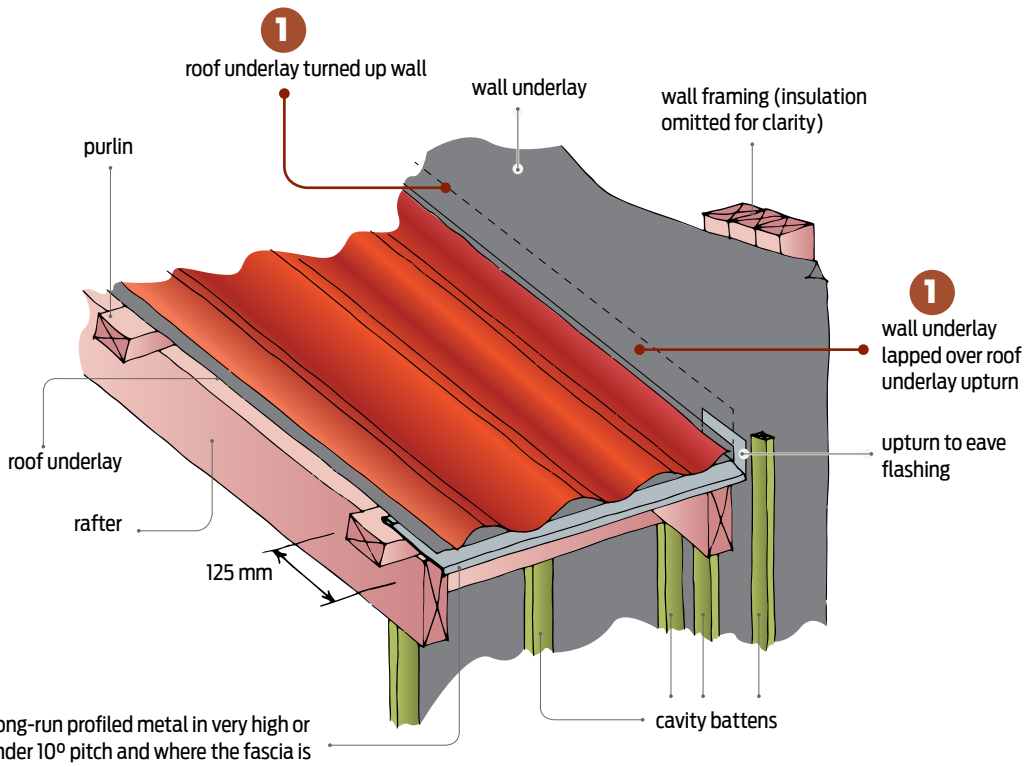
Section 4:

Roof/wall intersections

4.1 Roof-to-wall junction

BRANZ is sometimes asked how to detail roof-to-wall junctions. The detailing can be tricky, but following the Acceptable Solution and these step-by-step illustrations will help.



Note: Eave flashing required for long-run profiled metal in very high or extra high wind zones for roofs under 10° pitch and where the fascia is 100 mm or less from cladding.

Figure 77a **Roof/wall junction construction sequence – Step 1.**

NEW ZEALAND BUILDING CODE clause E2 *External moisture* requires that roofs and external walls must prevent the penetration of water that could cause undue dampness, damage to building elements or both.

The roof/wall junction where a roof finishes within the length of an adjacent wall combines different planes, angles and building materials, requiring careful detailing to ensure water cannot enter the building structure.

Apron flashing requirements

Figure 8B in Acceptable Solution E2/AS1 shows a roof/wall junction detail using an apron flashing and refers to paragraphs 5.1 and 5.2. These describe the requirements for apron flashings at roof-to-wall junctions, including that there must be:

- a 75 mm minimum wall cladding cover over the upstand
- a 35 mm minimum gap between the wall cladding and the roofing
- cover over the roofing as per E2/AS1 Table 7 depending on wind zone and roof pitch

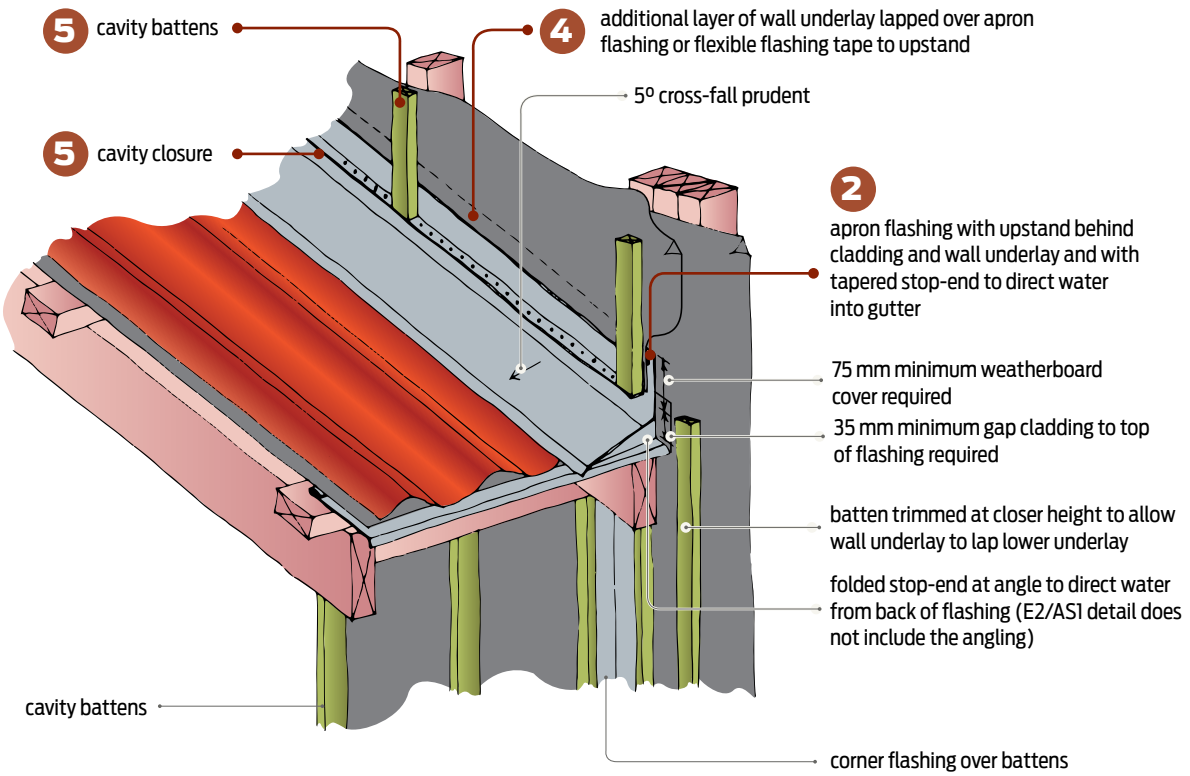


Figure 77b **Steps 2–5 (note that Step 3 is omitted for clarity).**

- a kick-out or tapered stop-end to the apron flashing – Figure 8B of E2/AS1 gives one option for folding a metal flashing to direct water to the spouting
- a cross-fall (shown in E2/AS1 figures but angle not specified) to drain water off the apron flashing – 5º is considered prudent.

Construction sequence

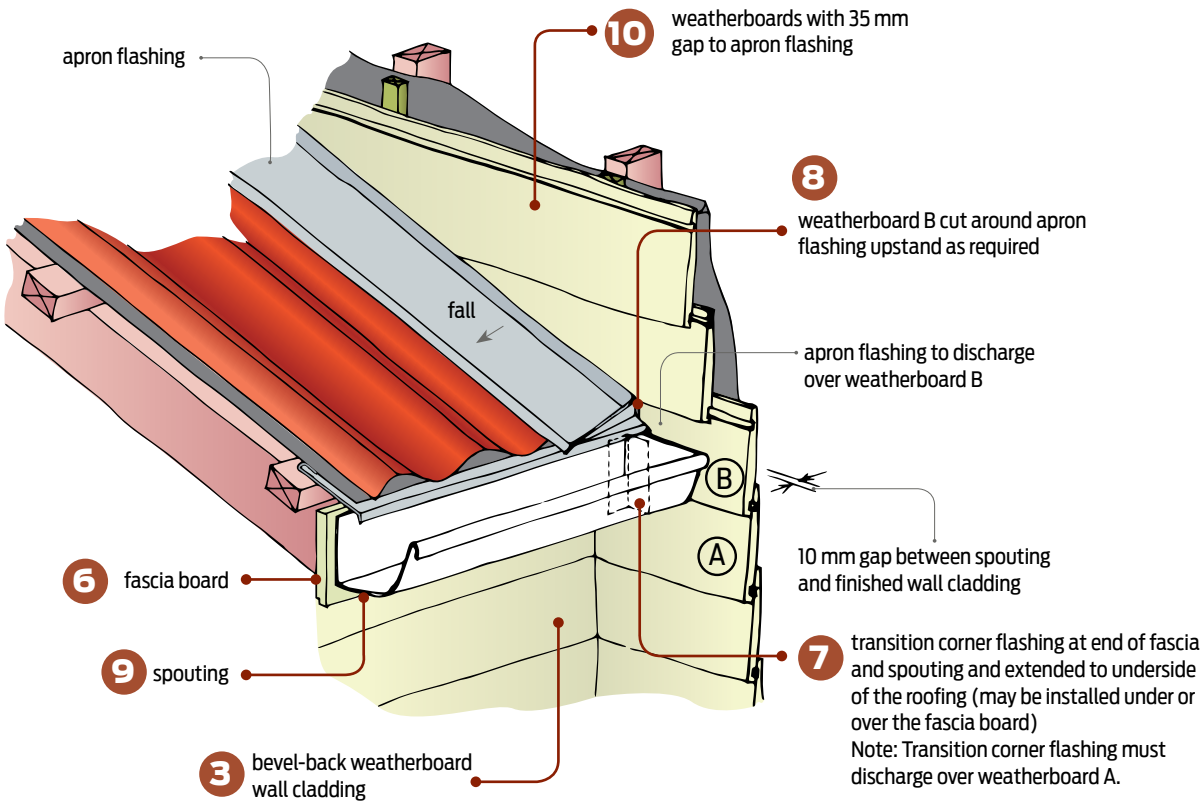
Figures 77a–c illustrate the construction sequence for the detail with bevel-back weatherboards over a drained and vented cavity.

