DRAINED CAVITY BASICS

Designers and builders may understand how cavities perform, but too often they are constructed incorrectly, trapping water behind the cladding. We revisit the basics.

By Greg Burn, Structure Limited

Over recent years, changes to building requirements have meant an increase in the use of drained and vented cavities behind exterior claddings. Understanding of cavities' performance, design and construction has certainly improved, but too often some of the basics are still done wrong.

Escape route for water

A drained and vented cavity is designed to drain any water that penetrates the building envelope down the back of the exterior cladding through gravity-assisted drainage. Drainage paths should take the water back out through an opening in the building envelope, to the outside face of the cladding, at the earliest opportunity.

The openings in the building envelope that allow water to drain to the exterior also allow air into the cavity. This air circulation dries out moisture within components of the wall cladding assembly, such as the back of the cladding, timber cavity battens or the wall underlay. While gravity drainage via the cavity is the primary means of removing water from within the cladding assembly, this air circulation is also important.

Detail at head of penetrations

For cavities to work, there must be specifically designed openings in the building envelope to the exterior of the wall cladding. These need to be constructed at the head of cladding penetrations such as windows and doors. The detail needs to incorporate a 5 mm gap from the bottom edge of the wall cladding to the head flashing, allowing water to drain out over the head flashing from the back of the cladding.

It is important that the head flashing covers the full depth of the cavity back to the wall underlay and that a second layer of wall underlay is lapped over the flashing (recommended by BRANZ), or as E2/AS1 Clause 9.1.10.4 allows, the top of the flashing is taped to the wall underlay with a compatible flashing tape. This allows any water on the underlay to drain out over the flashing.

Figure 1: The horizontal timber correctly has gaps and is sloped to allow water through but there should be a gap between corner battens (see Figure 2).

Similar details also need to be incorporated at inter-storey junctions where a horizontal flashing is installed to ensure water drains from behind the upper storey cladding out over the outside face of the lower cladding.

Bottom of cavity must be open

It is also fundamental that the bottom of the cavity is open:

- for the full depth of the cavity
- around the entire perimeter of the building
- at the bottom of the cladding near ground level
- at intersections, such as the bottom of an upper storey wall cladding installed above a lower level skirt roof.

It is still common to see cavities built that are blocked off at the bottom with continuous horizontal battens. These stop both drainage and air entry.

Use vent strip

Wherever there is an opening in the wall cladding to allow the cavity to drain, install a vent strip. This will allow drainage and ventilation to occur, but restrict vermin entry and reduce the potential for rain to be blown into the cavity in extreme conditions.

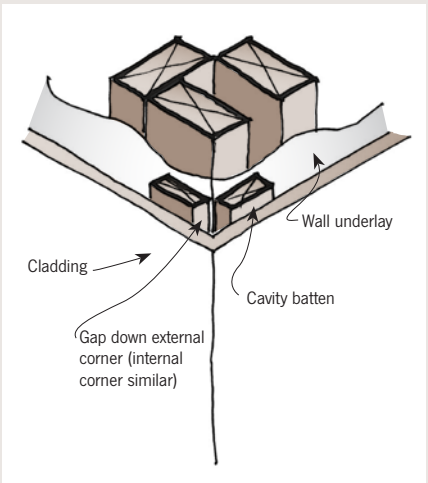

Figure 2: A gap between corner battens allows any water to drain down the corner.

Gaps and slopes for horizontal fixing timber

To maintain drainage paths down the entire back of the wall cladding, the installation of any horizontal fixing timber needed to support the cladding is important. Always install this timber on a slight slope and leave a gap to the main vertical battens at each end (see Figure 1). This allows water to drain around the ends.

On site, it is common to see continuous horizontal battens being installed at window heads and behind the cladding. These create dams in the cavity, sealing off both drainage and ventilation.

Wall underlay

Wall underlay should meet the requirements of E2/AS1 Table 23, be the same type around the entire building and be well installed. Remember to always:

- fix it tautly across the face of the framing
- tape any tears or penetrations →

- have vertical and horizontal laps that allow gravity drainage down the face of the underlay.

While cavities are designed to drain water down the back of the cladding, we need to ensure drainage paths will be maintained even in extreme conditions, when water may penetrate across the cavity onto the wall underlay.

Unfortunately, it is common to see several types of wall underlay, with differing performance characteristics, on one building. Poorly installed underlay is also far too common, such as underlay insufficiently secured to the frame, torn or ineffectively lapped and taped. These deficiencies may allow water into the framing and insulation.

Be careful installing insulation

Ensure that bulk insulation installed into the framing cavity from the interior of the building does not push the wall underlay out across the cavity and onto the back of the cladding. This has the potential to block off gravity drainage paths and wick moisture into the wall underlay and, ultimately, the wall framing.

