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Moisture management in masonry veneer

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Masonry veneer is not completely weathertight – water will pass through the veneer.

A drained and ventilated cavity that maintains a clear separation from the framing is required to deal with this water.

This Bulletin outlines the requirements for the construction of cavities behind masonry veneer.

1.0 INTRODUCTION

1.0.1 The purpose of the cavity behind brick and masonry veneer claddings is to provide a drainage space and allow drying by ventilation, as the veneer itself is not inherently waterproof. During rain, water will pass through the veneer and must be able to freely drain down the back of the veneer and exit at the base of the wall. A drained and ventilated cavity that maintains a clear separation from the framing or masonry substrate is required to deal with this water.

1.0.2 There are four fundamental reasons why it is necessary to design and incorporate a cavity in a masonry veneer cladding:

a. To prevent moisture from the inside face of the veneer transferring to the framing or structural element.
b. To generate airflow on the inside face of the veneer resulting in moisture evaporation.
c. To provide a clear separation between a rigid cladding and a flexible structural timber frame.
d. To provide a methodology by which the heavy exterior cladding can be securely fastened to the structural support and still permit a degree of movement during a seismic event.

1.0.3 This Bulletin outlines the requirements for the construction of cavities behind masonry veneer (within the scope of E2/AS1) to provide drainage and drying. It does not cover plastered veneers or the structural or other design and construction requirements for masonry veneer.

2.0 CAVITY DESIGN

2.0.1 The critical factors in masonry veneer cavity design and construction are as follows:

- A cavity width of not less than 40 mm – (a minimum of 50 mm is recommended) to accommodate variations in construction and sheet bracing elements, and maintain a 40 mm minimum width at all times.
- A maximum cavity width of 75 mm.
- The cavity width is determined from the fixing point of the brick ties upon which seismic performance is engineered.
- Veneer ties that are installed with a slope towards the back of the veneer (not towards the framing) and are free of mortar droppings upon completion of the veneer wall. Washouts should be installed in the veneer to facilitate this important aspect.
- The mortar bed is not to protrude more than 5 mm into the cavity.
- Ventilation and drainage openings at the bottom of the wall and across the top of any penetration in the veneer.
- Provision of a ventilation opening and allowance for longitudinal timber framing shrinkage at the top of the veneer. (Note: This consideration was critical when wet framing timbers were used, particularly when a mid-floor was involved, but is not as critical with kiln-dried framing and proprietary floor joists, as shrinkage will be minimal. This gap also allows the bricklayer to lay the top brick.)
- No openings between the veneer cavity and the roof or eaves spaces above preventing any blown roof cavity insulation entering the cavity and moisture laden air from the cavity rising into the roof space.
- No opening between the veneer cavity and the subfloor space when installed on a building with suspended framed floor construction. A flashing is to be installed to direct cavity moisture to the exterior of the veneer.
- Flashing around windows and doors.
- Cavity space is not used for running pipes and other services (a pipe or conduit may cross the cavity).
- Wall insulation is not allowed to push out the wall underlay into the cavity – if this occurs, it could block the cavity, and if it is in contact with the back of the veneer, it can reduce airflow and create a bridge allowing water to be transferred into the framing.
- Mortar droppings are cleared from the bottom of the cavity as work proceeds.
- The cavity is separated from the building interior by a recognised air barrier – typically, this is the tight stopped plasterboard interior linings but may be a wall underlay complying with the air barrier requirements of Table 23 of E2/AS1.
- On gable ends adjacent to roof cavities, a rigid air barrier is required between the cavity and the roof cavity area.

3.0 BOTTOM VENTING AND DRAINAGE

3.0.1 Masonry veneer cavities are considered to be wet cavities; therefore, making provision for drainage is critical. The drainage openings also facilitate the entry of air behind the cavity and, with the openings at the top of the veneer wall, will provide positive ventilation through the cavity that can dry out the moisture that does not drain out.

3.0.2 The most common way of providing drainage is to omit the mortar from every third vertical joint or perpend at the bottom of the cavity. Where the bottom masonry course is not a full height course, as is often done, the openings provided must give the same open area as that achieved with a full height course. This requirement is 1,000 mm^2 per lineal metre of wall.