Step 1 – Install roof underlay and cladding, turning the roof underlay up the adjacent wall.

Step 2 – Fit the apron flashing with a fall towards the roof and a tapered stop-end – folded on site or proprietary insert – to direct water into the gutter. Ensure it has the required minimum upstand height, roof cover and cross-fall (5º).

Step 3 – Clad wall up to fascia (weatherboard A in Figure 77c).

Step 4 – Cover apron flashing upstand with additional wall underlay or flexible flashing tape extending beyond bottom end of apron.



Note: An alternative is to use a proprietary stop-end that is fitted to the end of the underflashing.

Figure 77c **Steps 6–9.**

Step 5 – Install cavity battens and a cavity closure maintaining the minimum required gap – generally 35 mm (Figure 77b).

Step 6 – Install the fascia board.

Step 7 – Fit a transition corner flashing either under or over the fascia board to protect the soffit framing by bridging the gap at the end of the fascia board. Extend the transition corner flashing up to the underside of the roofing (Figure 77c) and over weatherboard A.

Step 8 – Fit weatherboard B over the cavity battens, cutting board to fit around the apron flashing stop-end as required.

Step 9 – Fit the gutter to fascia board, maintaining a minimum 10 mm gap between the end of the gutter and the weatherboard cladding.

Step 10 – Continue fitting weatherboards to wall maintaining 35 mm clearance to apron flashing.

4.2 Roof junction detail

Getting flashings right between a tight area such as the main gable of a building and the ridge of a smaller gable can be difficult. With these installation pointers, you can make sure this junction is weathertight.

CORRECTLY INSTALLED flashings are essential to ensuring weathertightness, but in some locations, detailing and installation can be tricky. This is when it is necessary to achieve a detail that not only keeps out moisture and meets the requirements of Acceptable Solution E2/AS1 but that is also durable and aesthetically pleasing.

One such detail is the junction between the main gable of a building and the ridge from a smaller gable, often a garage (see Figure 78).

Sequence of assembly – no eave

The sequence of assembly of flashing such a junction is critical to achieving a weathertight detail.

Figures 79a–c show the sequence for flashing the junction between the gable and ridge where there is no eave.

Figure 80 shows the shapes of each of the flashings and how they should be folded.

Step 1 – Flashing 1 is a typical apron roof flashing. The flashing upstand is carried up under the cladding and wall underlay and the ➤

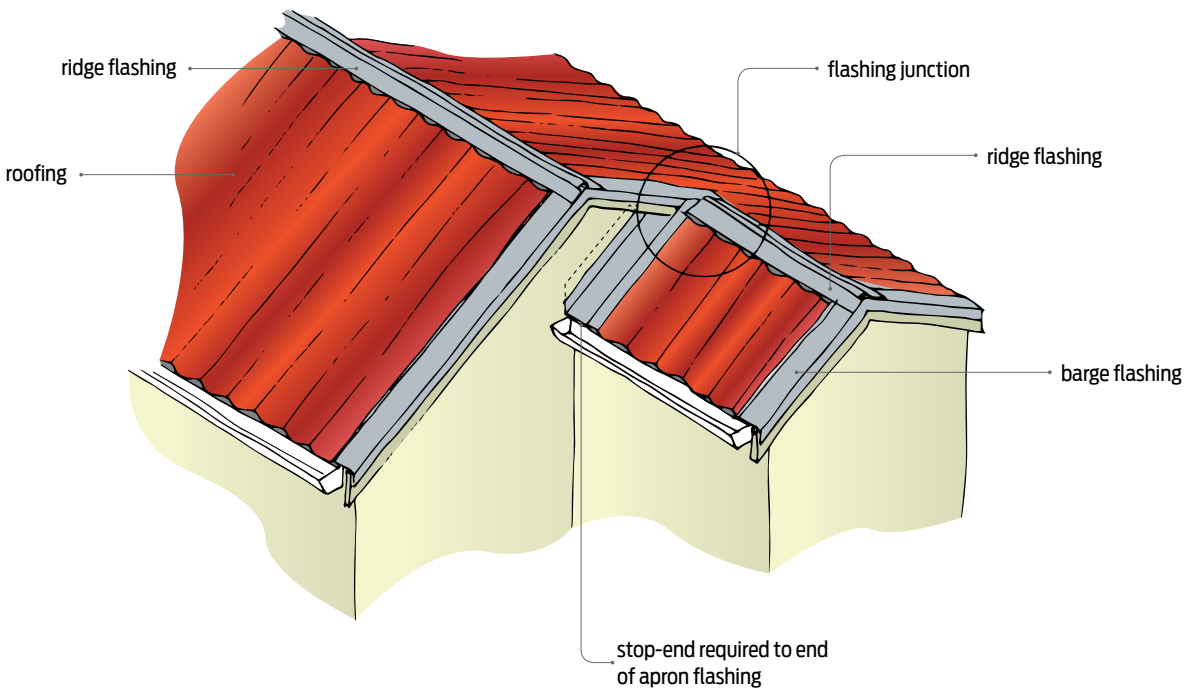


Figure 78 **Flashing junction of main gable and smaller gable.**

flashing apron is extended over the ridge of the smaller gable (see Figure 79a).

Step 2 – Flashing 2 covers both the apron flashing upstand and the wall underlay. It is folded over the large gable roof and the apron flashing and also extended over the ridge of the smaller gable (see Figure 79b).

Step 3 – Fit a butyl rubber patch over flashing 2 (see Figure 79b).

Step 4 – A ridge flashing is fitted over the smaller gable ridge butting up to the wall cladding, and the bargeboard is installed over the ridge. Flashing 3 is a standard barge flashing that, on the large gable roof, extends beyond the ridgeline of the smaller gable and aligns with the bottom edge of the ridge flashing (see Figure 79c).

Roof junction with an eave

Where there is an eave at the junction between the two gables, the apron and barge flashings are fitted in the same way. However, an undersoaker flashing is required over the soffit, apron flashing and roof (see Figure 80).

