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Effective Sealing of the Wall-Window Interface

By Michael Lacasse and Marianne Armstrong

Surveys show that at least 25 per cent of water leakage penetration into wall assemblies is a result of failures at wall-window interfaces. The National Research Council Institute for Research in Construction (NRC-IRC) is concluding a major study of wall-window construction details and their ability to manage rainwater and air leakage. This article presents three details derived from the results:

1. Protect the rough opening with flashing to ensure water tightness at the sill.

Walls fail because incidental water getting into the envelope cannot drain to the exterior or dissipate fast enough to prevent possible deterioration of building components. The details used for the installation of windows should take into consideration that some windows leak and water might get in, and therefore, there should be provision to let the water drain or dissipate.

At the head of a window, flashings serve this purpose. At the sill, a waterproof component (e.g., a metal or plastic pan or a self-adhered waterproofing membrane) should be installed and at least 150 mm up the side of the jambs to ensure the watertightness at the sill location (see Figure 1). The flashing must be carefully integrated with other elements at the wall-window interface; many problems are caused by poor lapping of protective layers around windows. Protective membranes should always be lapped so that water running down the wall behind the cladding stays outside the membrane.

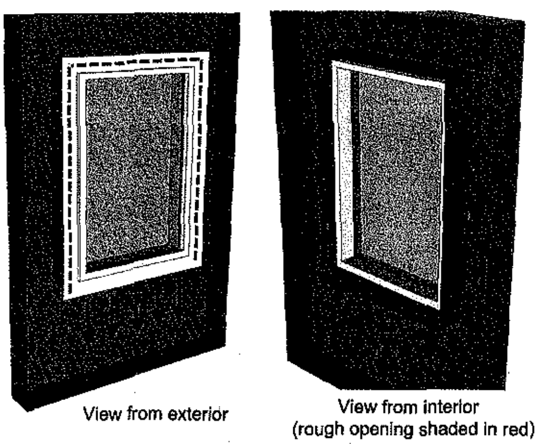

Figure 1. Interior or exterior air barrier is sealed to the window at the window interior.

2. Design the sill at the rough opening to facilitate drainage of incidental water.

The sill should be sloped to provide positive drainage to the exterior (Figure 1). This can be accomplished by installing a shim of foam or some other filler material (such as a block of wood or piece of vinyl siding), or by shaping the edges of the framing member so that it has a small slant to the exterior. If the sill pan is placed on a flat surface, a back dam should be used. For flanged windows, the flange at the bottom should be installed on shims or on nails having a button head so that a drainage space is provided along this lower edge. In either case, the sill pan must be sealed to the air barrier so that water cannot be driven past its inner rim.

3. Locate the wall-window seal on the interior of the wall assembly.

Air leakage can allow moisture to be deposited in wall cavities. Good building practice involves providing a continuous air barrier in the building envelope. Windows are part of the air barrier and a seal needs to be provided between windows and the wall air barrier system. There are four typical ways of providing an air barrier. Two of them, the sealed polyethylene and the airtight drywall approaches, are located on the interior of the building envelope, and two of them, the house wrap and the exterior insulation approaches, are located on the exterior (Figure 1).

If the sealing of a window to the air barrier system occurs on the envelope interior (Figure 1), water driven into the envelope cavity has a better chance of escaping, in particular if a sill pan and drainage space are provided beneath the window. If, on the other hand, an exterior air barrier is installed and water gets behind it, the water has no way of getting back out. It should not be assumed that the air barrier is perfect and rain cannot enter. This means that if an exterior air barrier system is used, a detail should be provided at window openings to transfer the air barrier to the window at the inside of the envelope.

It has been common practice to seal windows on all four sides. However, the research indicated that with the air barrier located on the interior and an air space below the window, there is less pressure differential at the exterior wall-window interface, which would otherwise tend to force water into the window rough opening and perhaps into the envelope cavity. Thus sealing the window at the top and along the sides allows drainage of incidental water from beneath the window sill and as well, a degree of pressure equalization around the window in the rough opening (Figure 2).

NRC-IRC, in collaboration with CMHC, is conducting research to determine the thermal implications of not filling the space below the window with insulation. It is thought that a small sacrifice in heat loss at this location is perhaps better in the long run than the risk of damage posed by water trapped in the envelope.

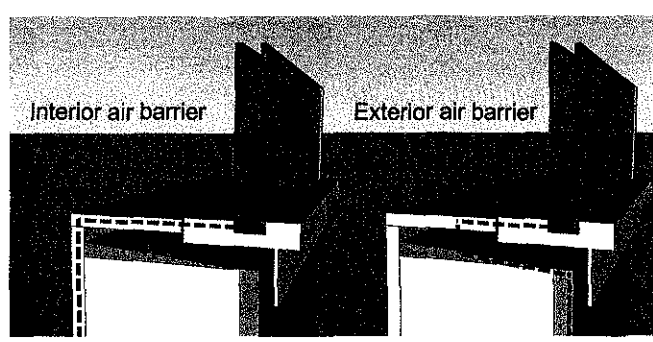

Figure 2. Sealing window on three sides provides for drainage and lower pressure differential at window exterior. Dashed red line shows location of seal.

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