BRANZ

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METAL TILE ROOFING

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There are three generic names for profiles of roof tiles in New Zealand – tiles, shakes and shingles.

This Bulletin covers the design and selection of metal tile roofs.

1.0 INTRODUCTION

1.0.1 Pressed metal tile roofing is one of the more common roof cladding systems used in New Zealand. There are a number of design requirements that need to be followed to ensure the installed roof will meet the performance requirements of Building Code clauses B1 *Structure*, B2 *Durability*, E1 *Surface water* and E2 *External moisture*.

1.0.2 Generic metal tile details and installation requirements are given in E2/AS1 clause 8.3. Other references applicable to metal tile roofing are:

- NZS 4217:1980 *Pressed metal tile roofs*
- New Zealand Metal Roof and Wall Cladding Code of Practice (NZMRM CoP) Section 10.

1.0.3 Metal tiles are typically a proprietary system – the supply and installation is under the direct control of the manufacturer, and they are not a product that can be purchased off the shelf.

2.0 TYPES OF METAL ROOF TILES

2.0.1 There are three generic names for profiles of metal roof tiles in New Zealand – tiles, shakes and shingles. However, there are several different companies manufacturing and marketing tiles in New Zealand, and each has slight variations on these profiles and names.

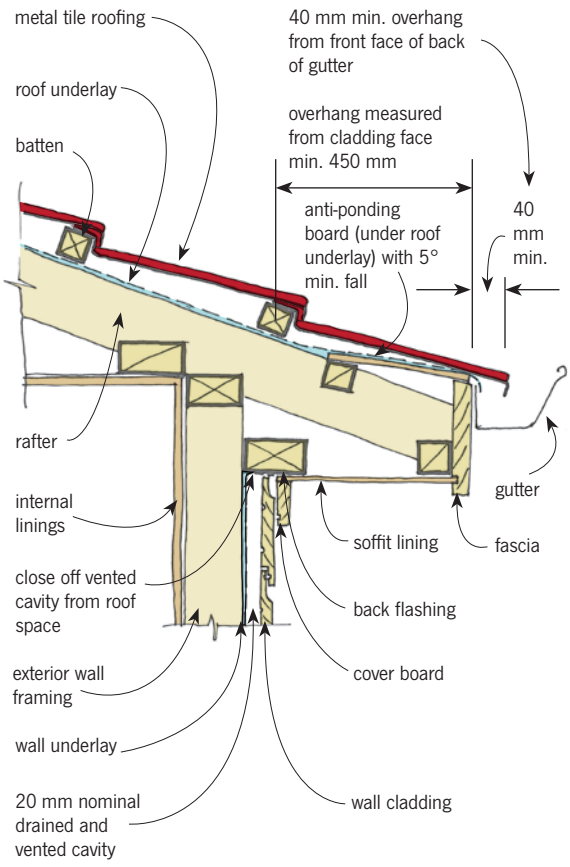

Figure 1. Eaves overhang – timber fascia.

2.0.2 Most tiles are manufactured by pressing from G300 grade zinc/aluminium alloy coated (AZ150) steel coil. Some companies may still use galvanised steel, but this product was overtaken in 1995 when zinc/aluminium alloy coated steel coil came on the market. Aluminium or copper base metal may occasionally be used for buildings in harsh salt-laden environments.

2.0.3 The finishes available are either a stone-chip coating applied after pressing to provide a textured finish or a factory-applied paint smooth coating applied before pressing.

2.0.4 Most metal tile systems have an anti-fingerprint coating on the underside.

2.0.5 Metal tiles are classified as a lightweight roof cladding.

2.0.6 Many manufacturers offer a coating warranty of 20 years and a durability warranty for the base tile of 50 years.

3.0 ROOF SLOPE/LENGTH

3.0.1 The minimum roof pitches for metal tile roofs given in E2/AS1 are:

- for standard metal roof tiles – 12°
- for shake metal roof tiles – 15°.