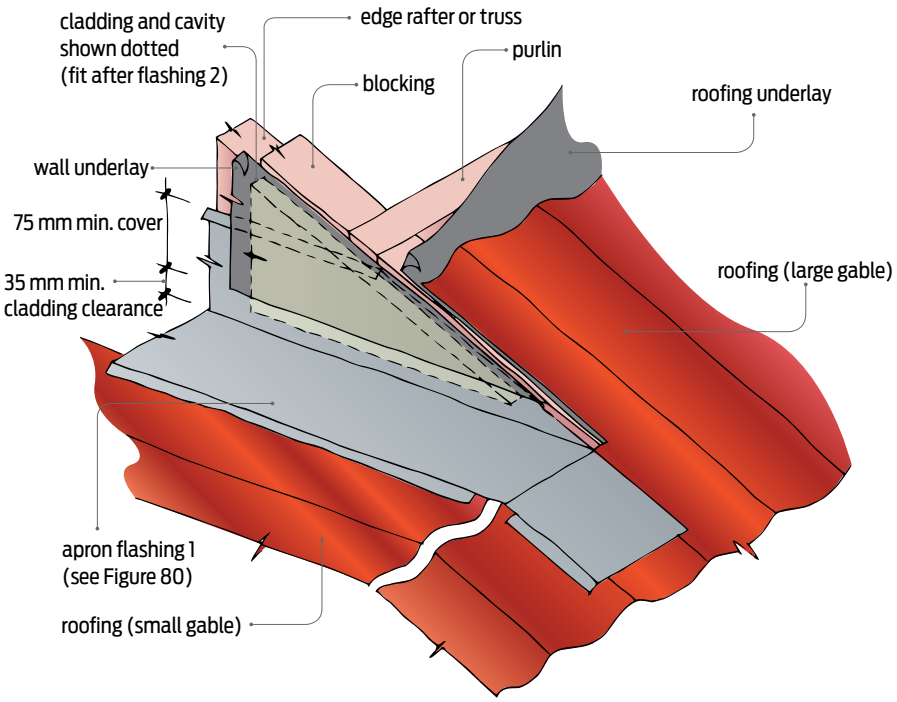


Figure 79a **Flashing the junction – Step 1.**

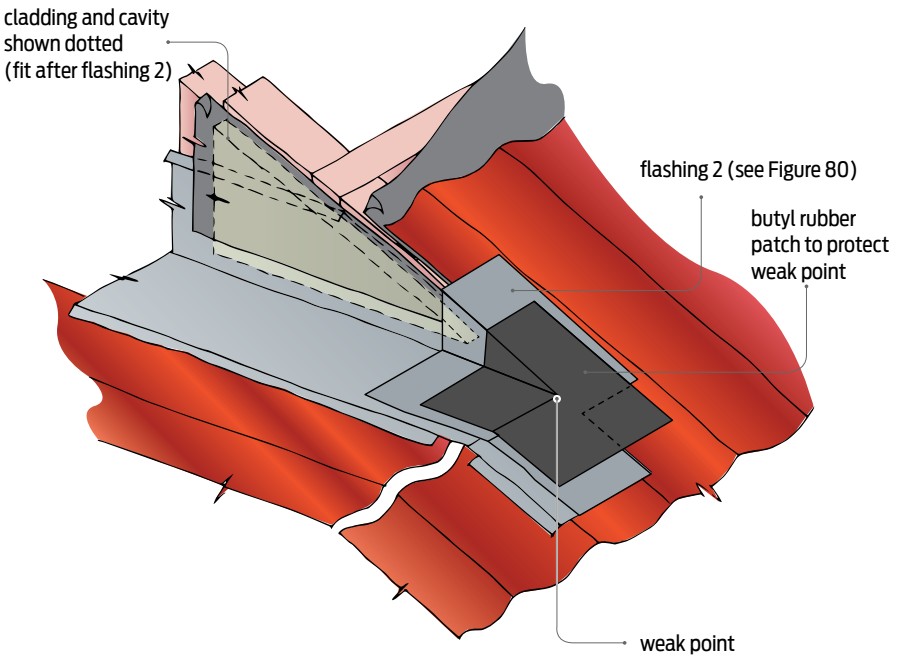


Figure 79b **Step 2.**

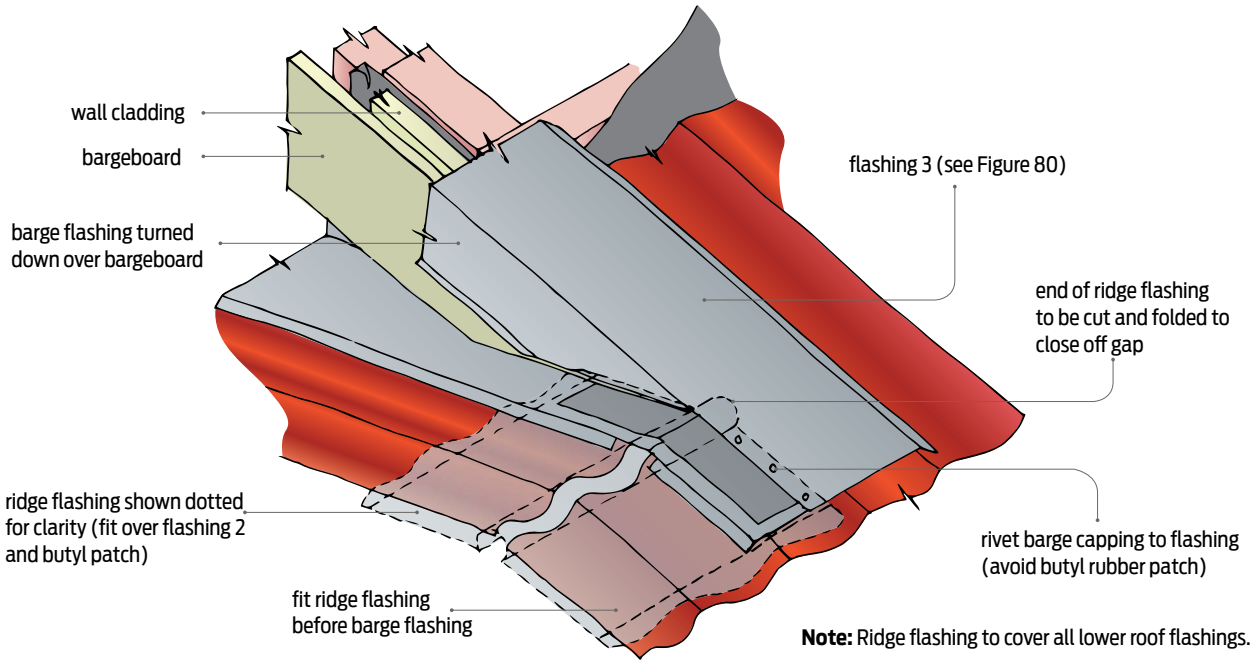
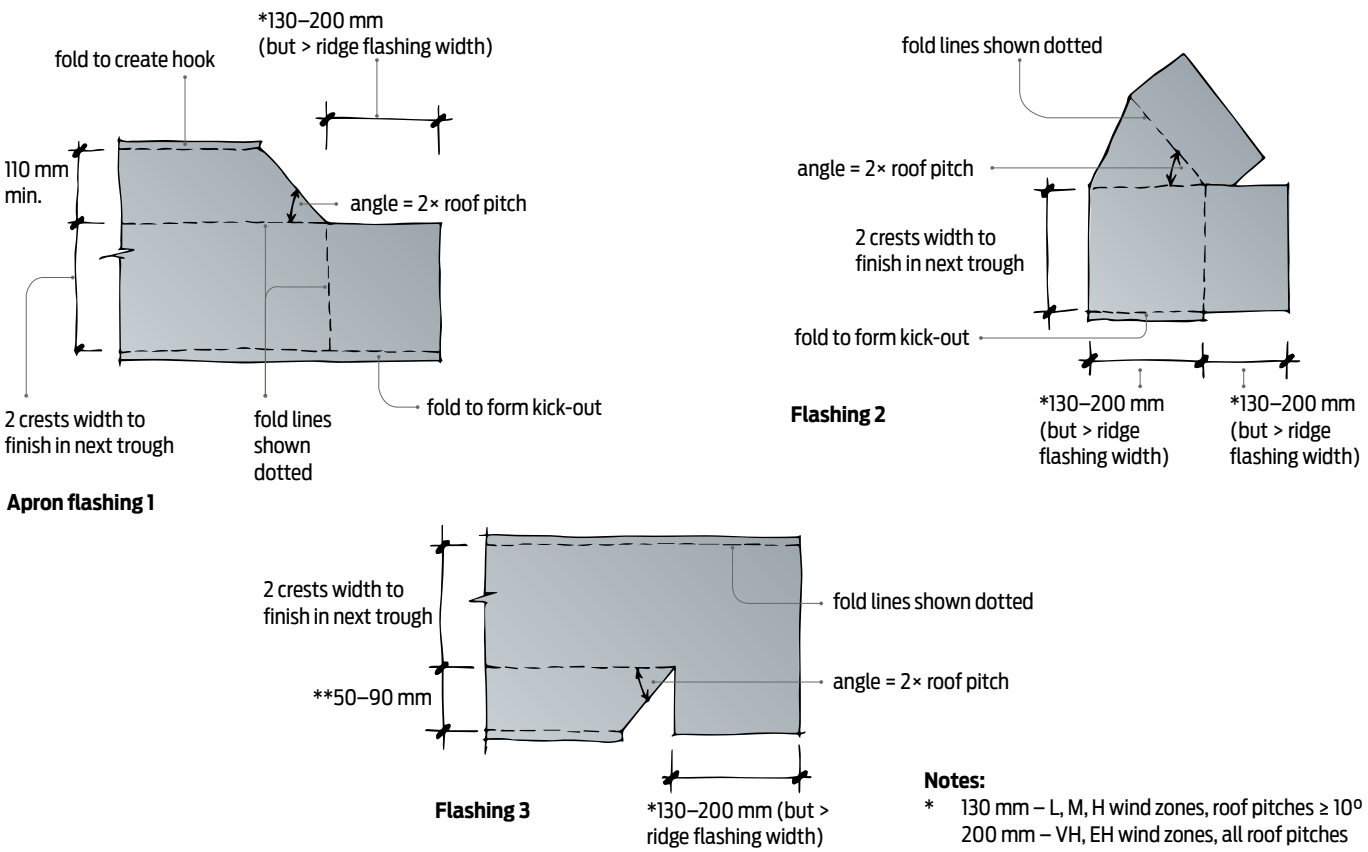


Figure 79c **Step 3.**



Notes:

* 130 mm – L, M, H wind zones, roof pitches ≥ 10°
200 mm – VH, EH wind zones, all roof pitches

** 50 mm – L, M, H wind zones, roof pitches ≥ 10°
70 mm – VH wind zone, all roof pitches
90 mm – EH wind zone, all roof pitches

