3.9 Detailing garage door heads

Here we cover the sometimes overlooked requirements for flashing garage door heads with a timber lintel.

ALTHOUGH THE NEED for flashings at external door and window heads is generally well understood, there is not the same understanding about the need for flashing at garage door heads.

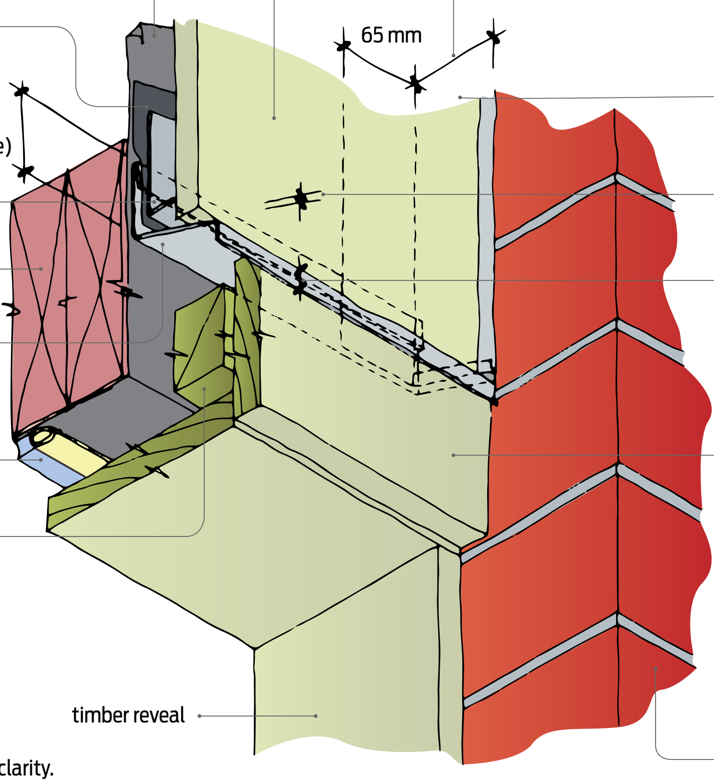
Building consent authorities are receiving applications for building consents in which garage door head details do not follow the same requirements for flashing as for other door and window head details.

Flashing needed for garage doors

The requirements for flashing garage door openings are simple – they are the same as for external door and window details.

Acceptable Solution E2/AS1 to Building Code clause E2 *External moisture* is quite prescriptive in terms of head flashing profile when used as a means of compliance.

Figures 57–59 are details based on E2/AS1 principles for both direct-fixed and cavity construction bevel-back, horizontal weatherboard cladding, and where an infill panel is used with masonry veneer cladding.



Note: Garage door not shown for clarity.

Figure 57 **Garage door head detail with masonry veneer cladding and infill panel over the door.**

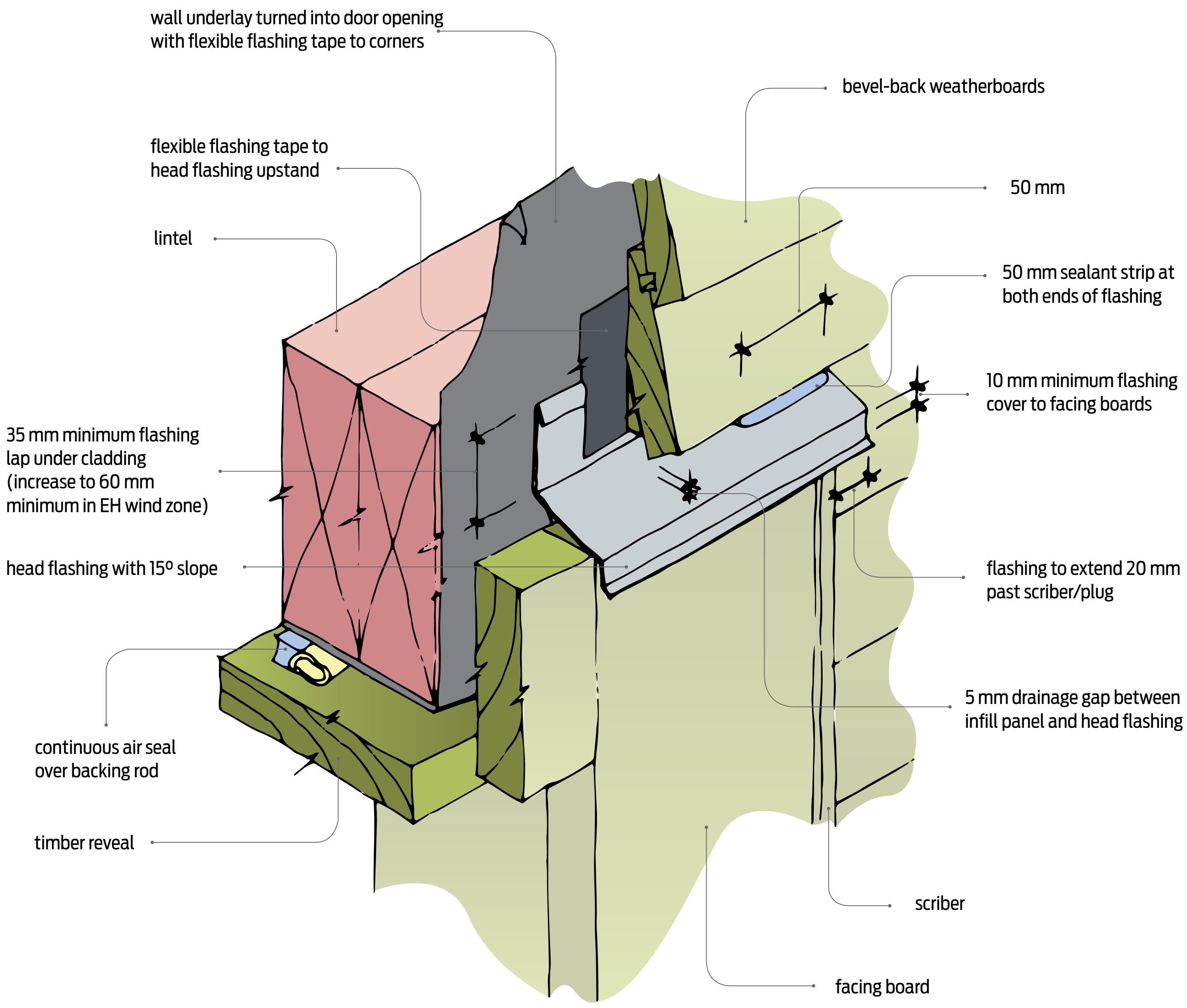
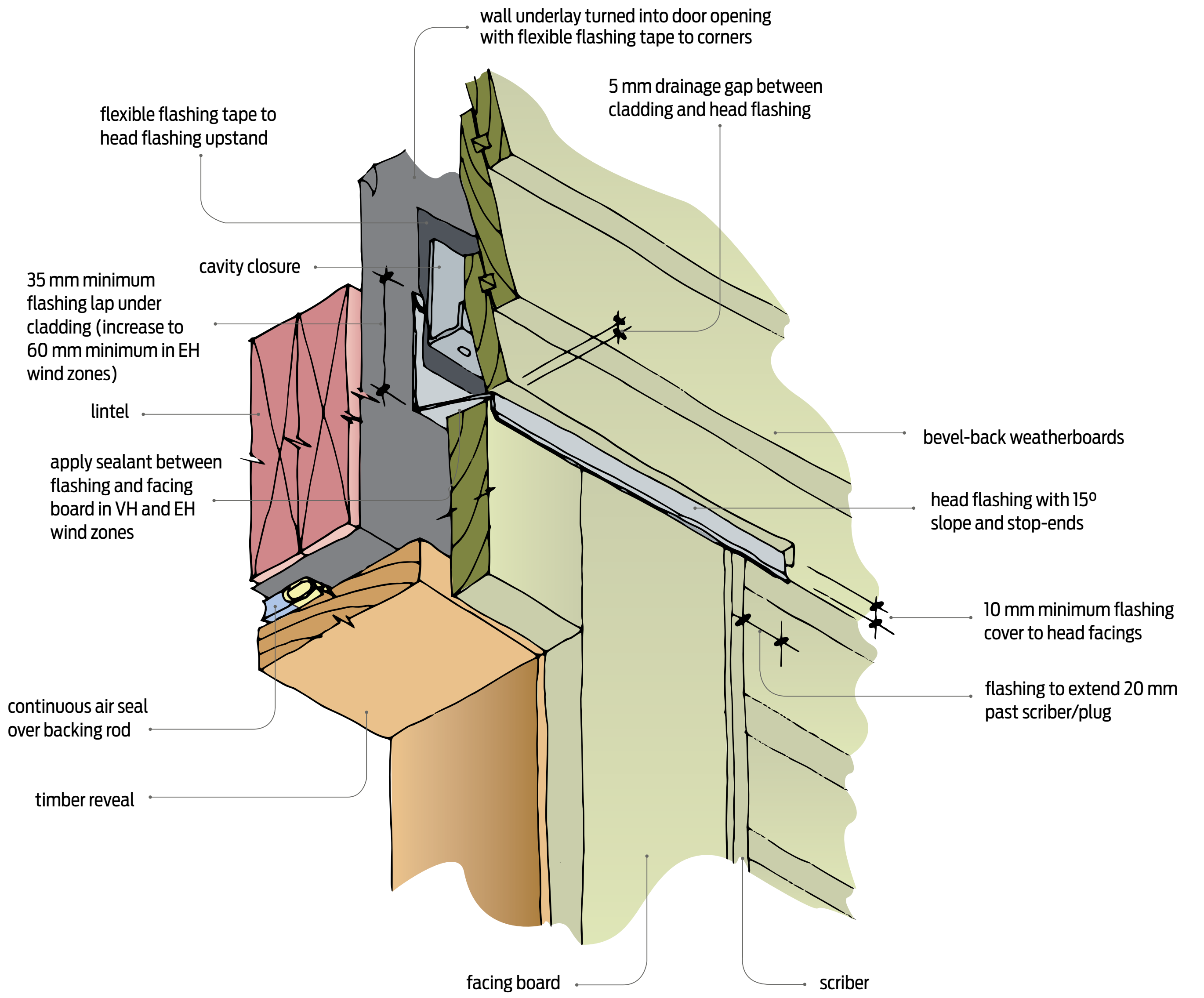