3.0.2 For shingle-style metal roof tiles, which are not covered in E2/AS1, the minimum recommended pitch varies between 15–20° depending on the specific shingle profile.

3.0.3 E2/AS1 limits the length or run of a metal tile roof to 12 metres.

4.0 ROOF DETAILING

4.0.1 All tile suppliers provide specific installation details for their roofing, which should be referred to by the designer when specifying the tile roofing system by brand and tile profile. Generic metal tile installation details are provided in E2/AS1 and also in BRANZ *Weathertight Solutions Volume 5*.

4.0.2 Figures 1–9 are reproduced from BRANZ *Weathertight Solutions Volume 5*.

5.0 ROOF UNDERLAY

5.0.1 Roof underlay used under metal tile roofs needs to comply with the requirements of Table 23 in E2/AS1.

5.0.2 The types of flexible underlay that can be specified with metal roof tiles include:

- bituminous kraft paper self-supporting underlay
- fire-retardant kraft paper self-supporting underlay
- synthetic underlay provided its use as a roof underlay is independently verified, for example, with a BRANZ Appraisal.

5.0.3 Typically, the underlay is installed on top of the rafters and the tile battens are fixed on top of the underlay. The underlay must be laid horizontally (parallel with the spouting and at right angles to the rafters) with a minimum 75 mm side lap (150 mm is recommended particularly if fire-retardant kraft paper roof underlay is used). 150 mm end laps must be made over a rafter to provide support.

5.0.4 At the eaves, the underlay must finish over the fascia board to allow any water on it to drain into the spouting. While not commonly done, adding an anti-ponding board will ensure that any liquid water on the roof underlay will not cause it to sag and prevent the drainage of the water into the gutter (Figure 1).

6.0 BATTENS

6.0.1 Tiles are fixed to battens set out on site to suit the specific tile dimensions. Designers should be aware of the set-out dimensions so that the rafter length can be designed (by adjusting the slope) to suit the tile module and avoid the need for tiles to be cut on site to fit.

6.0.2 If the trusses or rafters are at a maximum of 900 mm centres, battens should be 50 x 40 mm sawn timber. If the trusses or rafters are at 1200 mm centres, batten size must be increased to 50 x 50 mm.

6.0.3 Battens are to be specified under NZS 3602 as either H1.1 treated radiata pine or H1.2 treated for skillion roofs. No timber treated with copper-based preservative chemicals should be used with zinc/aluminium alloy coated steel tiles as they are not compatible and the treatment chemicals could result in premature corrosion.