Figure 80 **Flashing shapes.**

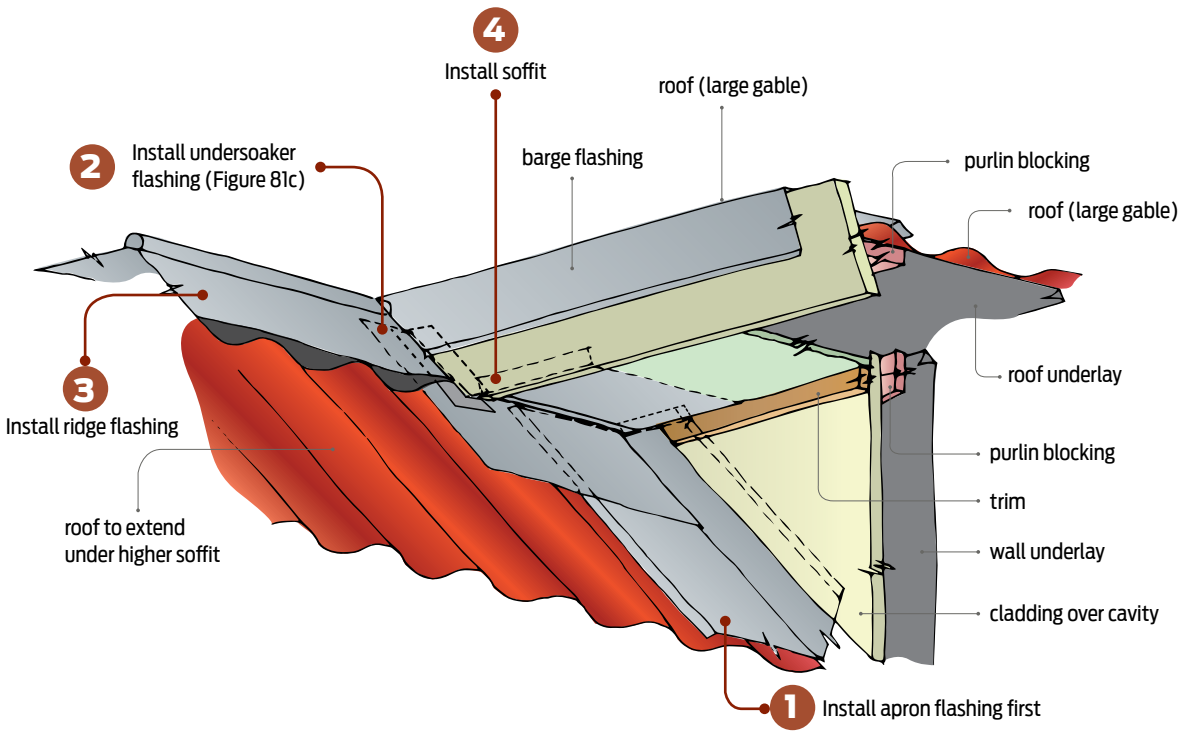


Figure 81a **Flashing detail sequence – gable with soffit.**

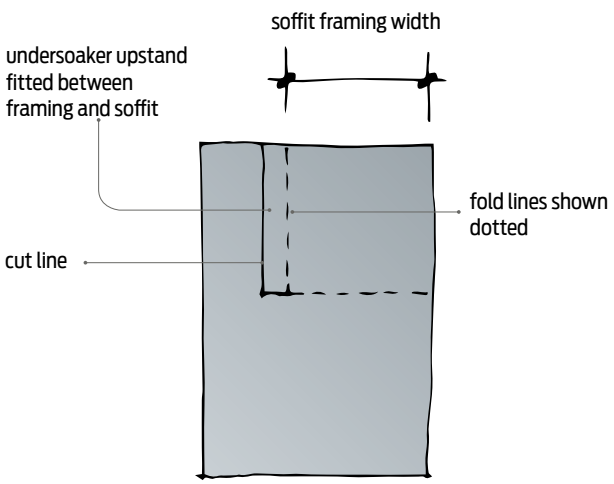


Figure 81b **Undersoaker flashing.**

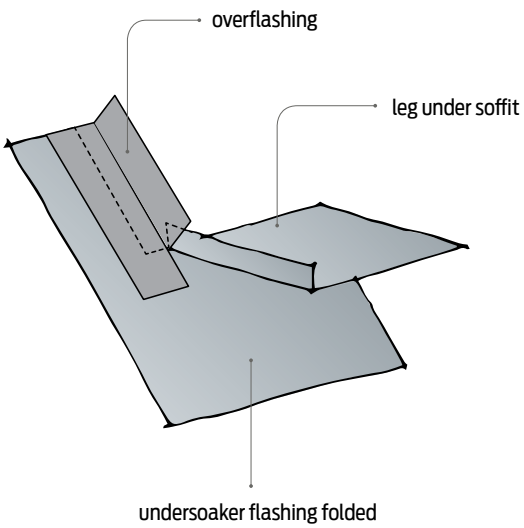


Figure 81c **Undersoaker flashing folded.**

4.3 Tricky lean-to junction

Good detailing of the roof wall junction for lean-tos is important for the weathertightness of a building, but this junction can present some challenges.

ROOF WALL JUNCTIONS can be classed as simple, such as a standard horizontal apron flashing (see A in Figure 82), or complex, such as where the previous apron flashing terminated within the wall area (see B in Figure 82).

Detail A is covered by E2/AS1, but detail B is not.

Building up the detail

Key elements to address with the termination of the flashing at B are:

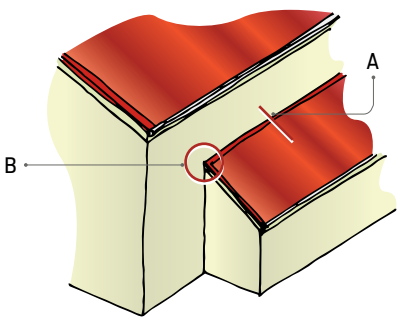


Figure 82 **Lean-to junction.**

- preventing wind-blown water getting under the edge of the flashing laid over the roof by downturning the end of the flashing cladding to the lean-to
- backflashing the internal corner and ensuring the backflashing extends up behind the barge-board and the apron flashing upstand.

Figures 83a–f outline the construction sequence for one option for detailing this tricky junction.