Figure 58 **Garage door head detail with direct-fixed bevel-back, horizontal weatherboard cladding.**



Note: Garage door not shown for clarity

Figure 59 **Garage door head detail with bevel-back, horizontal weatherboard cladding over a cavity.**

3.10 Horizontal cladding joints and inter-storey junctions

Use the correct specifications for flashings at horizontal cladding joints and inter-storey junctions.

HORIZONTAL Z flashings must be installed between cladding joints and at inter-storey junctions (see Figure 60). Z flashings must have a:

- 35 mm minimum upstand in L, M, H and VH wind zones and a 60 mm minimum upstand in EH wind zones
- 35 mm minimum cover in L, M, H and VH wind zones and a 60 mm minimum cover in EH wind zones over the lower cladding
- minimum cross-fall of 15°
- drip edge (kick-out or bird's beak) at the bottom edge of the flashing
- 5 mm gap above the slope of the flashing to enable water to drain from behind the cladding.

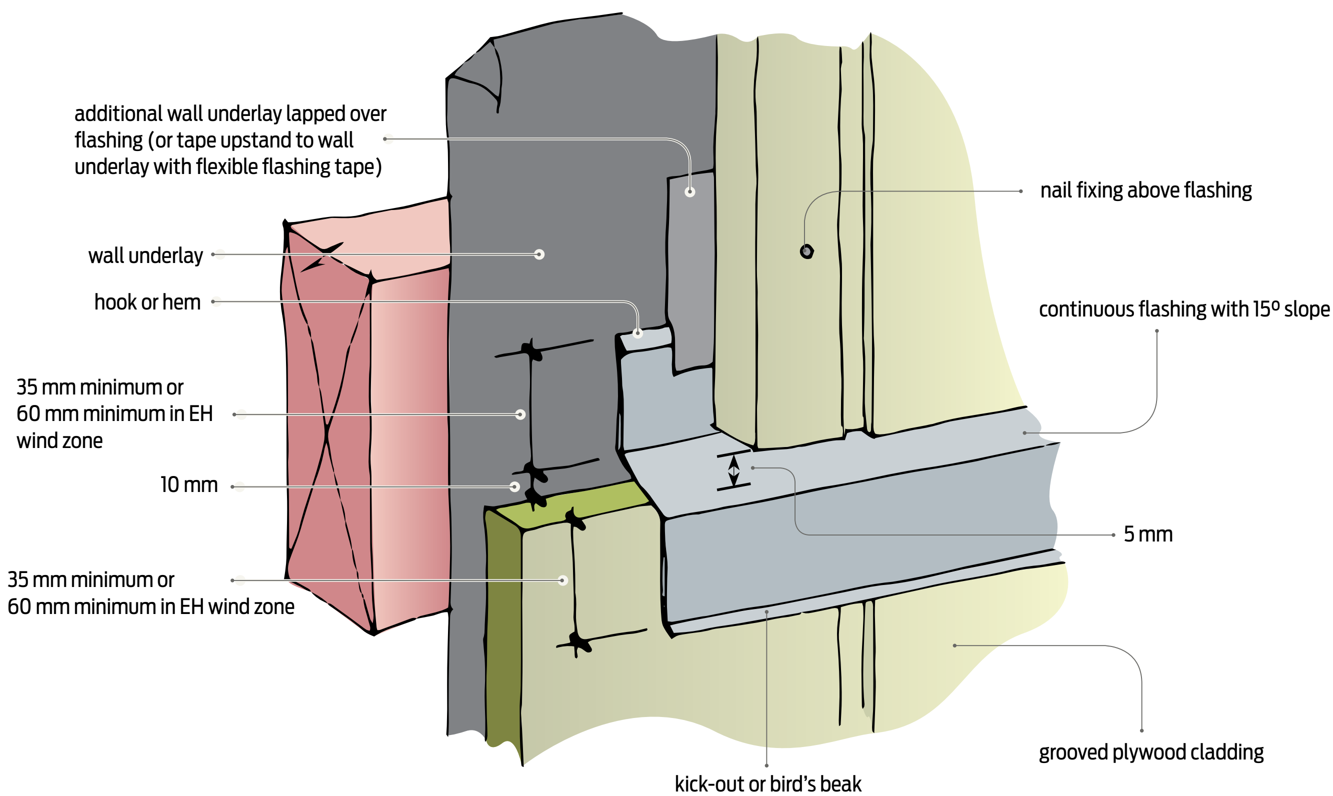


Figure 60 Inter-storey horizontal flashed joint.

3.11 At the crossroads

The junctions between different cladding materials can present a few challenges for designers. BRANZ has developed some details to help fill the gap.

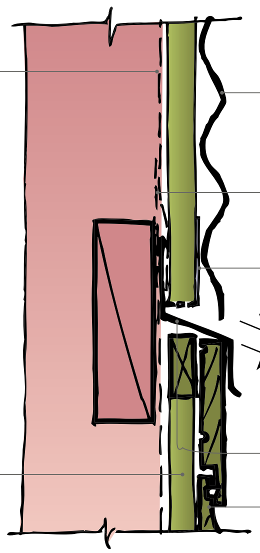


Figure 61 **Junction detail for horizontal profiled metal and rusticated weatherboards on cavity.**

E2/AS1 has junction details for cladding materials, including the top and bottom of claddings, internal corners, external corners or the interface between the cladding and aluminium window and door joinery.

However, there are no details within the Acceptable Solution that cover junctions between different cladding materials.