6.0.4 Moisture content is to be under 18% if kiln dried radiata pine is used or under 20% if Douglas fir is used.

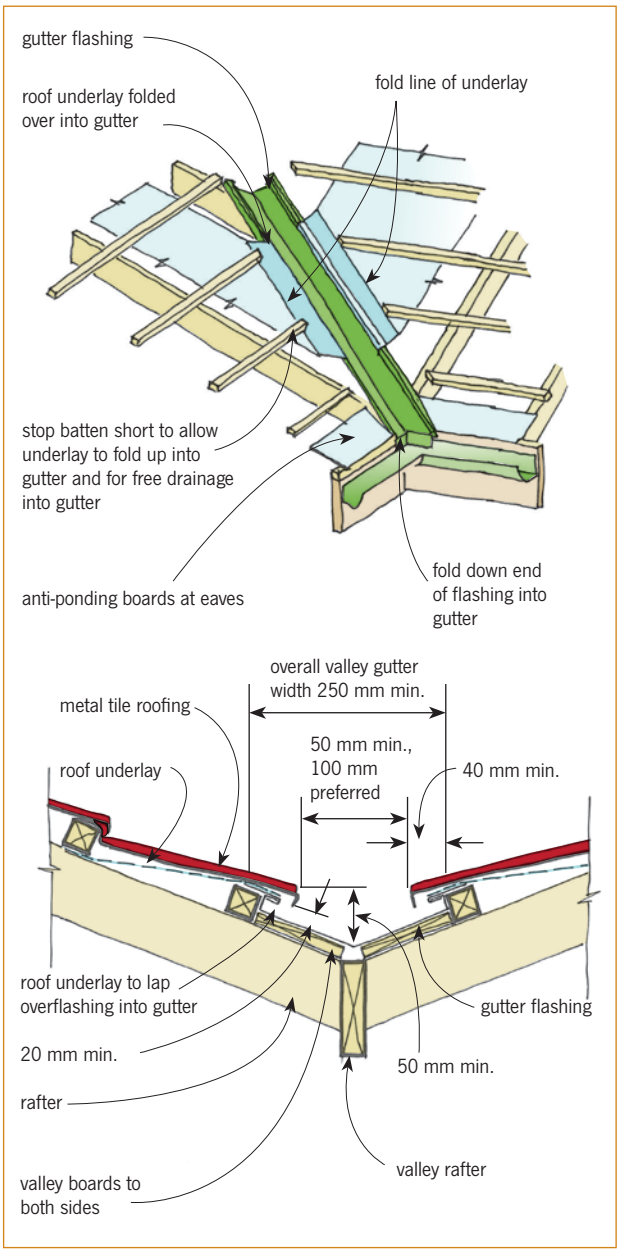

Figure 2. Valley detail.

7.0 BATTEN FIXINGS

7.0.1 Fixings for all battens to the framing below should meet the spacing and fixing capacity requirements for wind loadings in the area and fixing location – see NZS 3604 Tables 10.9 and 10.10. Multiple fasteners may be required where wind loads are higher.

7.0.2 Fastenings typically used to fix 50 x 40 mm battens to timber rafters are bright steel (see Table 4.3 of NZS 3604 1999):

- 90 mm x 3.15 gun nails, or
- 90 mm x 3.2 ring shank gun or hand nails, or
- 90 mm x 3.3 twist shank nails.

7.0.3 When fixing a timber batten to a steel rafter or truss, the fixings need to be specifically designed. With a hex head screw, the hex head should be finished flush with the top of the batten to ensure there is no damage to the roof tile system.

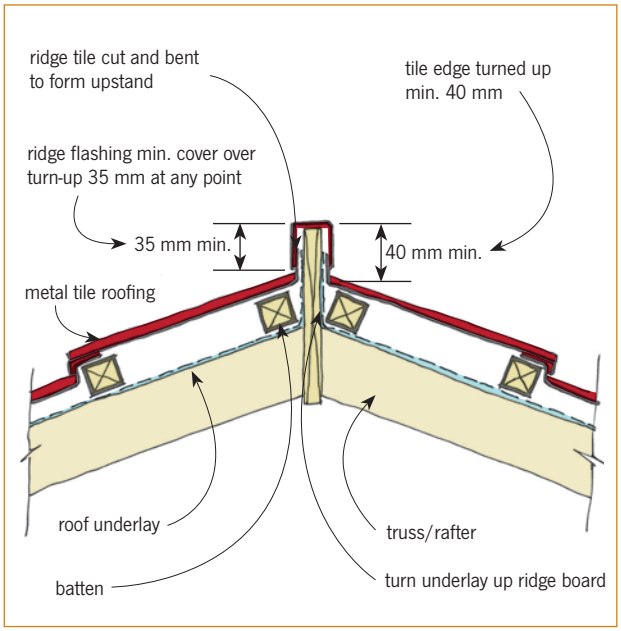

Figure 3. Ridge/hip flashing.

8.0 INSTALLATION

8.0.1 This section covers the installation requirements that designers and project supervisors should be aware of.

8.1 GENERALLY

8.1.1 The building and site must comply with all health and safety requirements relating to working at heights.

8.1.2 All installation must be carried out by manufacturer-approved installers who have been trained and are skilled in carrying out the correct installation procedure. If not, material or workmanship warranties will not be provided by the manufacturer.