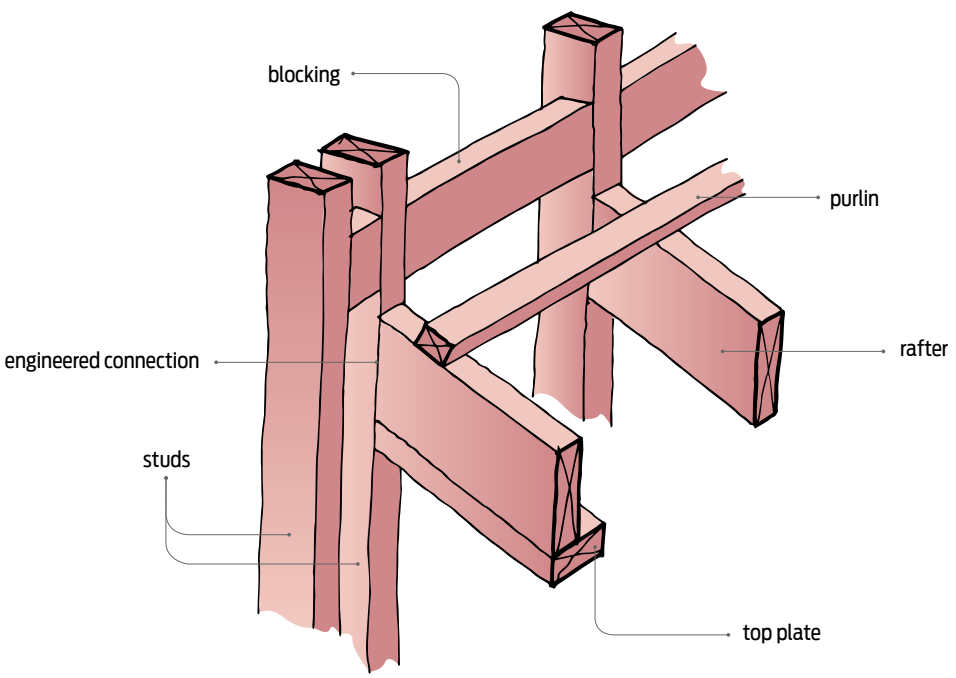


Figure 83a **Construction sequence Step 1 – Framing.**

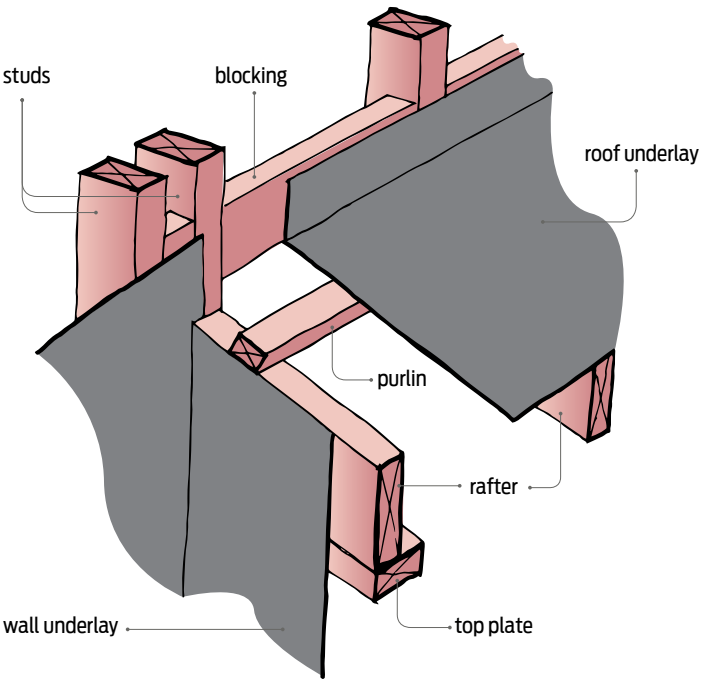


Figure 83b **Step 2 – Wall and roof underlay.**

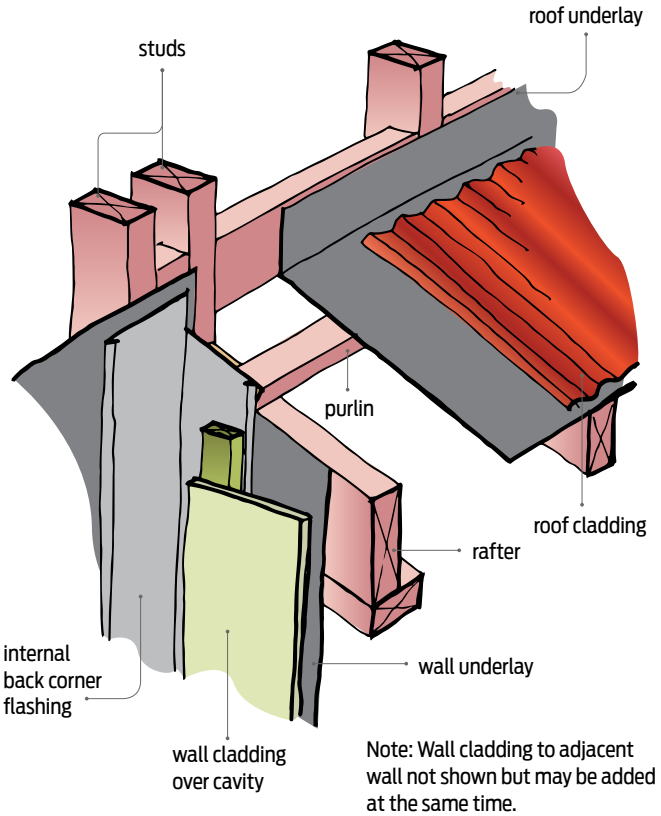


Figure 83c **Step 3 – Backflashing internal corner.**

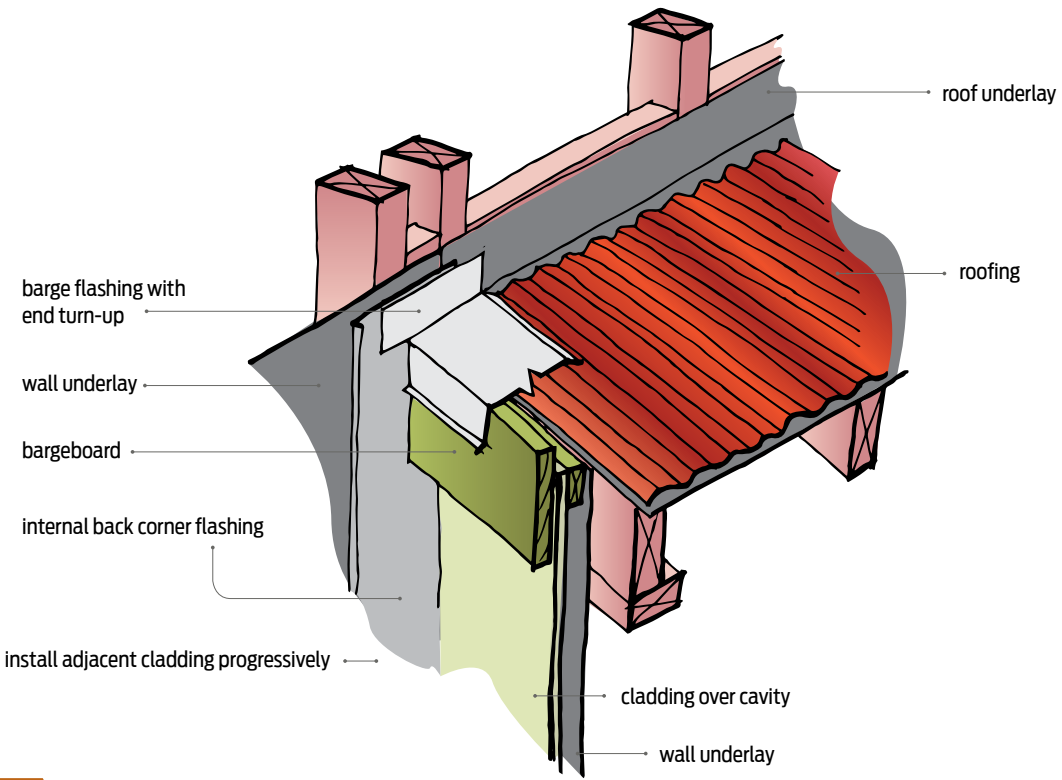


Figure 83d **Step 4 – Installing barge flashing.**

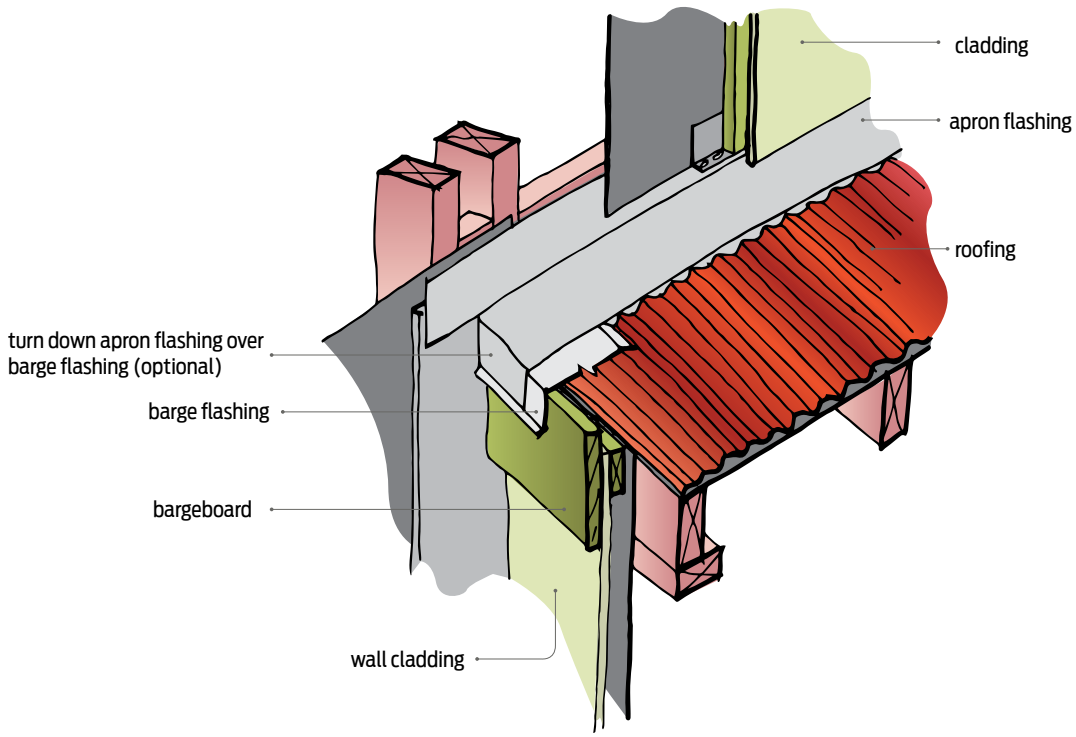


Figure 83e **Step 5 – Install apron flashing.**

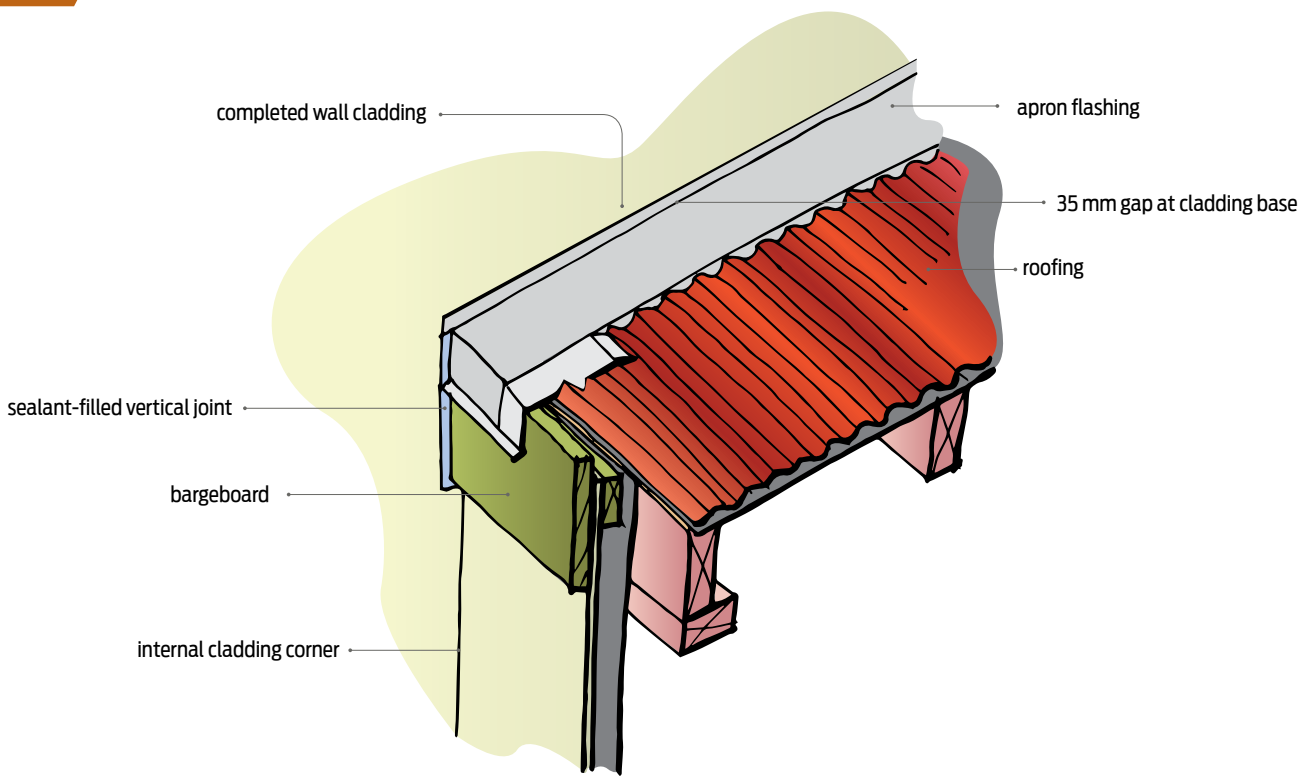


Figure 83f **Step 6 – Completed detail.**

4.4 Soffit detail at gable verge

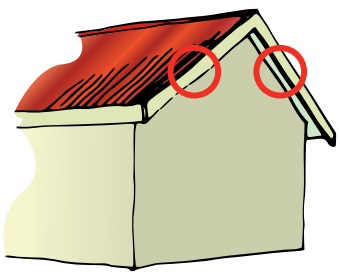
Gables need to be carefully detailed and constructed to prevent wind-driven rain penetrating the junction between the soffit and the wall cladding. Follow this step-by-step guide to achieve a weathertight detail.