3.0.3 Drainage slots must be located above the outside ground level, and owners should be advised that the vents are to remain open throughout the life of the building – garden soil, mulch or paths must not block the openings. Note: Slots should be kept to approximately 10 mm in width; in excess of 13 mm requires vermin-proofing.

4.0 DETAILING AT VENEER BASE

4.0.1 Masonry veneers must be supported on a continuous concrete or concrete masonry foundation wall or on a shelf angle using specific engineering design. There are a number of ways this can be done including:

- where the veneer finishes above ground level with an edge thickened slab (Figure 1)
- where the veneer is taken below ground level (Figure 2)
- for a suspended timber floor and concrete foundation wall (Figure 3).

4.0.2 To assist in drainage and to prevent moisture lying in the bottom of the cavity, the ledge formed should be coated or protected to stop the moisture being absorbed into the concrete or concrete masonry foundation/floor and a mortar fillet installed to help direct water present to the outside (see Figures 1–3).

4.0.3 Waterproofing can be achieved using a number of methods, including two coats of bitumen emulsion paint, appropriate bitumen flashing tape or, in some situations, turning the slab polythene up the face of the slab and stapling it to the framing.

5.0 TOP VENTING

5.0.1 To ensure there is sufficient air flow through the cavity to assist drying out the remaining moisture, ventilation openings are required at the top of the wall. Design and construct

openings so that the risk of rainwater driving into the cavity is minimised (Figures 4 and 5).

5.0.2 When using open perpends in the top course to provide venting, it is important to ensure that the top brick is secure, as it is only bedded along the bottom with no mortar bed on top of the brick to help anchor it in. To reduce the risk of loose bricks in the top course, create the open perpends in the row second from the top to provide the top ventilation.

5.0.3 Masonry veneers on north and west walls may act as a 'heat sink'. Although masonry veneers can hold moisture, which may end up in the cavity, the heat from the sun, even during winter months, can assist the removal of moisture from the veneer by evaporation.

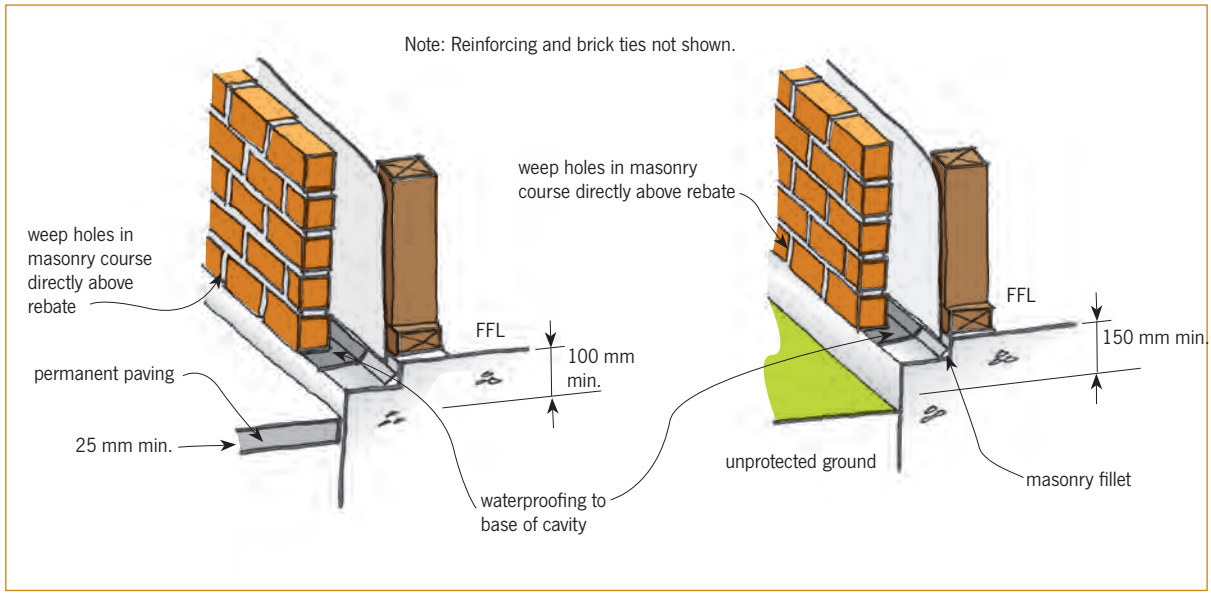

Figure 1: Veneer base – veneer finishes above ground level with an edge thickened slab.