8.1.3 All bending and cutting must be carried out at ground level – not on the roof.

8.1.4 All necessary materials must be delivered to the site prior to commencing the installation.

8.2 KEY INSTALLATION STEPS

8.2.1 The key steps for installing metal tile roofing are as follows:

1. Set out the batten locations with a nail at the front edge of the batten line on each rafter or truss.
2. Lay the battens in position and cut them to the correct length. Butt joints must be made over a rafter or truss member.
3. Lay underlay horizontally from the spouting line upwards with battens temporarily shifted to allow installation. It is a requirement to carry underlay over ridge and hips and across valleys.
4. Replace and fix battens.
5. Install valleys (Figure 2). Valley laps and junctions are to be riveted and sealed using the method given in the NZMRM CoP.
6. Lift tiles onto the roof and store over a support member.
7. Lay tiles from the ridge line, usually starting with the second to top course, and work down

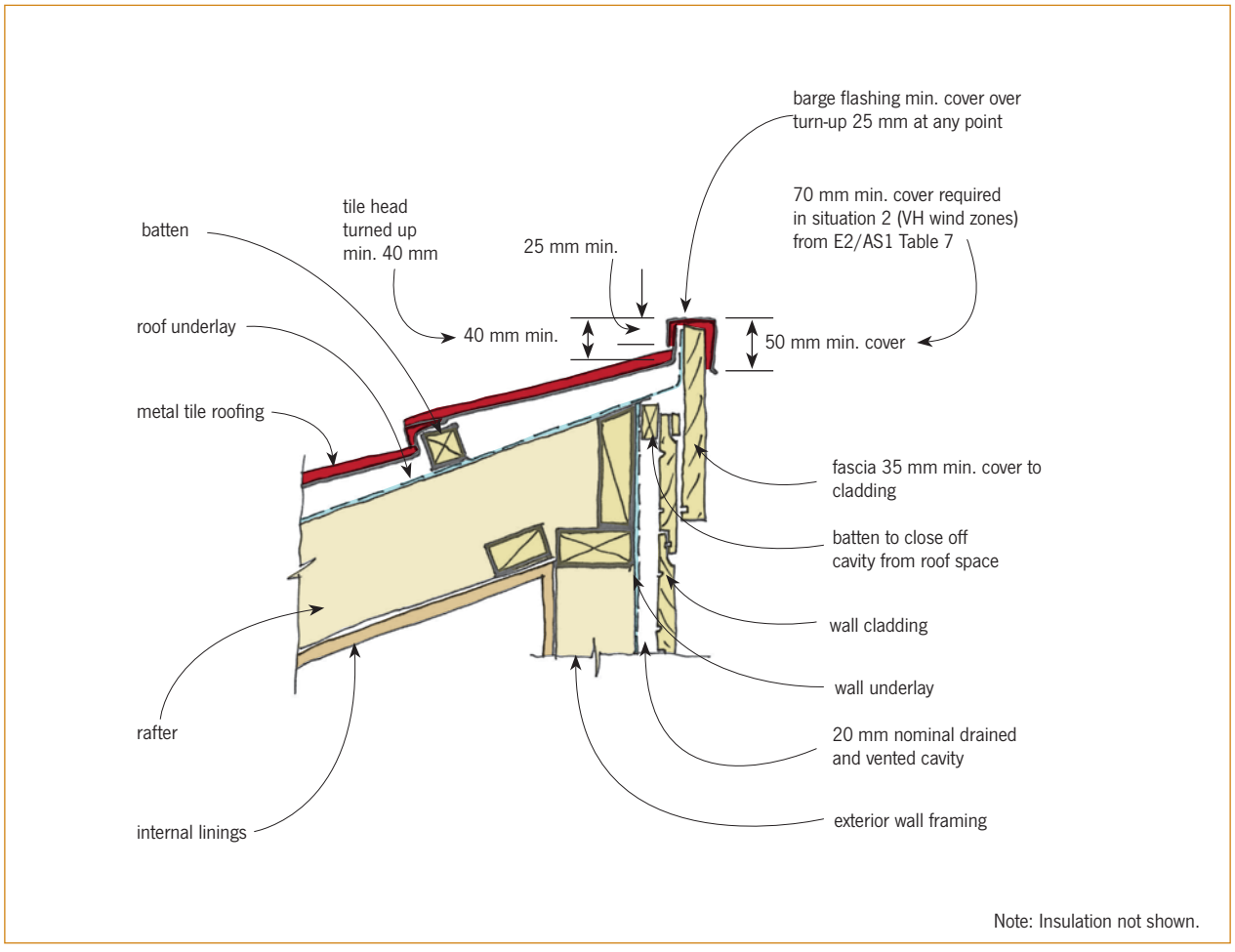

Figure 4. Apex – flush – timber fascia.