THERE IS A TWOFOLD weathertightness problem at the junction between the soffit and the wall cladding:

- Gables tend to be higher and more exposed.
- The cladding is cut to the angle of the roof pitch where it intersects with the soffit lining to create a wedge-shaped gap at each end of the boards.

Tradition compounds problem

The traditional way to construct eave and verge details is to install soffit linings before the external cladding. This compounds the weathertightness problem as the cladding is butted to the soffit



lining, allowing any water running down the soffit to enter the gap between the lining and the top of the cladding. From there, it will run down behind the cladding.

Better to install weatherboards first

A better way to achieve a weathertight detail is to install weatherboards first. The intersection of the soffit lining and the top of the weatherboards can be effectively flashed and wedges installed to block the gaps between the weatherboards.

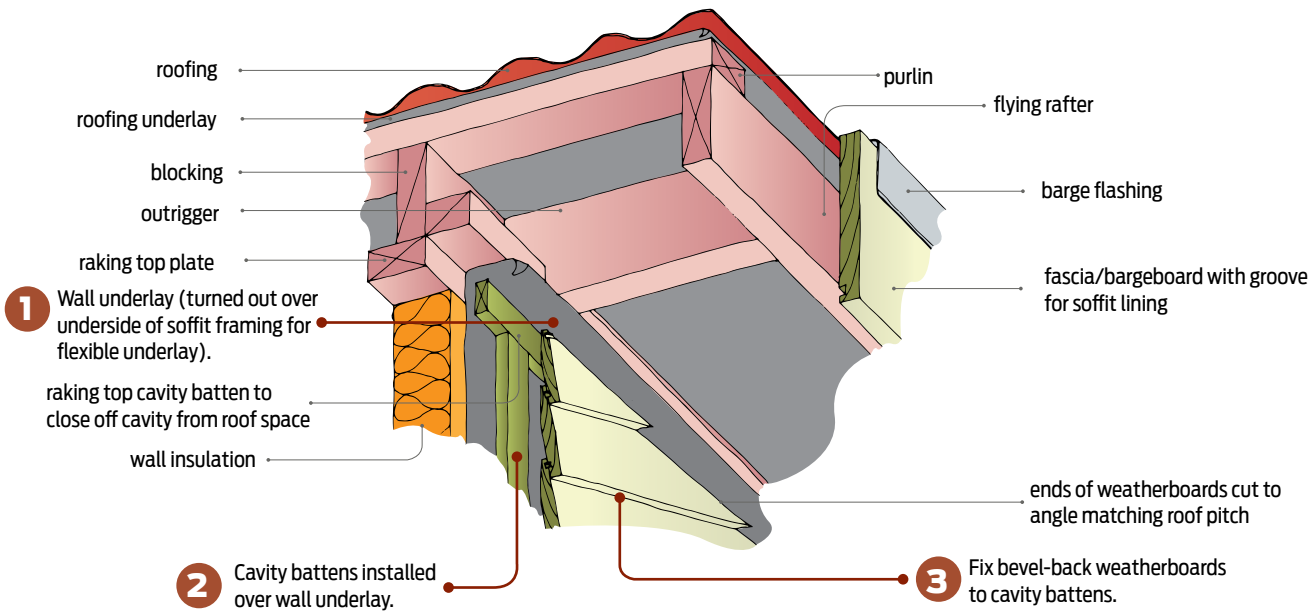


Figure 84a **Soffit detail at gable verge for weatherboards – Steps 1–3 .**

The sequence of construction is described in Steps 1–7 and shown in Figures 84a–b.

Step 1 – Carry wall underlay up the wall framing and turn out over the underside of the flying rafters/soffit framing.

Step 2 – Install vertical cavity battens and raking cavity batten to close off the roof space.

Step 3 – Install bevel-back weatherboards up to the underside of the soffit framing. Ends of weatherboards are cut to match the angle of the roof pitch.

Step 4 – Fix minimum 45 × 45 mm angle flashing to the underside of the soffit framing and over the weatherboards. For boxed soffit, fold flashing to form a stop-end at the bottom. Fit an additional angle flashing behind the fascia return.

Step 5 – Install the soffit lining by slotting it into the groove in the bargeboard and fixing to the framing.

Step 6 – Cut wedges to fit gaps at the junctions of the soffit and the weatherboards.

Step 7 – Fix a timber trim or cover batten to the intersection between the soffit lining and the weatherboards.

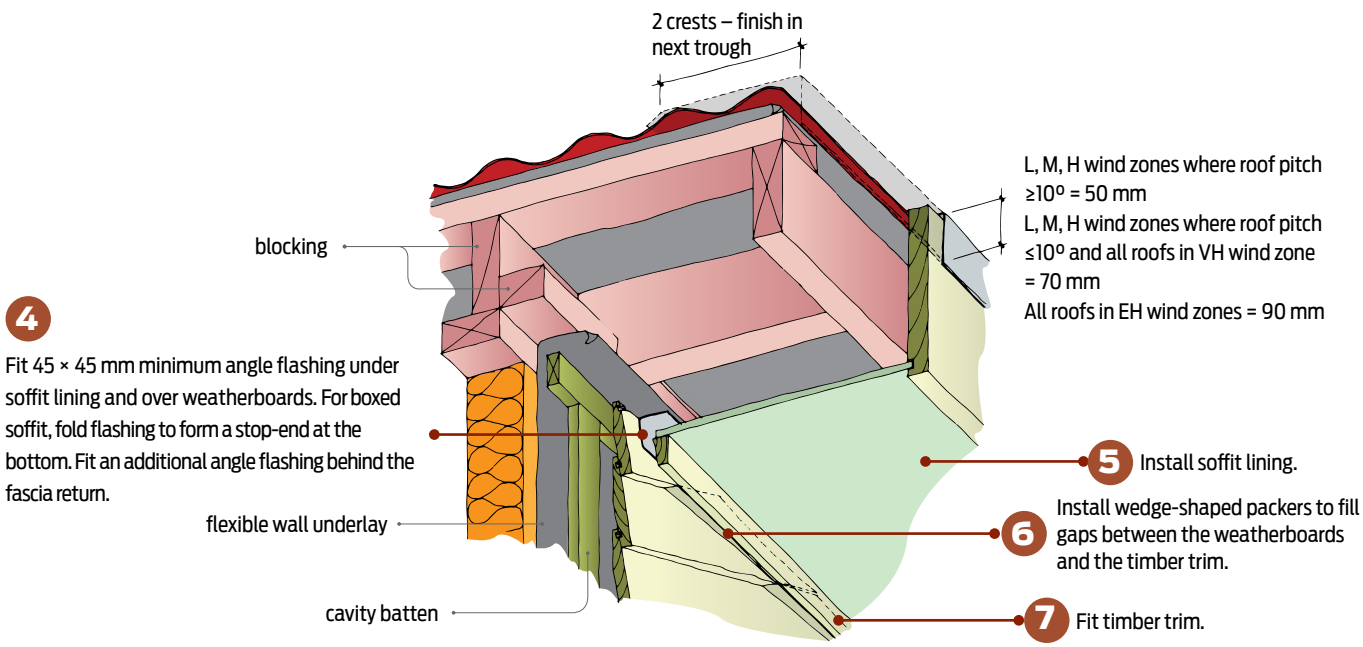


Figure 84b **Steps 4–7.**

4.5 Parapet or balustrade-to-wall junction

What you need to know about constructing a timber-frame parapet or enclosed balustrade and their junction to a wall junction.

THE JUNCTION between a parapet or enclosed balcony and the main wall must be offset from the adjacent walls and flashed with a saddle flashing (see Figure 14) as per E2/AS1 Figures 11 and 12.

E2/AS1 gives no minimum offset dimension between a parapet or enclosed balcony and the main wall. A 200 mm minimum offset allows sufficient space for installing the balustrade or parapet.

E2/AS1 requires at least 150 mm between the trimming stud to a door or window adjacent to the solid balcony wall framing.

Enclosed balustrades and parapets that are continuous and in the same plane as an adjacent wall are outside the scope of E2/AS1.

Parapet and balustrade wall construction

General construction of parapets and enclosed balustrades requires that:

- the framing is fully enclosed with wall or roof underlay
- all claddings on parapets and enclosed balustrades are over drained cavities, except vertical corrugate
- all claddings are installed over a rigid wall underlay, consisting of 7 mm H3 treated plywood or 6 mm fibre-cement sheet overlaid with a flexible wall underlay in extra high (EH) wind zones
- there is a drained cavity with flush-finished, fibre-cement and exterior insulation and finish system (EIFS) claddings in all wind zones and with all claddings except for vertical corrugated steel in EH wind zones
- a sloped capping flashing is fitted across the top of the wall.

Parapet and balustrade capping

All parapets must have either a sloped metal capping, or a butyl or EPDM membrane over the top of the wall and down both sides of the cladding.

Enclosed balustrade walls may have either:

- a metal capping or a butyl or EPDM membrane over the top of the wall and down both sides of the cladding, or
- a waterproofing membrane approved by the supplier of the jointing and finishing system with a textured coating applied over the top of the wall for EIFS and flush-finished fibre-cement claddings. Note: minimum 10° slope to the top of EIFS formed texture coated balustrade.

No penetrations are allowed in the top surfaces of parapets and enclosed balustrade walls. Where rails are required on balustrades, they must be side-fixed through the cladding into the framing as per E2/AS1 Figure 19 (see Figure 85).