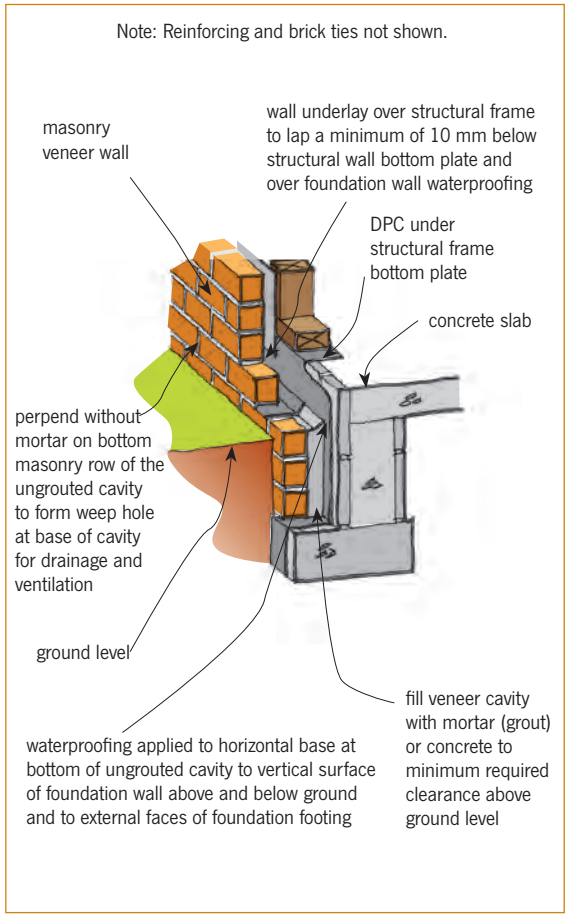

Figure 2: Veneer base – veneer is taken below ground level.

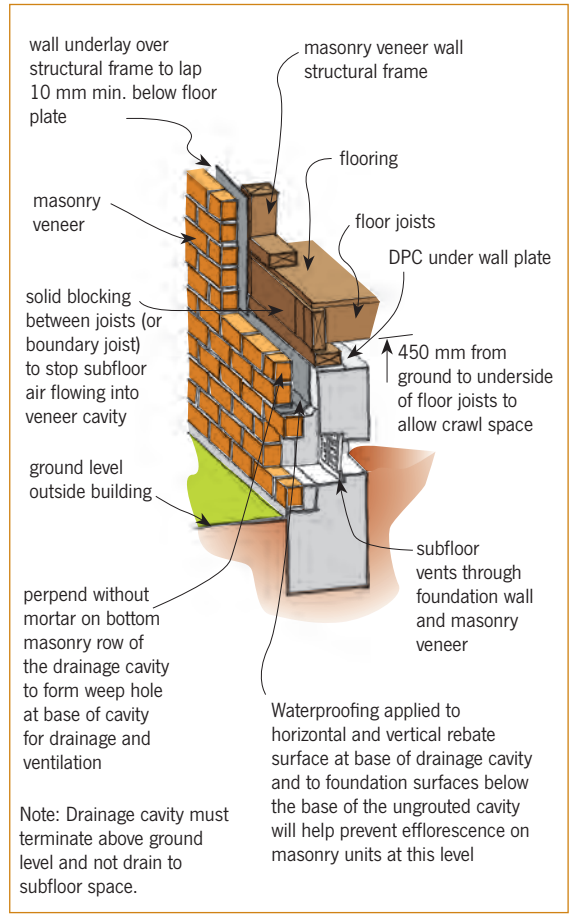

Figure 3: Veneer base –suspended timber floor and concrete foundation wall.