to the spouting line to complete the section of roof. At the spouting line, tiles should typically project 40 mm past the face of the fascia board to create an overhang into the spouting. Profile shape and roof slope may vary this dimension.

8. Lay tiles with side laps facing away from the predominant wind direction.
9. Fix the tiles in accordance with the manufacturer's recommendations. Generally, tiles are held in place with four evenly spaced 50 mm x 2.8 hot-dip galvanised colour-matched nails fixed into the batten through the front downturn into the face of the batten. Tiles at the spouting line should be fixed at the top of the tile profile using an EPDM/neoprene washer under the head.
10. Install ridge and hip caps and fix in accordance with the manufacturer's instructions.
11. Bend up the tile edge by 40 mm along the line of a ridge, hip, verge or barge. For ridges and hips, a cap supplied by the roofing manufacturer is fitted over the upturn to give a 35 mm lap (Figure 3). A similar detail is used at the verge or barge (Figures 4 and 5).
12. Bend up the tile edge by 40 mm along the line of the wall where an apron flashing is required (as in Figure 36 of E2/AS1). The upturn is then protected by an over flashing supplied as part of the roofing system.
13. Form roof penetrations with a proprietary neoprene boot flashing following the flashing supplier's installation instructions (Figure 6). For larger penetrations, such as a flue, the tile adjacent to the flue should have the edges turned up 40 mm before the boot flashing is installed (Figure 7). Where a batten is cut, additional support will need to be provided.
14. Form square penetrations such as chimneys and rooflights with a membrane drainage gutter (Figure 8) or a custom-built metal flashing behind the penetration that drains out on to the lower tiles. Many proprietary roof lights/windows are supplied with flashing kits that must be used to maintain product warranties.