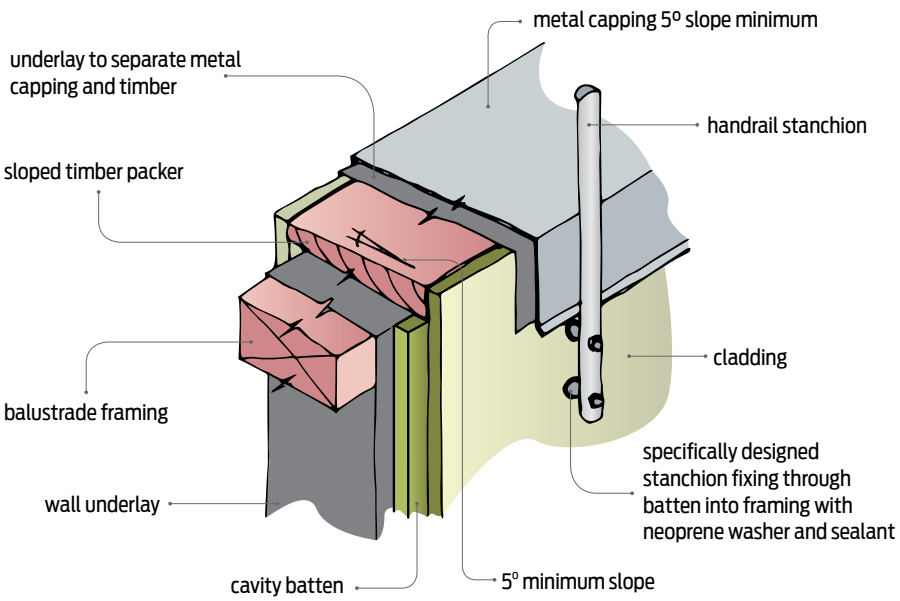


Figure 85 **Side fixing of handrail.**

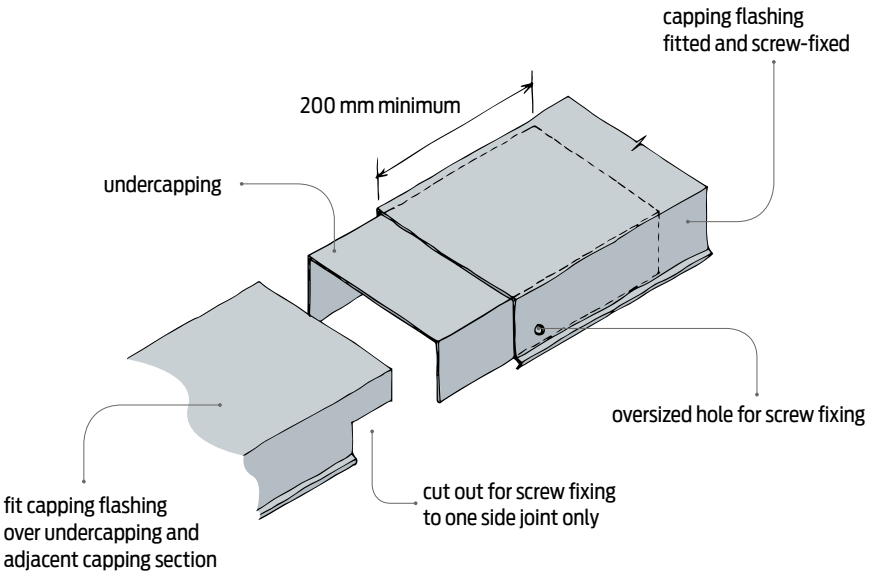


Figure 86 **Expansion joint.**

The sides of cappings must overlap the cladding laps on both sides as per E2/AS1 Table 7 situation 2, ie ≤10°:

- 70 mm – for L, M and H wind zones
- 70 mm – for VH wind zones
- 90 mm – for EH wind zones.

Considerations for selecting the capping material for parapets and enclosed balustrades include:

- durability
- suitability for the environment
- specific conditions of use compatibility with adjacent materials
- appearance
- location and construction of joints
- fixing type and locations.

Cappings installed over parapets and enclosed balustrades are considered relatively easy to access and replace, so they may have a durability of not less than 15 years. The flashing installed under a plastered finish must have a minimum 15-year durability because of the difficulty in replacing it.

Metal cappings

Metals that may be used for cappings include:

- aluminium – minimum 0.7 mm thick
- galvanised steel – minimum 0.55 mm thick
- aluminium/zinc alloy-coated steel – minimum 0.55 mm thick
- stainless steel – minimum 0.45 mm thick
- copper – minimum 0.5 mm thick
- zinc – minimum 0.7 mm thick.

Installation requirements for metal cappings include:

- a 5° minimum slope across the top of the wall, with the slope to the inside face of the building to prevent water run-off staining the exterior surfaces
- a sloped timber or polystyrene packer or 9 mm H3 plywood on packers to support the capping
- separation of the metal capping from an underlying timber packer by roof or wall underlay
- the bottom edges on both sides must be folded to form a kick-out or bird's beak drip edge
- the drip edge on the inside face of enclosed balustrades must be a bird's beak.

The drip edges must be in addition to the flashing cover dimension.

Joins in the metal cappings may be made using:

- a soaker flashing under the join with a 50 mm minimum overlap on each side of the joint, with sealant or a compressible strip inserted between the soaker flashing and each capping section. The capping sections must be fixed to the structure through the downturns.
- an overlap joint with a 100 mm minimum overlap and sealant under the overlapped sections. The sections are riveted together and sections face screw-fixed to the structure with oversized holes to allow for expansion.
- an expansion joint formed by inserting an undercapping with a 200 mm minimum overlap. Screw-fixing of the capping through the undercapping is one side of the joint only (see Figure 86).

Expansion joints must be provided for joined cappings when:

- the combined length is more than 12 m long for light-coloured and stainless steel
- the combined length is more than 8 m long for dark-coloured steel, copper or aluminium
- both ends of the capping are fixed.

External corners must be flashed using a preformed corner soaker as an underflashing as shown in E2/AS1 Figures 9(e) and (f).

Flush-finish topped balustrades

Where the top to an enclosed balustrade is formed with EIFS or flush-finished fibre-cement, a liquid waterproof membrane must be applied and protected by the textured coating.

E2/AS1 does not permit the use of a concealed flashing with stucco.

The balustrade must:

- have no penetrations in the top
- have a minimum cross-fall slope of 10° provided by a shaped polystyrene packer (BRANZ recommends 15° for rough textures) and overlap the balustrades or parapet wall cladding on both sides as per E2/AS1 Figure 130.

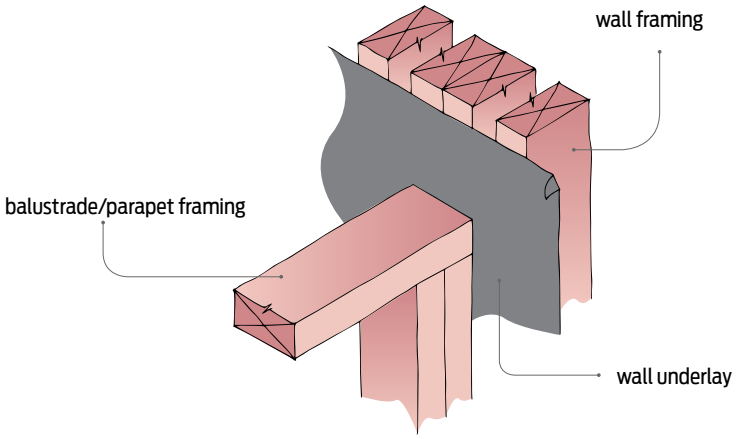


Figure 87a **Saddle flashing construction sequence – Step 1.**

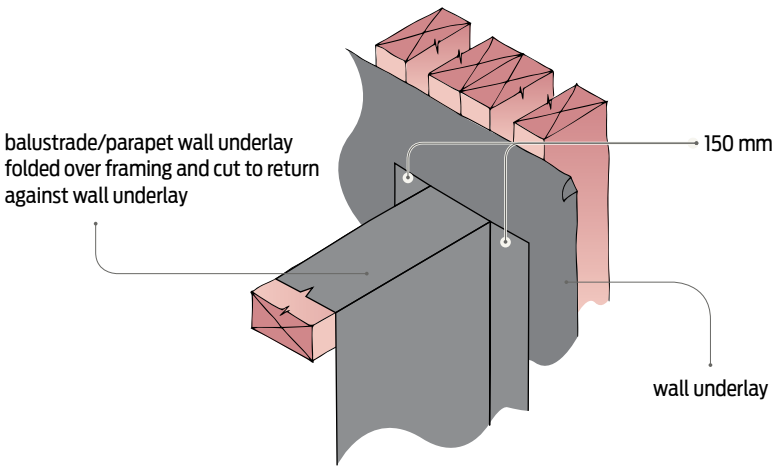


Figure 87b **Step 2.**

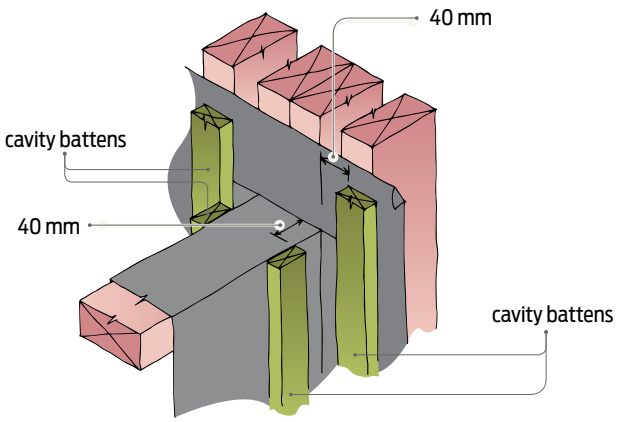


Figure 87c **Step 3.**

Saddle flashings

Saddle flashings are required at the junctions between an enclosed balustrade or parapet and the main wall. They must have a minimum 50-year durability, 50 mm minimum upstand and sides and extend at least 100 mm over the top of the balustrade or parapet.