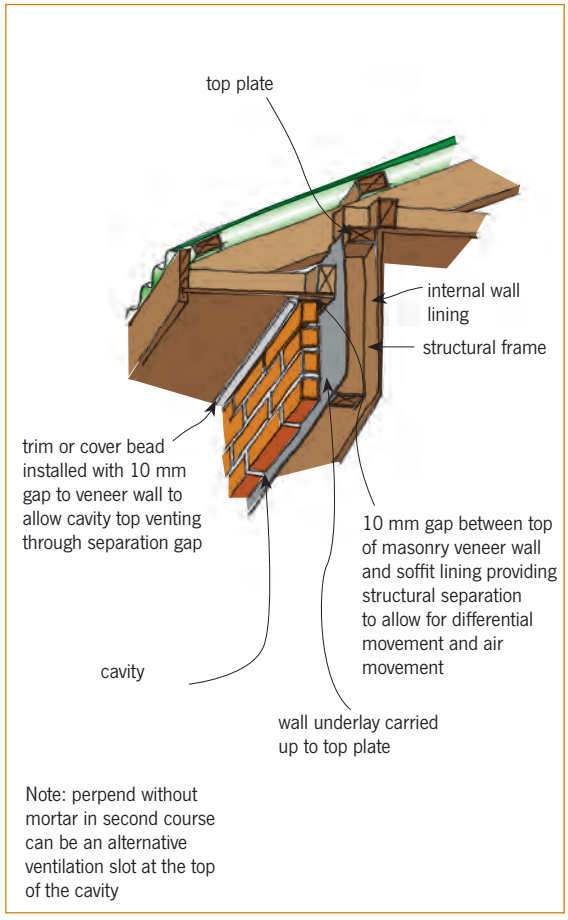

Figure 4: Top ventilation openings for buildings with an eaves overhang.

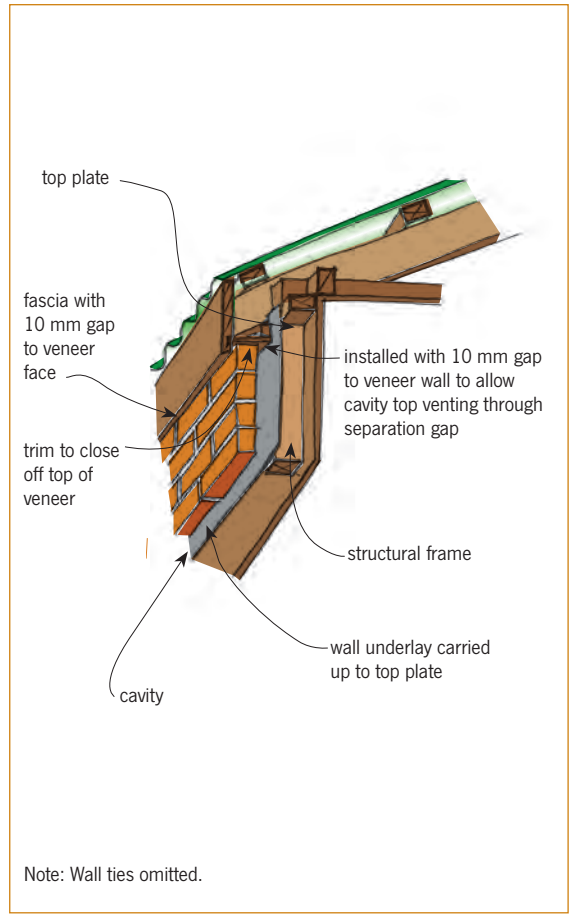

Figure 5: Top ventilation openings for buildings with no eaves.