Often need flashing

In many cases, the junction between different materials is best designed incorporating a flashing shaped to accommodate the peculiarities of the different cladding, such as:

- substantially different profile shapes
- thickness differences – both the material and the profile
- transitions between direct-fixed and cavity claddings or vice versa.

Individual CAD details also available

Individual junction details can also be purchased from the BRANZ Shop in pdf or cad/dwg formats.

While these details are not an Acceptable Solution, they do provide solutions for horizontal and vertical junctions between a range of cladding materials and can be used to support the consent application for an alternative method. Figures 61–63 are examples from Volume 1 *Horizontal weatherboards*.

Note To purchase BRANZ Details, see the BRANZ Shop at www.branz.co.nz.

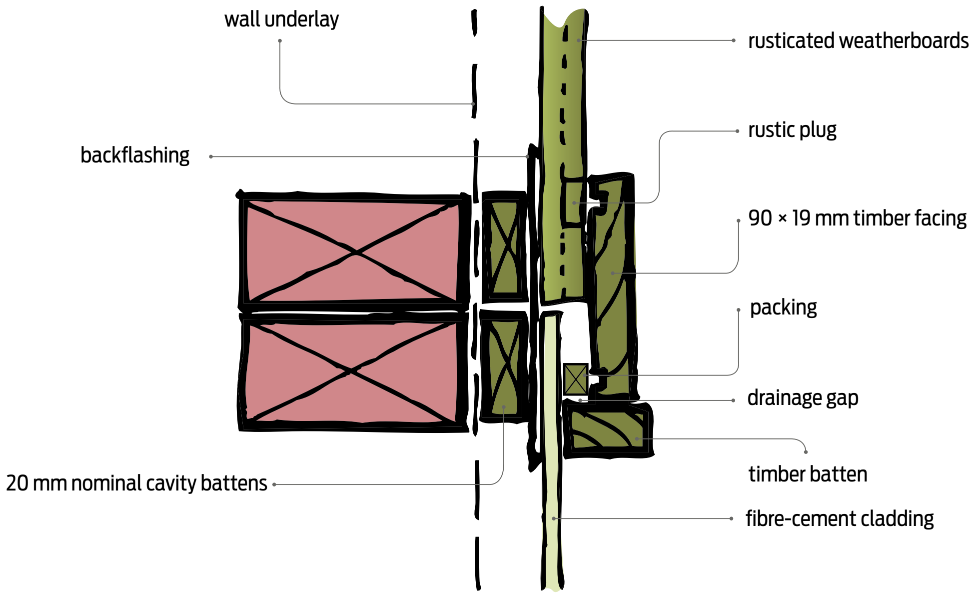


Figure 62 **Fibre-cement sheet junction abutting weatherboards on cavity.**

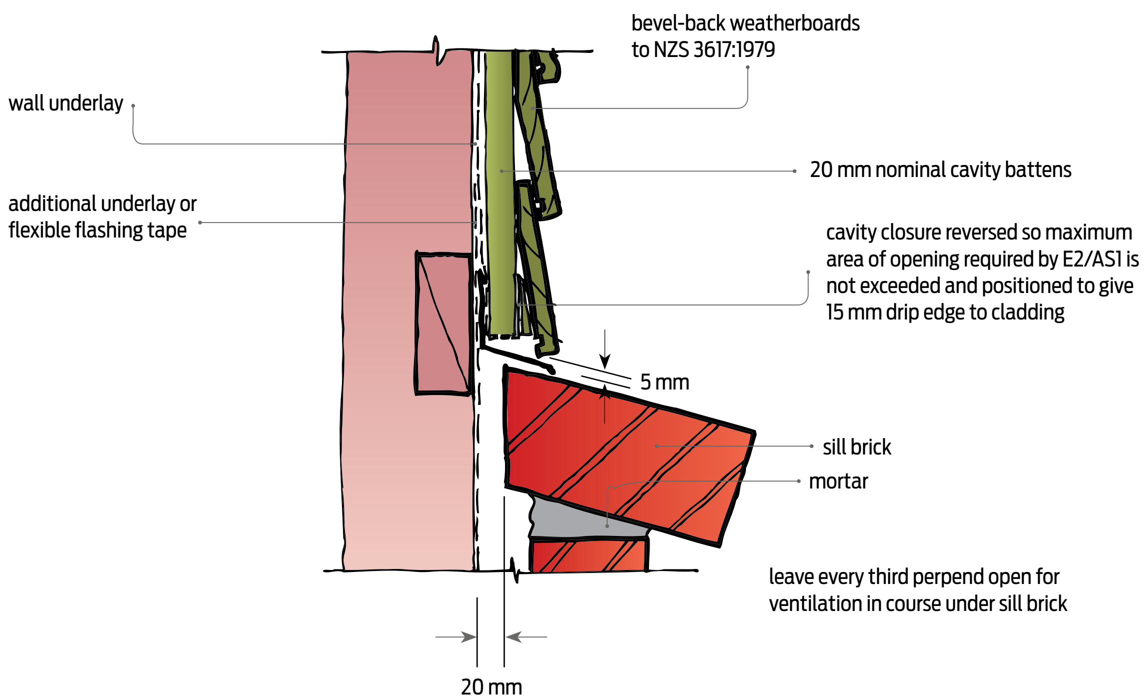


Figure 63 **Masonry veneer junction with weatherboards on cavity.**

3.12 Cladding junctions

Multiple claddings are common on new houses. Getting the junctions between these claddings right can be tricky but is critical for the weathertightness of the building.

TWO CLADDINGS commonly used together on modern houses are brick veneer with bevel-back weatherboards installed over a cavity.

The following two sequences of 3D drawings outline the construction sequence for:

- a vertical junction between bevel-back weatherboards installed over a cavity and brick veneer (see Figures 64a–f)
- a horizontal junction when the bevel-back weatherboards are above brick veneer (see Figures 65a–f).

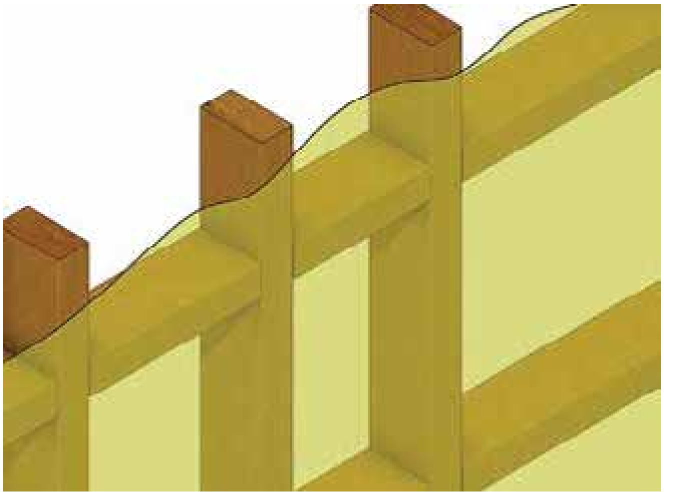


Figure 64a **Construction sequence for vertical junction between bevel-back weatherboards over a cavity and brick veneer – Step 1.**