To prevent this, install a plastic tape or extra batten vertically across the face of frame nogs, midway between the main cavity battens fixed to the frame studs. This will hold the underlay in place.

Several site visits have revealed wall underlay forced against the back of the cladding by the insulation. The underlay has then absorbed water and transferred this moisture to both the insulation and the timber frame. Fixing the situation after the wall cladding is installed is almost impossible.

Window and door openings

Care also needs to be taken with the preparation of window and door openings in the frame. This is necessary to protect the framing at vulnerable areas, such as at the sill and corners where the mitres in exterior aluminium joinery could allow water to penetrate and accumulate in the trim cavity and drain to the sill. Remember to:

- turn the wall underlay into the framed opening all the way around and cut off on the interior line of the frame
- install flexible flashing tape across the full width of the sill, turn it up 100 mm at each corner and out 50 mm over the face of the underlay
- layer tape at the corners of the opening to completely protect the timber framing (depending on the type of flashing tape used)
- treat the head similarly (see Figure 3).

It is not necessary to tape the entire vertical face of the jamb framing as it adds cost and may lead to unnecessary sweating of the framing.

Get joinery size right

Exterior joinery needs to be sized so that, when it is installed, the window flanges provide a minimum of 10 mm cover to the exterior cladding to meet E2/AS1 requirements. There should also be a minimum 5 mm gap between the prepared frame opening and the joinery timber reveal, allowing for the installation of an air seal in the trim cavity.

Often, windows are measured before installing the window tape. The result can be windows that fit too tightly in the rough opening and have no allowance for the air seal. Thus the flexible flashing tape may get damaged during installation.

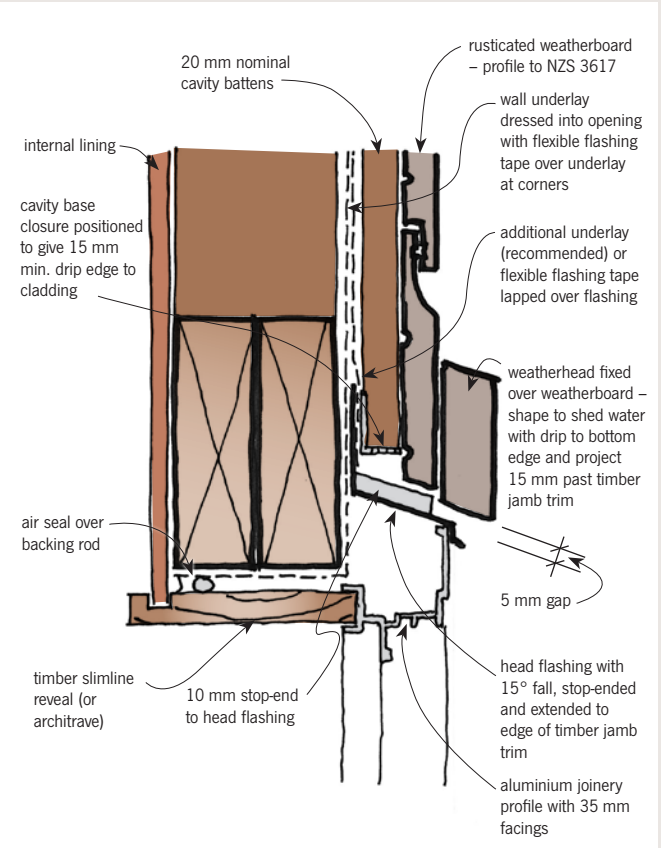

Figure 3: Detail of an aluminium window cavity head. (Source: *BRANZ Weathertight Solutions Volume 1 Horizontal weatherboards.*)

Air seal necessary for cavity

The air seal is formed by installing a continuous bead of expanding foam sealant around the entire perimeter of the opening. This should be on the inside line of the frame, to the minimum 5 mm trim cavity between the window or door reveal and the frame. The sealant needs to be installed against a PEF backing rod so the foam forms a bead and does not expand into the trim cavity.

There have been many instances where the foam has expanded to fill the entire trim cavity, even coming out behind the window flange. This restricts air circulation within the trim cavity and potentially exposes the foam to moisture in the drained and vented cavity, creating a capillary path for water entry to the air seal.

An air seal is fundamental to the performance of the drained and vented cavity. It works with the plasterboard interior lining to create a pressure barrier that allows air to enter the cladding assembly, moderating the pressure within the drained cavity and trim cavity to a level similar to the outside air pressure. This reduces the potential for water to be driven towards the lower pressure interior of the building through the cladding by a higher pressure exterior driving force, such as when wind is driving rain against a building.

Following these basic principles will ensure a drained and vented cavity will work as intended.