **3.7.2 Installation**

- .1 Underlay shall be installed parallel to the eaves with head laps of not less than 100 mm (4") and side laps of not less than 150 mm (6").
- .2 The top edge of each strip shall be fastened to hold it in place until the battens are applied.
- .3 The underlay shall over lap the eave protection a minimum distance of 100 mm (4").

### **3.8 VENTILATION**

- .1 Every roof space or attic above an insulated ceiling shall be ventilated with openings to the exterior to provide unobstructed vent area of not less than 1/300 of the insulated ceiling area.
- .2 Vents may be roof type, eave type, soffit type, gable-end type or any combination thereof, and shall be uniformly distributed on opposite sides of the building. Roof vents shall be equally distributed so that approximately 50 percent of the required vent area is located near the lowest part of the roof and approximately 50 percent of the required vent area is near the ridge. For exceptions see Alberta Building Code Section 9.19.1, Venting.
- .3 If roof type vents are used the vent hole in the sheathing shall be offset laterally from the vent by a minimum of one tile spacing.

### **3.9 TILING**

#### **3.9.1 General**

- .1 Tiles and tiling accessories are to meet the requirements of CSA Standard CAN/CSA-A220-0.

#### **3.9.2 Fastening**

##### **3.9.2.1 General**

- .1 The roof slope and tile mass are the main determinants in selecting the correct mechanical fastening of roof tiles. Consideration shall also be given to the type of building and its exposure to local environmental conditions.

- .2 Tile pieces at hips, valleys and abutments that cannot be nailed or clipped are to be fastened with non-corrosive wire and bedded.
- .3 When used tile clips shall be securely fastened to the tile batten and shall be positioned within the lower third of the tile.

**3.9.2.2 Extent of Fastening**

**3.9.2.2.1 Standard Conditions**

- .1 Tiles are to be fastened as required in Table 3.9.1 are to be nailed or clipped.

**High Wind Areas**

- .1 In high wind areas the fastening of the tiles shall be in accordance with the tile manufacturer’s written installation instructions for high wind areas.

**Table 3.9.1  
Fastening Required for Normal Weight Tiles  
Standard Conditions**

Roof Slope	Fastening for tile	Fastening at eaves, gables, hips and ridges
> 1:3 < 1:1.7	Nail or clip the tiles in every third course	Nail or clip (a) first two courses along the eaves (b) first two courses or tiles each side of hips or ridges; and (c) first two rows in from all gables
> 1:1.7 < 1:1	Nail or clip the tiles in alternate courses	
>1:1 < 1.25:1	Nail or clip every tile	Nail or clip every tile

(1) NOTE: Subject to manufacturer’s recommendations, screws may be substituted for nails and clips

**3.9.3 Laying of Tile**

**3.9.3.1 General**

- .1 The tiles are set out with courses straight and parallel with tiles in each course or in alternate courses kept in alignment so that the roof presents a regular and even appearance.

**3.9.3.2 Cutting of Tile**

- .1 The cutting of tiles at hips, valleys, and abutments shall be clean and straight and provide a regular and even appearance.

**3.9.3.3 Tiling of Valleys**

- .1 Tiles at the edges of valleys are be cut to provide an open valley of not less than 50 mm (2”) from the centre line of the valley to the tile on either side.

### **3.9.3.4 Hip and Ridge Tiles**

- .1 Hip and ridge tiles shall be laid in straight lines, lapped a minimum of 75 mm (3"), nailed to the hip and ridge battens, and bedded and caulked as described in Clause 3.10

### **3.9.3.5 Rake Tiles**

- .1 Rake tiles shall be laid in straight lines, lapped a minimum of 75 mm (3"), and fastened with two nails to the fascia.

## **3.10 BEDDING, CAULKING AND CLOSURES**

### **3.10.1 General**

- .1 Caulking and sealants shall be suitable for exterior use and be resistant to weathering. The bedding compounds shall be compatible with and adhere to the materials to which they are applied. The use of silicone caulking materials is not permitted.
- .2 Caulking and sealants are to conform to CGSB Standards 19-GP-5M, CAN/CGSB-19.13, 19-GP-14M, or CAN/CGSB-19.24.

### **3.10.2 Hips, Ridges and Rakes**

- .1 A continuous bead of bedding shall be laid to ensure not less than 30 mm (1-1/8") of contact between hip and ridge tiles, adjoining roof tiles, and the bedding.
- .2 Lapped hip and ridge tiles shall be caulked with not less than 10 mm (3/8") of contact between the lapped tiles and the caulking.

### **3.10.3 Vermin Screening**

- .1 Honeycomb plastic, foam fillers, mortar or equivalent are to be used to seal access areas larger than 15 mm x 15 mm (9/16" x 9/16") at eaves, valleys, channels and rakes.