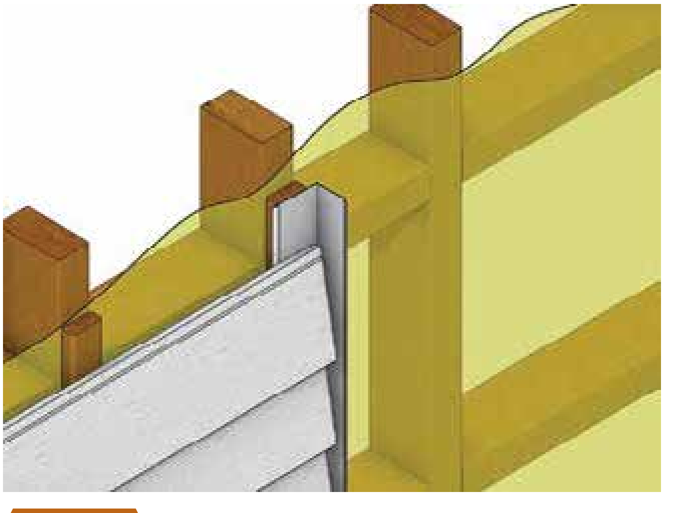


Figure 64d **Step 4.**

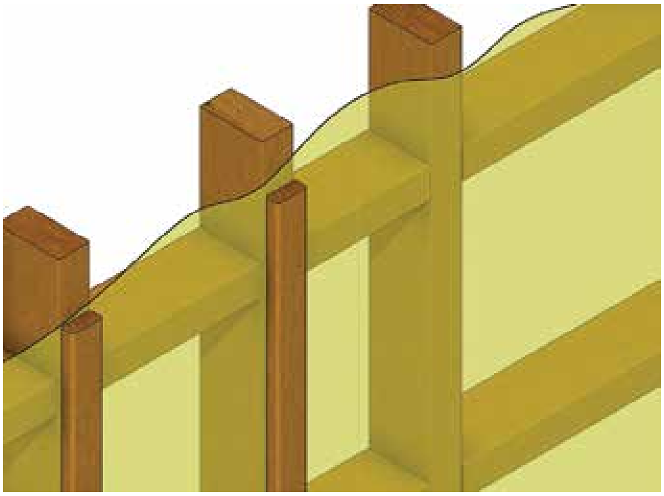


Figure 64b Step 2.

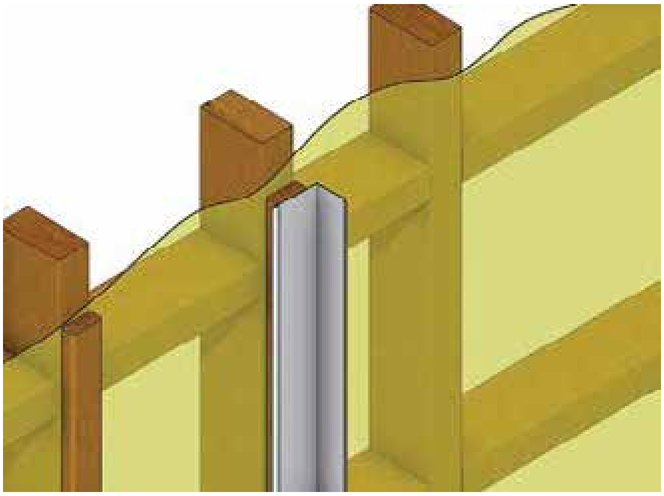


Figure 64c Step 3.

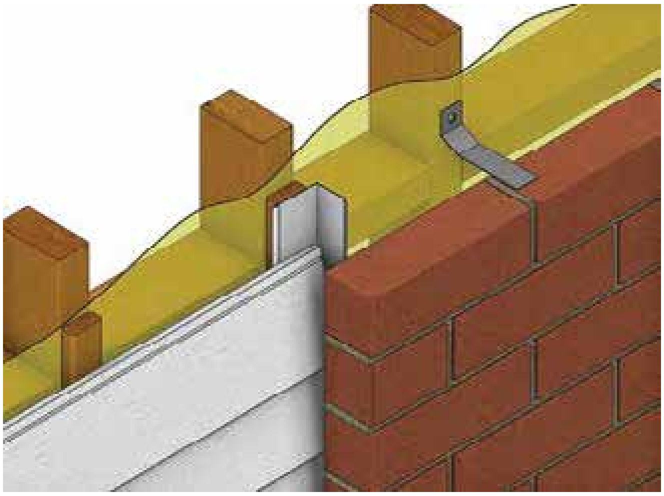


Figure 64e Step 5.

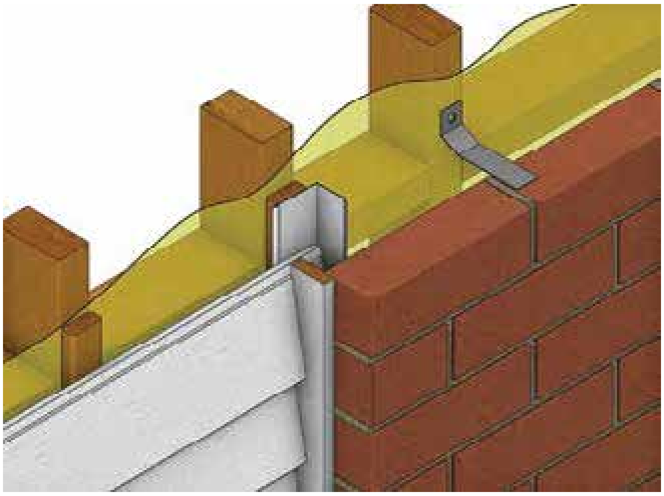


Figure 64f Step 6.

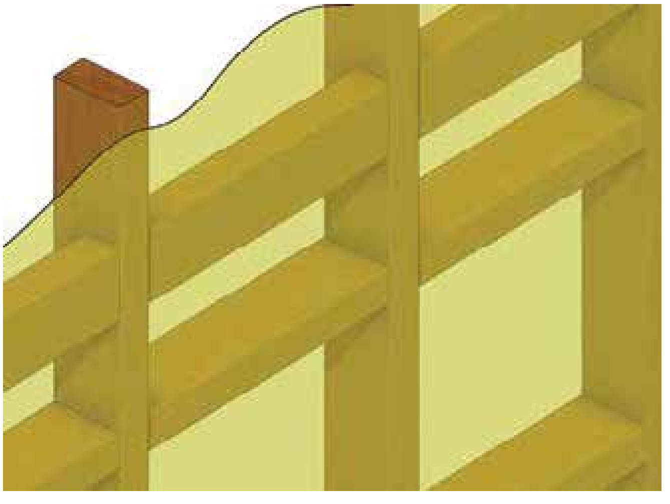


Figure 65a Construction sequence for horizontal junction between bevel-back weatherboards over cavity above brick veneer – Step 1.

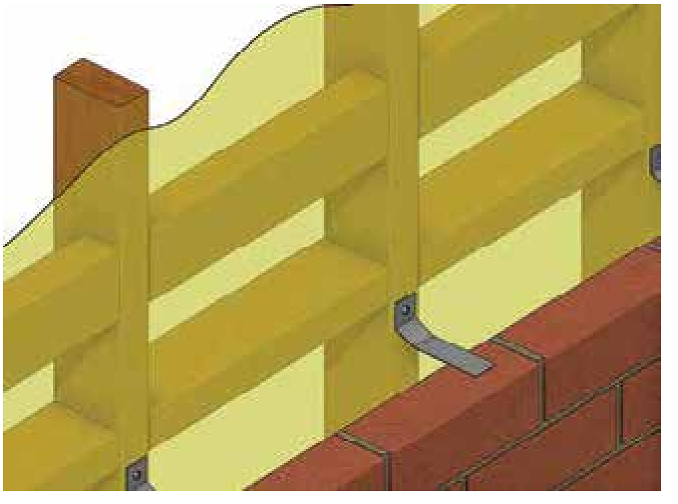


Figure 65b Step 2.

Figure 65d Step 4.

Figure 65e Step 5.

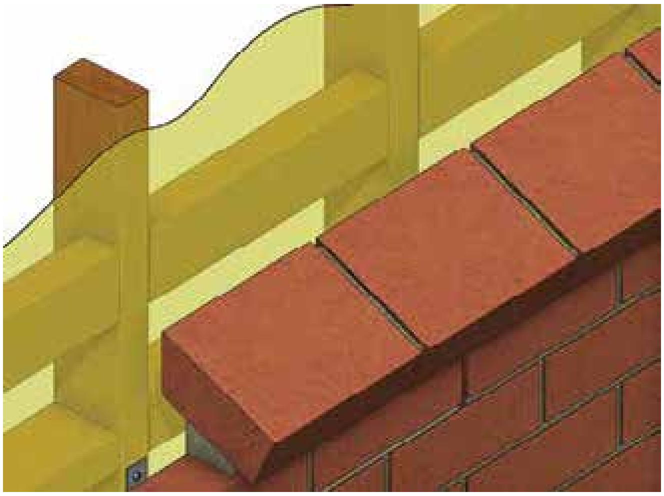


Figure 65c **Step 3.**

Figure 65f **Step 6.**

Building consent for junction detail

Buildings often have junctions between different wall claddings that require careful flashing.