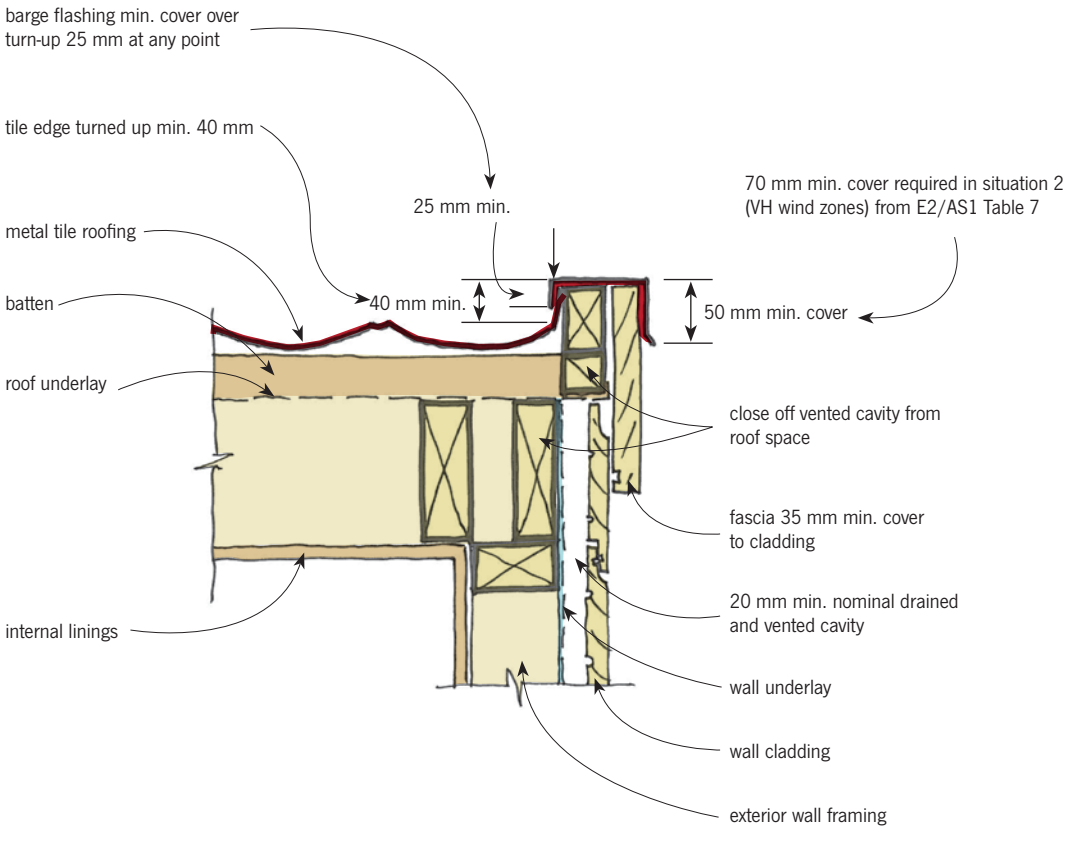

Figure 5. Barge – flush – timber fascia.