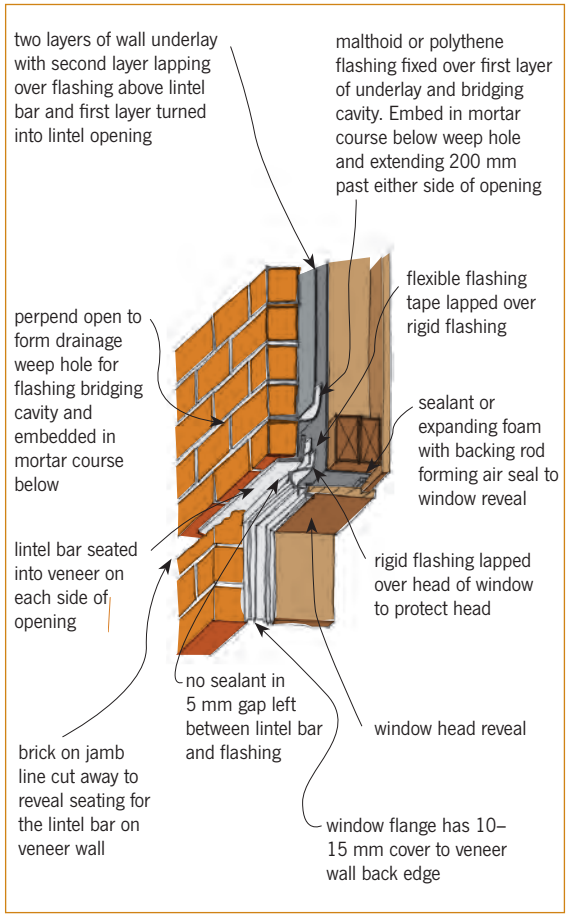

Figure 6: Typical window head detail.

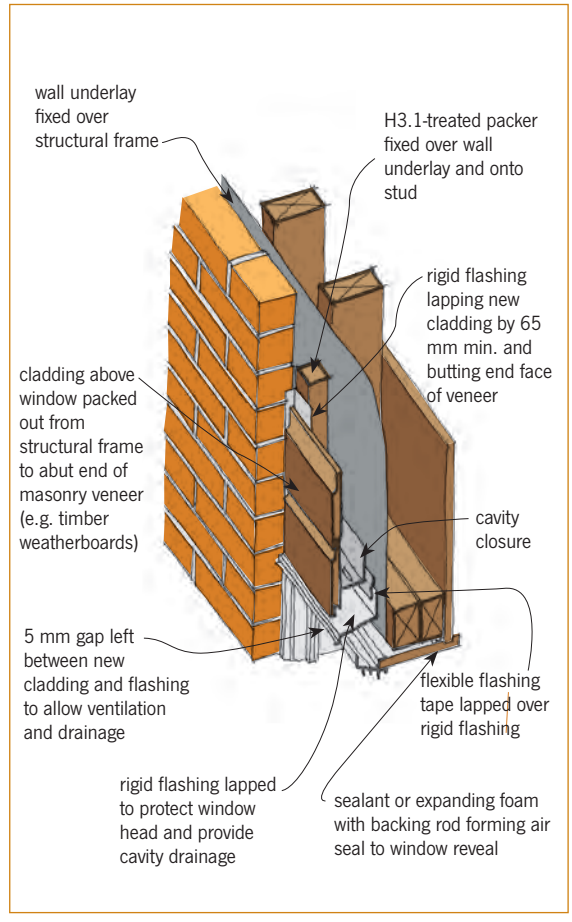

Figure 7: Window head with a lightweight cladding above the window.

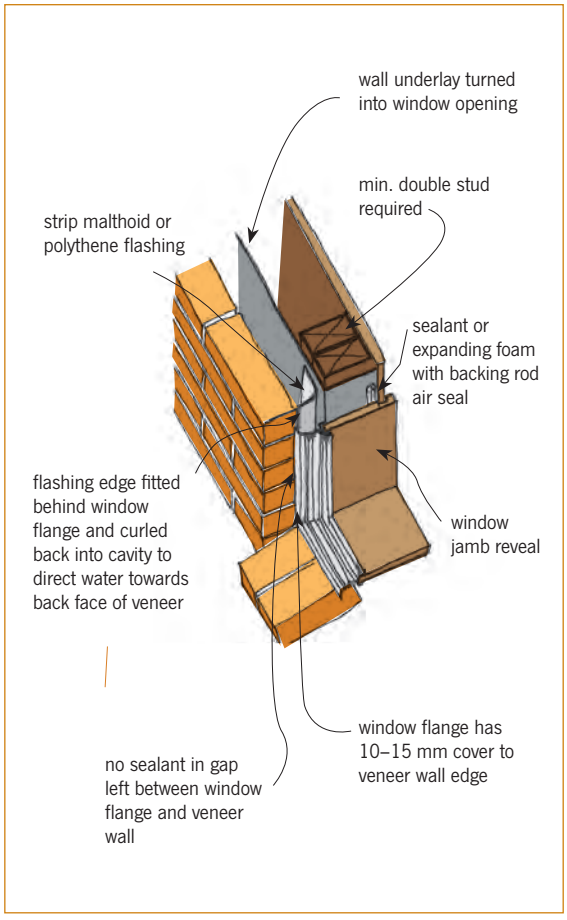

Figure 8: Typical jamb detail.