MANY NEW constructions incorporate more than one wall cladding, and additions to an existing building may have a different wall cladding. The range of flashing details that these situations can encompass is extensive (and beyond the scope of this supplement).

Usually alternative methods

Almost invariably, the details will need to be submitted as alternative methods in the building consent application. This requires the applicant to demonstrate compliance of the detail with the relevant Building Code clauses.

Resources available

Several resources are available to help demonstrate compliance:

- BRANZ Details – available on the BRANZ website at www.branz.co.nz. To find a suitable detail:
  1. Select the main cladding from the options provided:
     - rusticated weatherboards
     - bevel-back weatherboards
     - vertical profiled metal
     - horizontal profiled metal
     - masonry veneer
     - concrete masonry
  2. Scroll down to the section 'Junctions to other claddings'.
- *NZ Metal Roof and Wall Cladding Code of Practice* available online at www.metalroofing.org.nz.
- CCANZ CP 01: 2014 *Code of Practice for Weathertight Concrete and Concrete Masonry Construction* available online at www.ccanz.org.nz.
- Manufacturers' product literature – most cladding manufacturers provide manuals with installation details of their products.

3.13 Weatherboards above brick veneer

House designs with brick veneer cladding at the bottom and weatherboards above present a design challenge. Here we have some details that allow ventilation and drainage from the upper cladding while preventing additional moisture entering from the brick cavity and maintaining ventilation of the veneer cavity.

FOR ALL ITS SOLID appearance, masonry veneer is not a waterproof cladding. Masonry veneers are absorbent, and water can migrate through to the cavity – hence masonry veneers are known as wet cavity systems.

E2/AS1 applies

E2/AS1 applies to veneers of clay brick, concrete brick or concrete block attached to timber framing with a drained and ventilated cavity between the framing and the veneer. The width of the cavity must be between 40 and 75 mm.

Figures 66a and 66b highlight some issues with details in E2/AS1 Figure 73E(m).

Let moisture drain or evaporate

Any moisture that penetrates the veneer must be able to drain away or evaporate from the cavity, so the cavity must be:

- drained and ventilated at the head of openings to allow moisture out
- drained and ventilated at the bottom to allow air in and moisture out
- ventilated at the top of walls and beneath openings wider than 2.4 m to allow air in to the cavity
- sealed off from the roof, subfloor space and

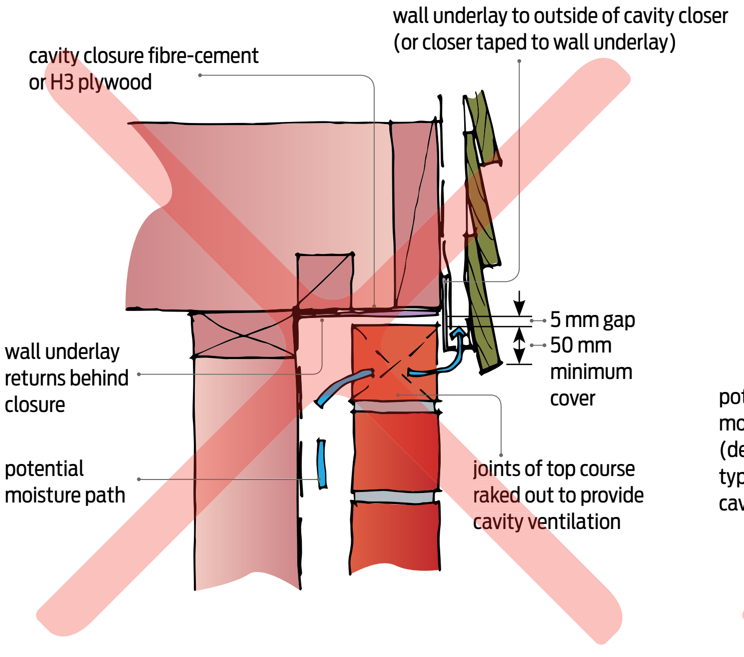


Figure 66a Unacceptable detail – Figure 73E(m) from E2/AS1 with upper cladding on a cavity and ventilation via top course of bricks allows transfer of air between cavities.

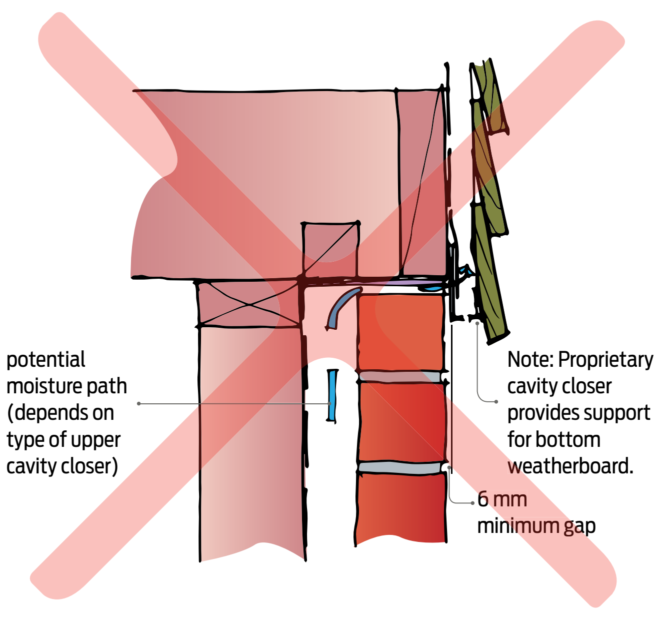


Figure 66b Unacceptable detail – Figure 73E(m) with upper cladding on a cavity and continuous ventilation above the top of the bricks. The top of the veneer cavity is unvented (blocked by the weatherboard cavity closure).

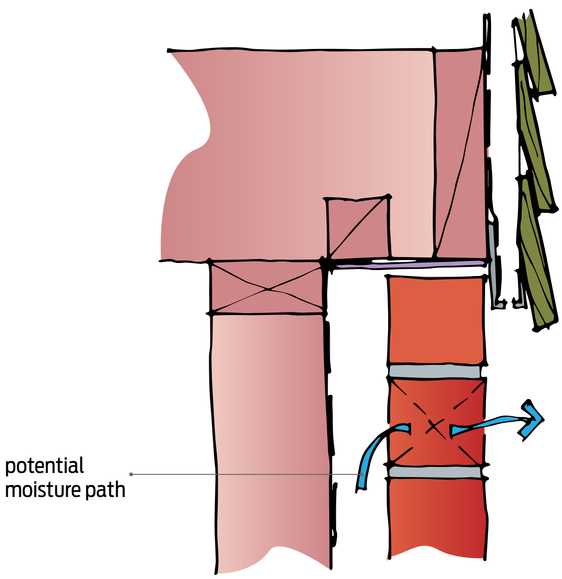


Figure 66c **Brick cavity vented through second-to-top course of bricks allows moisture to exit the cavity well clear of the upper level cladding.**

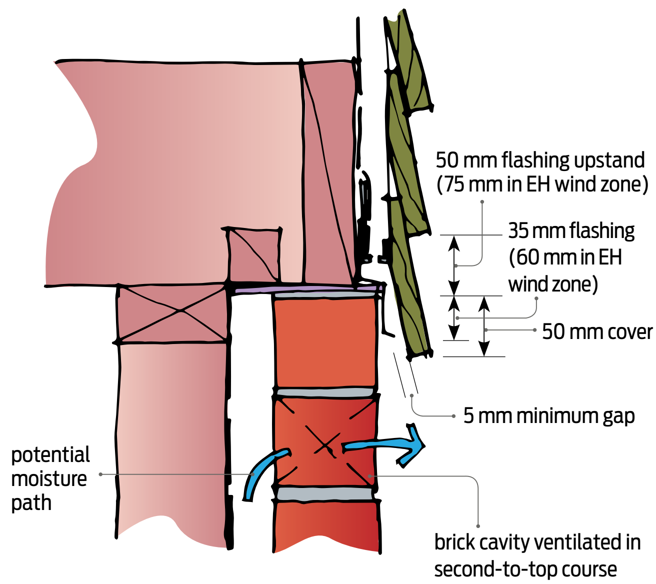


Figure 67 **Bevel-back weatherboard, flashed cavity.**

any cladding cavity above the veneer to prevent moisture from migrating into these areas.