Saddle flashing construction sequence

The saddle flashing construction sequence is shown in Figures 87a–f as follows:

Step 1 – Construct the balustrade/parapet framing using double studs to attach it to the main wall framing over the wall underlay (Figure 87a).

Step 2 – Wrap the balustrade/parapet framing with wall underlay, folding it over the main wall underlay (Figure 87b).

Step 3 – Install cavity battens to each side of the balustrade/parapet framing and to the main wall on both sides of the balustrade/parapet leaving 40 mm wide vertical channels in the internal corners (Figure 87c).

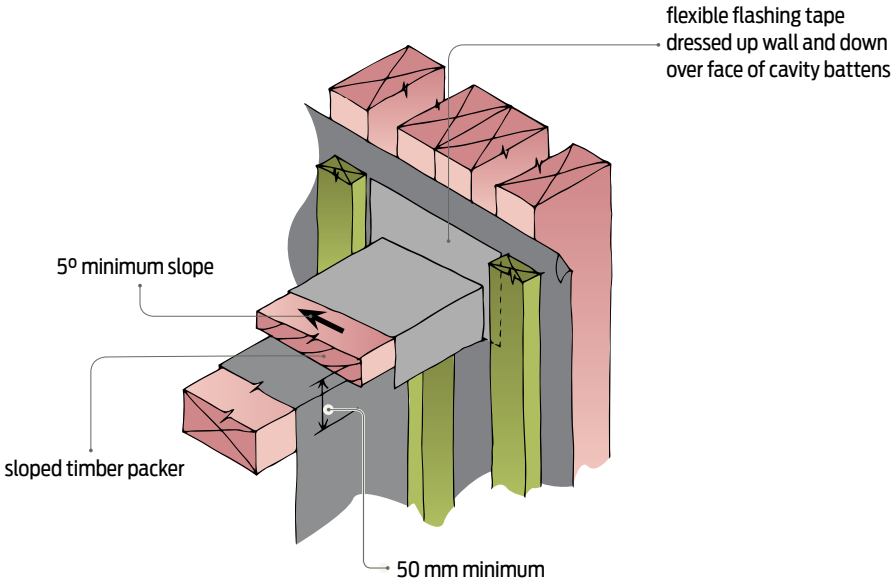


Figure 87d **Steps 4–5.**

Step 4 – Install a sloped packer that is wide enough to fully cover the top of the cavity battens to the balustrade/parapet framing (Figure 87d).

Step 5 – Apply flexible flashing tape over the packer at the junction between the balustrade or parapet and the main wall, dressing it up the main wall underlay and for a minimum of 50 mm down the face of the balustrade or parapet cavity battens (Figure 87d).

Step 6 – Overlay timber packer with additional underlay to separate the timber and the metal capping.

Step 7 – Fix 50 × 50 mm internal corner flashings with hems (or 75 × 75 mm flashings in EH wind zones) over the cavity battens on each side of the balustrade or parapet wall where it meets the main wall (Figure 87e).

Step 8 – Install cladding to both sides of the balustrade/parapet wall over the corner flashing (Figure 87e).

Step 9 – Fit a saddle flashing at the junction between the top of the balustrade or parapet

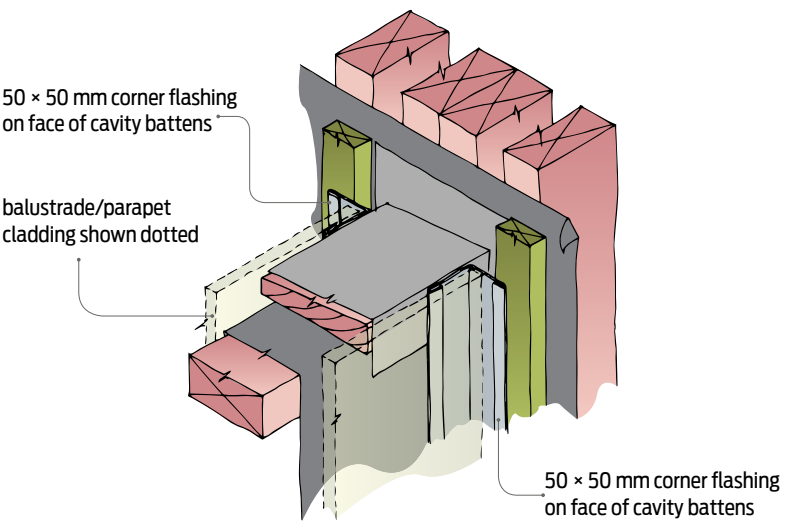


Figure 87e **Steps 6–8.**

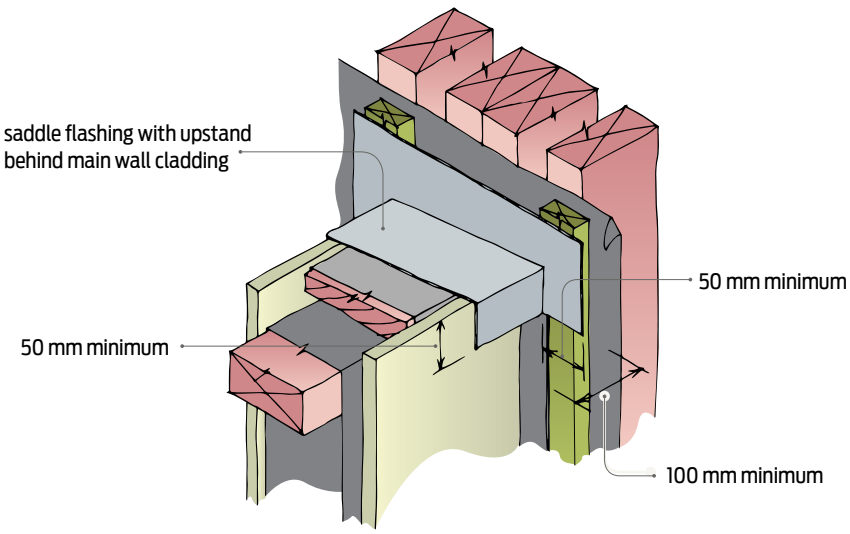


Figure 87f **Step 9.**

wall and the main wall so that it goes over the corner flashings and the balustrade or parapet cladding and is fixed to the main wall cavity battens (Figure 87f).

Step 10 – Cut and fix the main wall cladding around the balustrade/parapet wall and saddle flashing, leaving a 5 mm gap for moisture to be able to drain away (see Figure 87g).

Step 11 – Fit the metal capping over the top of the parapet/balustrade wall with two rows of sealant between the capping and the saddle flashing (Figure 87g).

Step 12 – Fix the capping through the sides of the flashing only.

Base of enclosed balustrade or parapet

The base of the enclosed balustrade or parapet must have:

- the cladding finishing at least 35 mm above the highest point of the deck surface
- the decking membrane turned up at least 150 mm under the cladding blocking fitted between the stud framing to provide support for the decking membrane upstand
- a triangular fillet so that the membrane can be smoothly turned up.

Where cavity battens are installed, they must stop 10–15 mm above the bottom of the cladding to provide a drip edge and be closed off with a cavity closer.

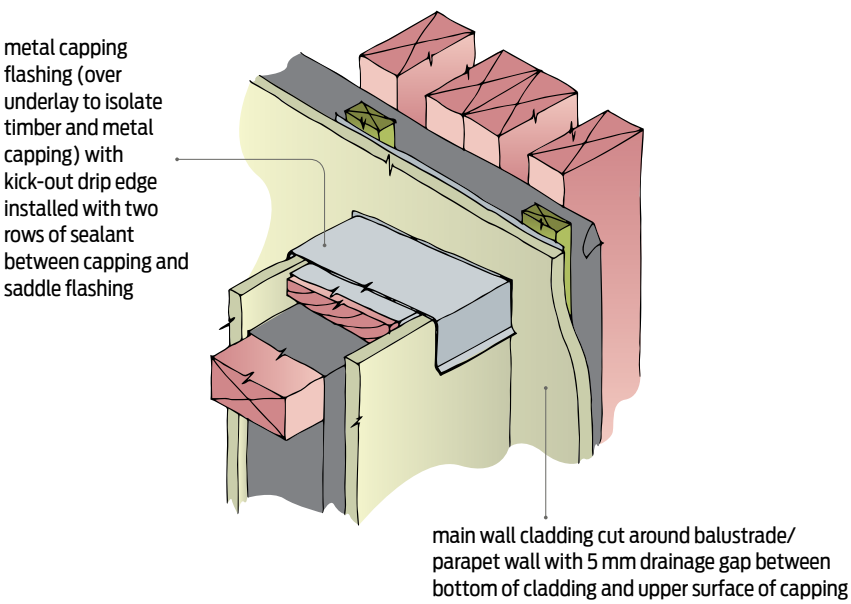


Figure 87g **Step 10–11.**

5 Glossary

ACCEPTABLE SOLUTION	A solution that must be accepted by a BCA as complying with the Building Code.
ALTERNATIVE METHOD	A proposed method that does not follow a Verification Method or Acceptable Solution, but if accepted and consented by the BCA, will become an Alternative Solution.
ALTERNATIVE SOLUTION	An alternative method that has been accepted and consented by a BCA.
BCA	Building consent authority.
CLADDING	The exterior weather-resistant surface of a building.
COMPATIBLE	When materials can be used together without affecting each other.
EPDM	(Ethylene propylene diene monomer) – a closed-cell sponge rubber material with good compressibility and resistance to weathering.
TERRITORIAL AUTHORITY (TA)	City, district or regional council.
WIND ZONES	Categories of wind force (based on speed) defined in NZS 3604:2011. Wind zone categories are low (L), medium (M), high (H), very high (VH) and extra high (EH).