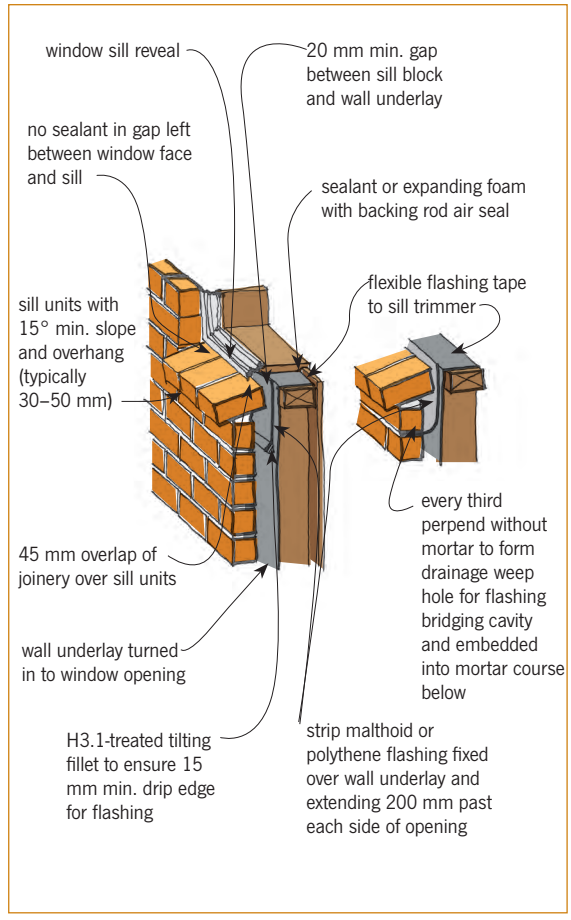

Figure 9: Preferred sill detail.

6.0 WINDOWS AND DOORS

6.0.1 Window and door joinery is generally not sealed to the masonry veneer cladding, so some water will get into the cavity around such penetrations. To ensure this water is managed, flashings are recommended to:

- intercept the water in any cavity above the window and ensure it is drained to the outside
- ensure any water that gets in around the jamb and sill flanges is not transmitted into the framing.

6.0.2 For buildings within the scope of E2/AS1, Figure 6 gives a typical window head detail, Figure 7 shows a different cladding above the window, Figure 8 gives a typical jamb detail and Figure 9 shows a preferred sill detail.

Figure 10: Penetration detailing showing taping to the wall underlay.

7.0 PIPE PENETRATIONS

7.0.1 Pipe penetrations through the cladding must be installed as the veneer is erected or a sleeve should be inserted for the pipework to be passed through. Penetrations through the wall underlay must be taped to the underlay with flexible flashing tape (Figure 10) to ensure that the drainage path is maintained and that water cannot track along the penetration into the insulation and wall framing. If possible, the penetration should have a slight slope – lower at the outside so that water in the cavity impacting on it will run to the back of the cladding.

7.0.2 The practice of installing penetrations after the wall is completed means that the penetration is not able to be taped off to the wall underlay.

8.0 FINISHED FLOOR LEVELS

8.0.1 Finished floor levels within the building must always be above the bottom of the veneer cavity so that water cannot drain back inside the building. For concrete slabs, a minimum set-down of 50 mm is required, and the finished level of the slab must be at least 100 mm above permanent outside paving or 150 mm minimum above a grassed or garden surface.

8.0.2 It is recommended that a 100 mm step-down be considered, which, in addition to providing additional protection, will mean the base of the dwelling will not be seen when the exterior ground is sealed.

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