Important to get cavity ventilation right

Veneer cavity ventilation is usually provided by raking out perpend joints to a minimum of 75 mm at 800 mm maximum centres or 1,000 mm²/m wall length.

Ventilation can also be achieved by forming a 5 mm minimum continuous gap between the top course and the soffit. The upper cladding must have 6 mm minimum clearance to the bricks and extend 50 mm below the top of the veneer.

BRANZ recommends providing ventilation by raking out joints in the second-to-top course rather than the top course of brickwork (see Figure 66c). This allows moisture to evaporate clear of the cavity above and facilitates installation of the upper course of bricks.

Adapting E2/AS1 details not the answer

The details in E2/AS1 cover a variety of situations but do not provide a solution where there is an upper floor with a lightweight cladding fixed over a 20 mm cavity. Simply adapting Figure 73E(m) from ES/A21 by adding a cavity ➤

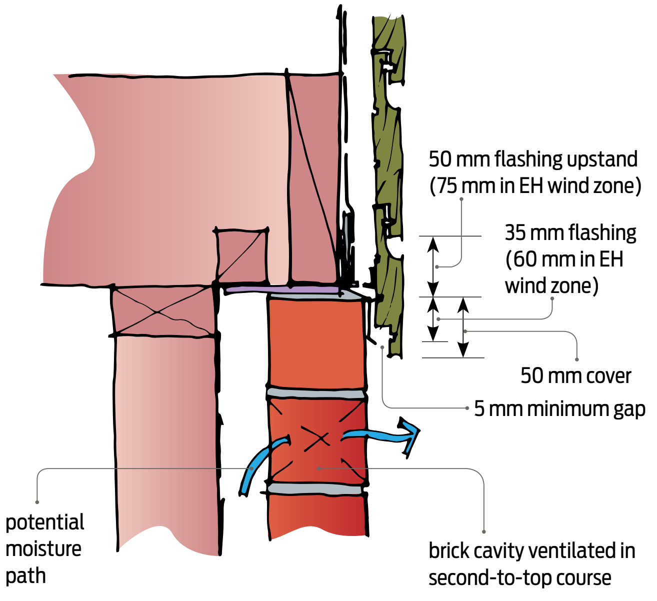


Figure 68 **Rusticated weatherboard, flashed cavity (flat sheet similar).**

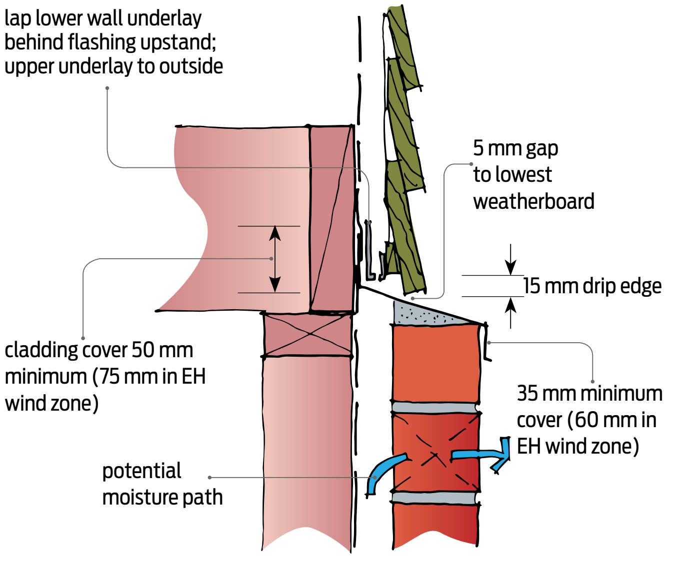


Figure 69 **Upper floor framing in line with lower floor.**

behind the upper cladding may create a path for moisture to migrate into the upper cavity (see Figures 66a and 66b).

Detailing options

There are several detailing options to isolate the two cavities, allowing drainage from the upper cavity without compromising the ventilation of the veneer cavity. To further protect the upper cavity from ingress of moisture, a flashing can be installed at the base of the upper cladding (see Figures 67–69).

The flashing upstand should be 50 mm minimum (75 mm in EH wind zone) and cover the veneer by 35 mm minimum (60 mm in EH wind zone). A 5 mm minimum gap must be maintained between the flashing and the back of the upper cladding to provide ventilation for the upper cavity.

The soffit or closure to the brick cavity shown in these details provides a consistent finish where there may be a porch or other recess in the lower wall.

3.14 Cavity closures to cantilevered joists

Drained cavities to external walls need to be constructed correctly to keep wind-driven rain and vermin out and allow drainage and ventilation. One overlooked area is when external walls are supported on cantilevered floor joists.

DRAINAGE AND VENTILATION is achieved in drained cavities by leaving the bottom of the cavity open and fitting a cavity closure to prevent the entry of vermin.

Cavity closures at base of all cavities

Cavity closures are required at the base of all cavities including:

- above window and door heads
- at the base of all walls
- at inter-storey flashed junctions.

They should have 3–5 mm drainage holes or slots to provide an opening area of 1,000 mm² per metre length of wall.

Walls on cantilevered floor joists

A sometimes overlooked location for cavity closures is at the base of an upper level external wall supported on cantilevered floor joists (see Figure 70).

Although the cantilevered floor joist space must be closed off, the base of the cavity to the wall above must remain open, so cavity closures should be installed.

Position above bottom of cladding

A drip edge is needed at the base of all walls, above door and window openings and above horizontal flashings that bridge the cavity (E2/AS1 9.1.8.3).

This is done by positioning the cavity closure 10–15 mm above the bottom edge of the cladding.