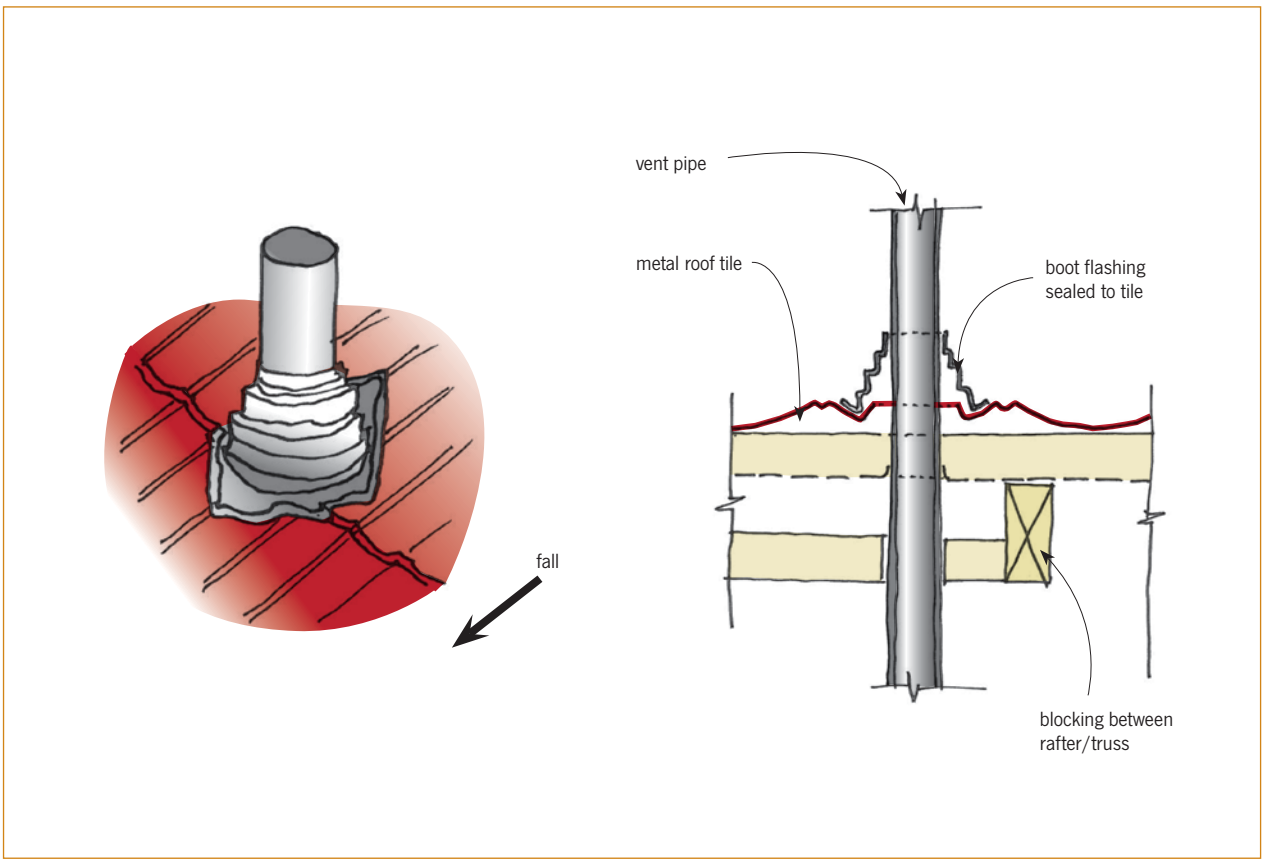

Figure 6. Roof penetration.