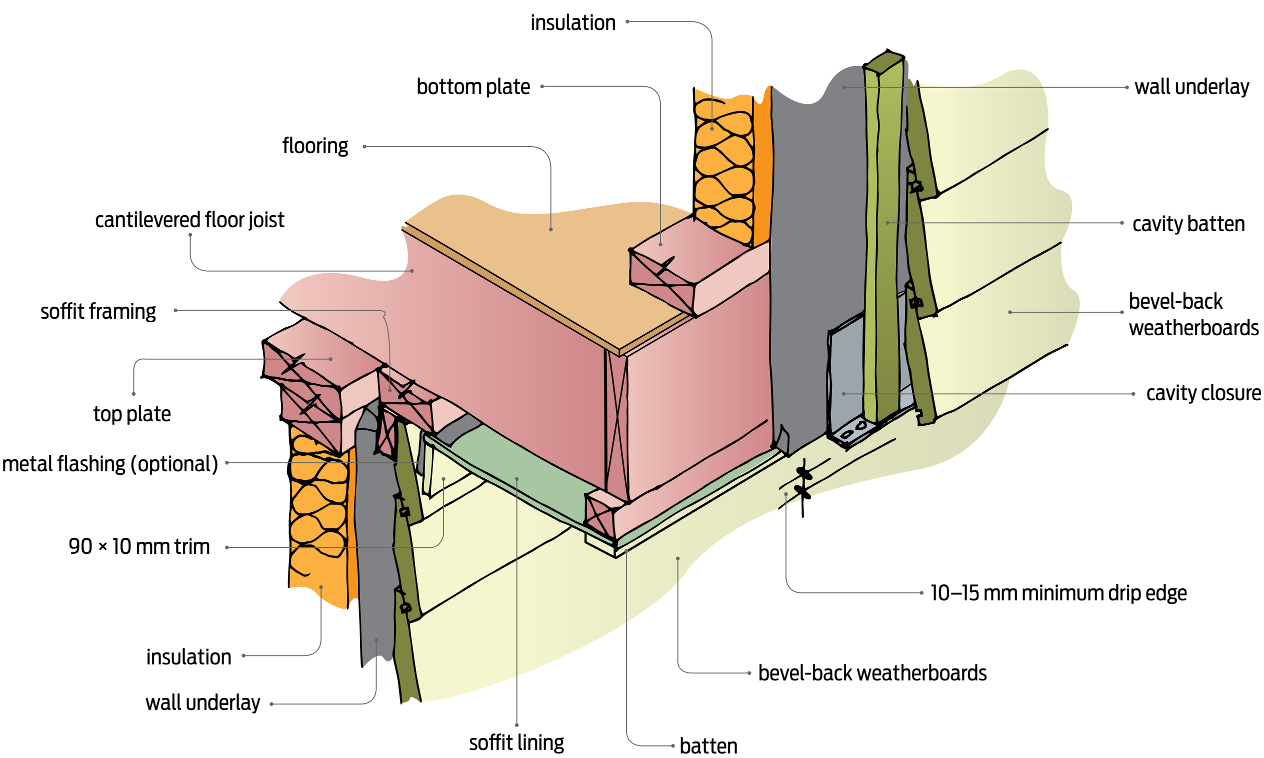


Figure 70 Cavity closures to cantilevered floor joists.

3.15 Detailing cladding penetrations

Penetrations through claddings need to be carefully detailed so they are weathertight. For commercial buildings, they may also need to be seismically restrained to prevent impact damage.

NEW ZEALAND BUILDING CODE clause E2 *External moisture* requires that exterior walls must prevent penetration of water that could cause dampness or damage to building elements.

If not appropriately designed and installed, penetrations through external claddings potentially compromise the weathertightness of a building. The requirements of clauses B1 and E2 are at odds with one another and can present detailing problems.

Timber-frame construction

Acceptable Solution E2/AS1 (paragraph 9.1.9.3 and Figures 68 and 69) describes methods of creating weathertight details using flashing tape and flanges in both cavity and direct-fixed situations.

The E2/AS1 details do not require a significant clearance around pipes, but they can be used as a basis for creating weathertight details that include the clearances required by clause B1.

Through wall underlay

Where the pipe penetrates through the wall underlay, flexible flashing tape should be used to seal the underlay for at least 100 mm and to the pipe for at least 25 mm (see Figure 71).

A flange with a diameter 20 mm larger than the pipe and with a skirt at least 25 mm deep should be fitted over the pipe. The 10 mm gap between pipe and flange can be filled with sealant applied over a backing rod.

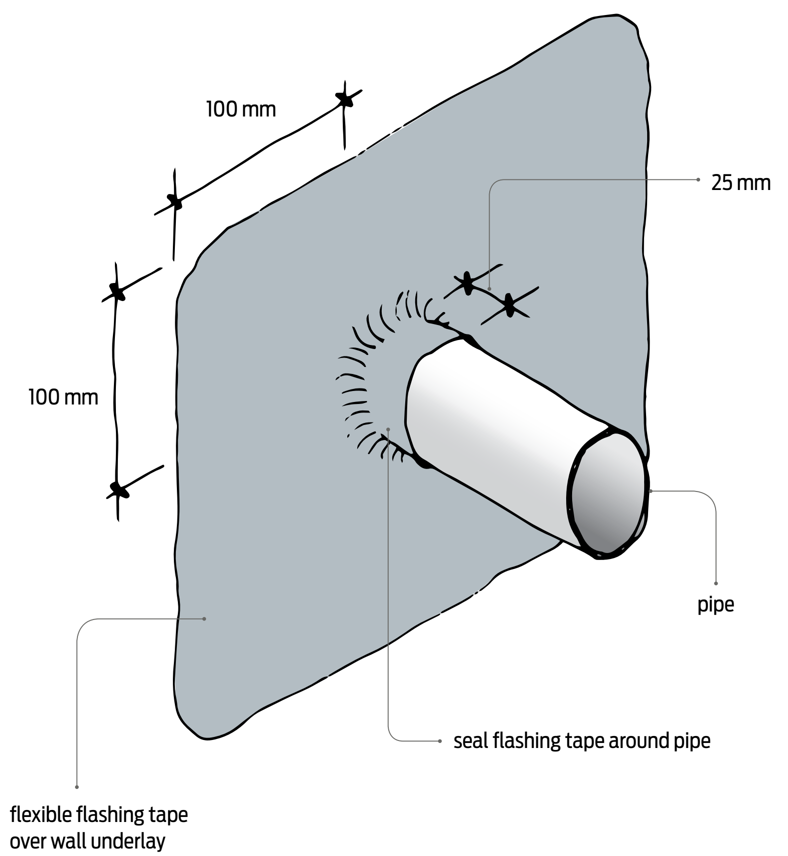


Figure 71 **Sealing underlay and pipe with flexible flashing tape from E2/AS1.**

Coated cladding

Where cladding finishes are EIFS, monolithic coatings or stucco, finish the coating over the skirt of the flange.

Weatherboard claddings

For weatherboard claddings, cut a hole to the correct size (diameter of pipe plus 10 mm all around) through the weatherboard. The penetration should be made through the centre of the board, not at a joint. Prime the cut, then apply sealant over a backing rod into the gap between the hole and the pipe.

A flange may be installed over the sealant joint, and for bevel-back boards, a shaped fillet will be required to provide a flat surface for the flange (see Figure 72).

Concrete or masonry walls

Where pipes penetrate concrete or masonry walls, a 50 mm clearance must be allowed between the pipe and the wall structure when following NZS 4219:2009. Apply a waterproof membrane to the opening – at least 50 mm around the face of the opening and at least 50 mm into the opening.

The pipe should go through a flange with a minimum 20 mm larger diameter than the pipe and a skirt at least 100 mm deep. Apply sealant over a backing rod to the gap between the pipe and flange and carry the waterproofing coat applied to the concrete or masonry down over the flange (see Figure 73).

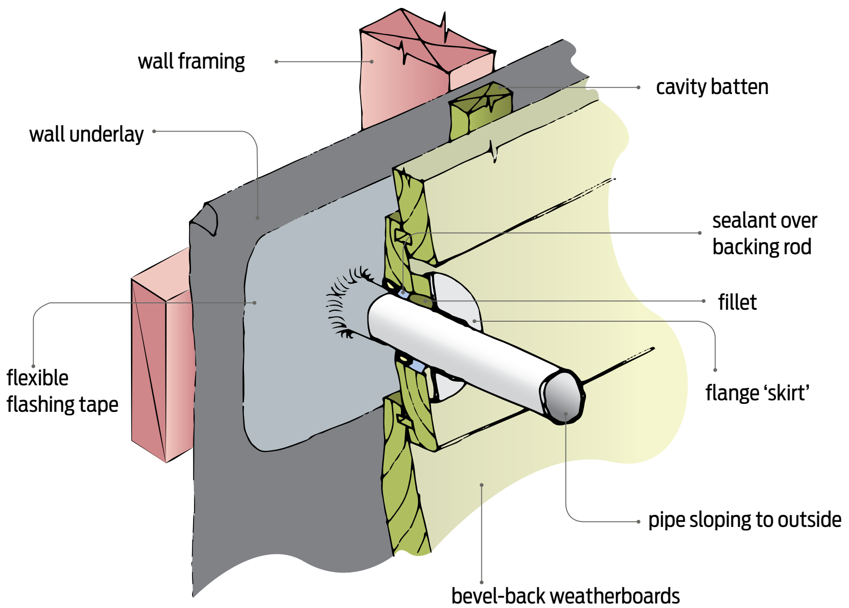


Figure 72 **Penetration through weatherboard cladding (E2/AS1).**

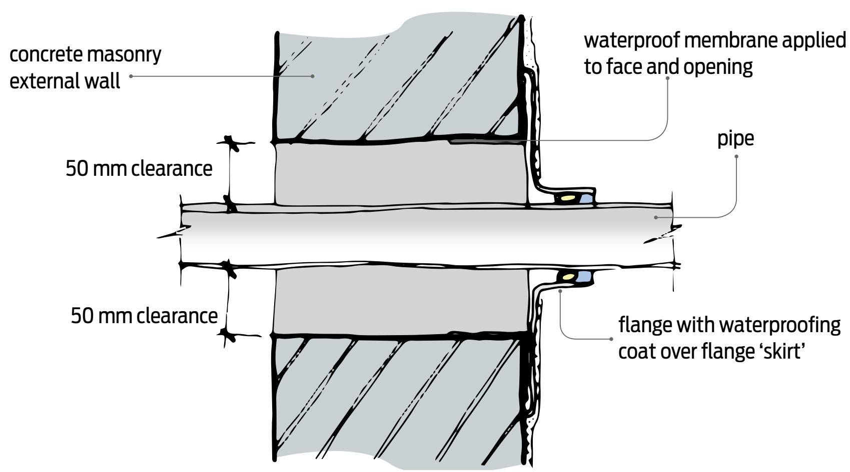


Figure 73 **Penetration through concrete masonry external wall (NZS 4219:2009). Note that E2/AS3 (CCANZ CP01) does not require a 50 mm clearance.**

3.16 Penetrations through existing walls

When a penetration is required through the cladding of an existing building, effective sealing and weatherproofing is more difficult than when a penetration is incorporated during construction.

FOR NEW CONSTRUCTION, guidance on sealing and weatherproofing penetrations through external wall claddings is provided in the Acceptable Solution E2/AS1 to Building Code clause E2 *External moisture*.

Many things require new penetrations

Occasionally, a penetration may need to be made through an existing wall cladding. Examples include when installing a heat pump, clothes dryer or rangehood, new plumbing or drainage pipes or cabling for TV, phone or data. In these situations, effective sealing and weatherproofing are more difficult to achieve.

Proactively minimise the risk

Things can be done, however, to mitigate the risk of water and air leakage created by penetrations through existing wall claddings.

Removing cladding best but difficult

If possible, the best solution is to remove enough of the external cladding to be able to access and fully seal the wall underlay around the penetration in accordance with E2/AS1. This is often not feasible.

Locate in sheltered position

When a penetration must be made through external wall cladding, locate the penetration where possible in a sheltered position such as:

- immediately under or through the eaves
- under a veranda or porch
- on the sheltered side of the building.

If it is not possible to locate an outlet in a sheltered part of the building, the penetration

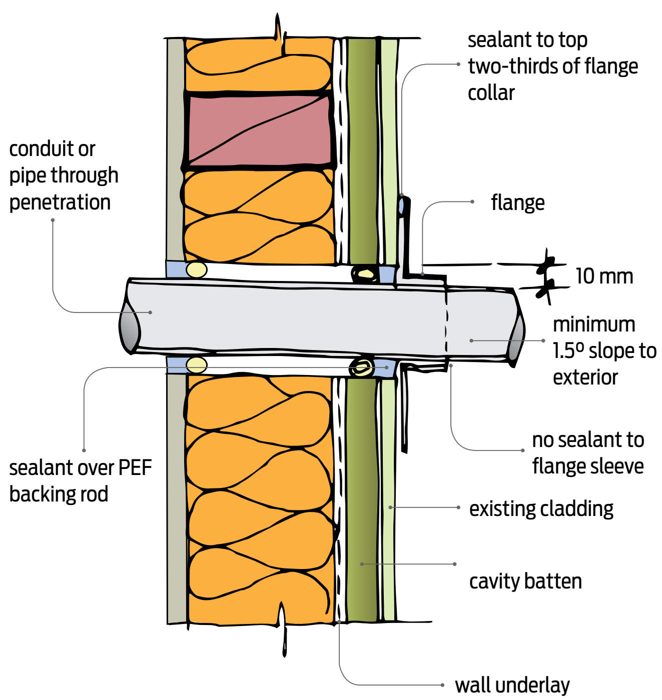
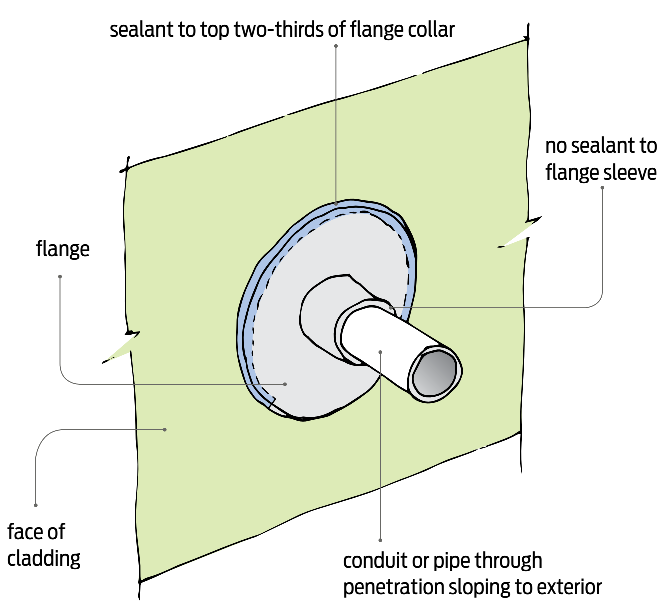


Figure 74 **Pipe penetration through an existing exterior wall.**



Note: Shaped packers sealed to cladding are required behind flange for profiled claddings.

Figure 75 **Sealing a pipe flange to cladding.**

should be protected by a cowl or shield. By reducing the amount of water passing over the penetration, the risk of water entering the opening is also reduced.

Slope opening to the exterior

Drill upwards from the exterior when cutting a penetration through the exterior cladding so that any water that gets in the hole is able to drain out again (see Figure 74).

The CCANZ publication CP 01:2014 *Code of Practice for Weathertight Concrete and Concrete Masonry Construction* recommends that a penetration through an external wall has a minimum downward slope of 1.5º to the exterior.

Seal around pipe penetrations

Pipes through a penetration should be firmly fixed so the pipe does not move within the opening. Apply sealant over a PEF backing rod around the opening, cover with a flange and seal around the top two-thirds of the flange collar (see Figures 74 and 75). Do not apply sealant to the flange sleeve, as the sleeve will allow any water that gets past the flange to drain to the outside.

As well as protecting against water entry, the flange will also protect the sealant around the opening from UV radiation or weathering.

Seal around pipes or sleeves where they penetrate interior linings.

Install cabling in a conduit

Cabling and other flexible materials may be subjected to wind movement. This is likely to cause any sealant around the opening to be damaged and eventually fail.

Installing all cabling and flexible material in a conduit when retrofitting through existing cladding means the conduit can be sealed and flanged in the same way as the rigid pipe penetration.

Where wires are not in a conduit:

- drill upwards through the cladding
- protect with an exterior deflector sealed to cladding.

a. Hoses coming through the top of the exterior wall.

b. Applying sealant around pipework.

c. Applying sealant to cover.

d. Cover in place over penetration and fully sealed to cladding.

Figure 76 **Heat pump pipework installation into an existing house.**

Relocating meter boxes

If a meter box needs to be relocated to the outside of the building, rivet a 30 × 30 mm angle to all sides of the meter box and flash over the angle along the top edge in a similar way to the solution shown in E2/AS1 Figure 68.

Alternatively, a relocated meter box may be installed behind a window panel so it is isolated completely from the weather.

Sometimes have to avoid penetrations

Avoid penetrations through a flat or low-pitched roof or deck as these are more difficult to waterproof. If a penetration is required, another location for the penetration should be found.

Retrofitting heat pump pipework

Figures 76a–d show the installation of heat pump pipework into an existing house. The penetration for the pipework through the external cladding is high on the external wall and is under a veranda.

The hole is filled with sealant around the pipework. The proprietary cover has sealant applied to the top edges while the bottom is left open to allow any water that may get in to drain out again.