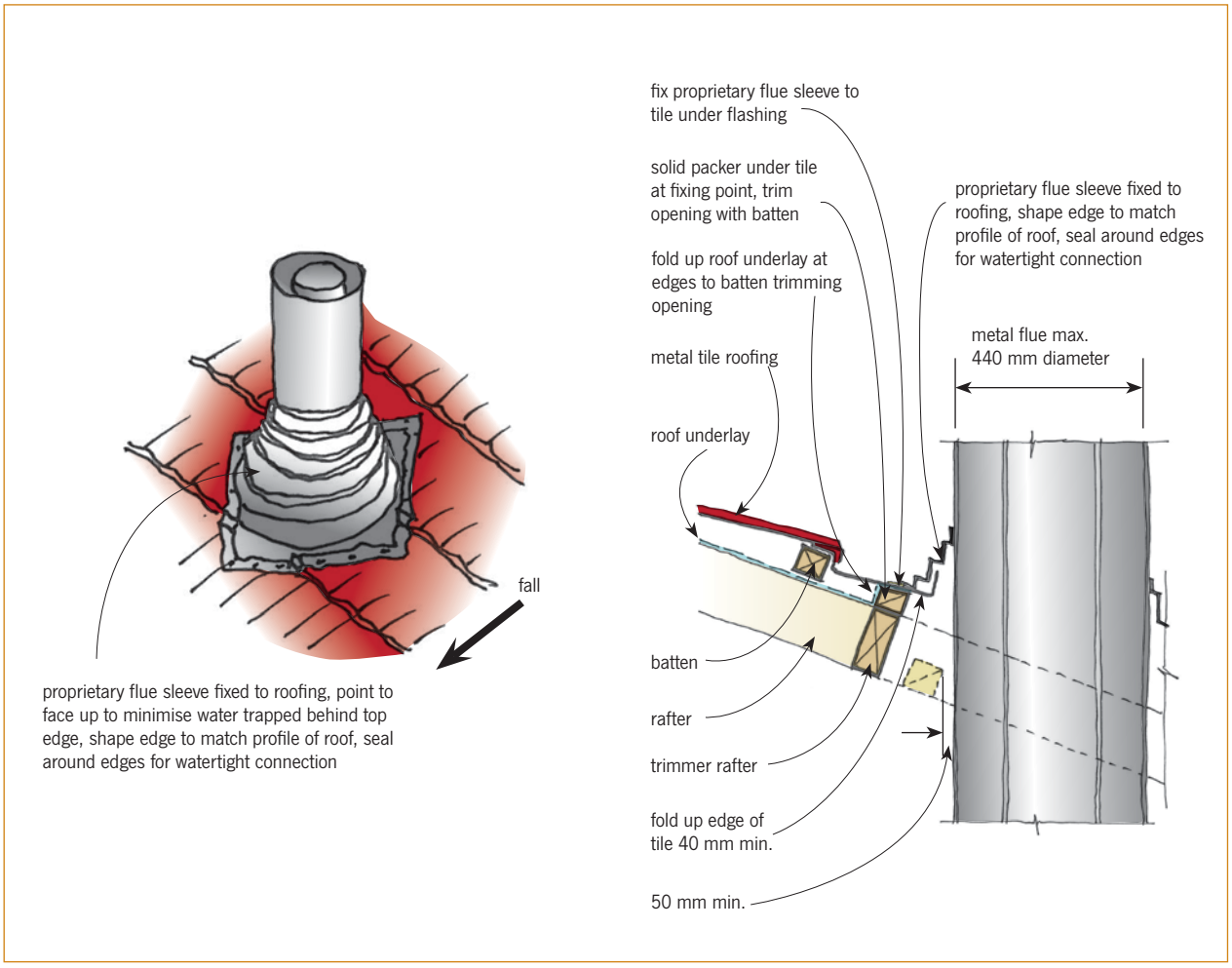

Figure 7. Larger penetrations – note that additional side and bottom details are contained in BRANZ *Weathertight Solutions Volume 5* Section 3.

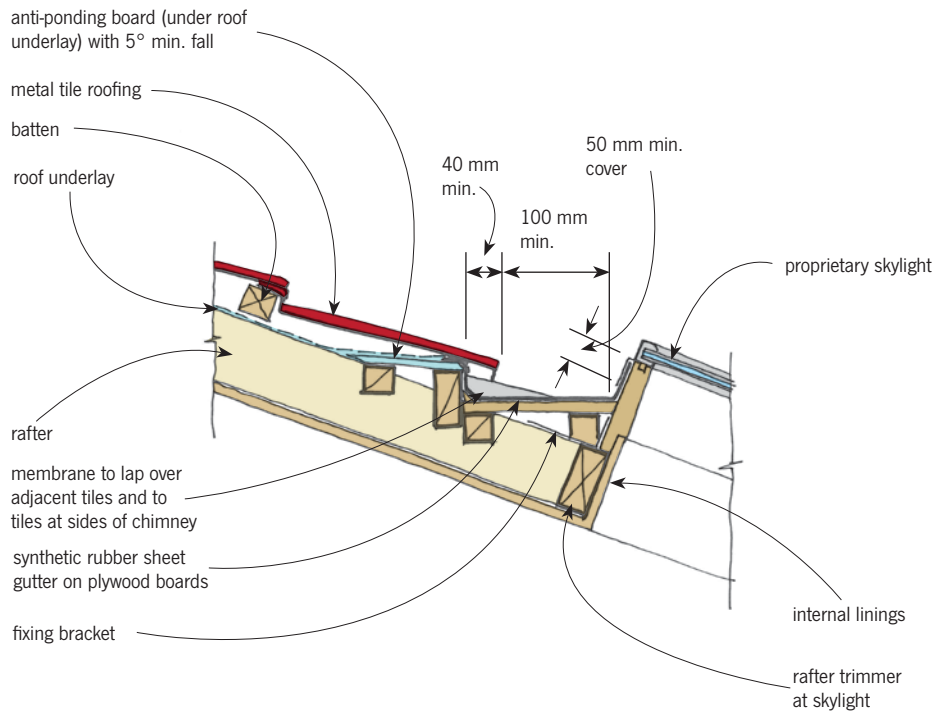

Figure 8. Skylight – note that additional side and bottom details are contained in BRANZ *Weathertight Solutions Volume 5* Section 3.

9.0 MAINTENANCE

9.0.1 Any roof areas that are sheltered from being rain washed should be hosed down regularly – at least once per year or at least every 4 months if the building is in a coastal area.

9.0.2 The roof system should be sprayed regularly with a manufacturer-approved product to ensure organic growth such as moss and lichen does not cause the coating system to fail or become unsightly.

9.0.3 After some time, the roof system may need to be recoated to ensure there are no failures of the metal system. A manufacturer-recommended recoating system should be used to ensure there is no premature failure due to non-compatibility.

9.0.4 These maintenance requirements should be explained to the building owner.

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