

# Research Report



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## Avoiding Moisture Problems at Penetrations, Windows, and Doors

- Concrete in the Reward iForm™ provides a stable support for sleeves containing utility wires or pipes
- Primary and secondary means of protection against moisture entry should be provided at penetrations, windows, and doors
- In the unlikely event moisture penetrates the wall, it will most likely be visible and not hidden in cavities as it can be in frame and masonry walls

**Penetrations through all walls** need to be sealed and caulked to prevent moisture and air infiltration. Joints at window and door openings must also be sealed. A primary and secondary means of defense against moisture intrusion is recommended.

**Wall penetrations.** Utility access ports accommodate utilities that run from the outside to the inside of the building. These include dryer vents and conduit, wires, or pipes for electrical, gas, sprinkler, cable, internet, and telephone. These access ports should be planned and positioned into the Reward iForm wall prior to placement of the concrete.

The access port is a PVC or steel sleeve placed in the wall that is large enough to carry the required utility. Where possible, sleeves should be located between the plastic ties of the Reward iForm so ties do not need to be cut. An imprint of the sleeve is made on the wall and the EPS foam is removed using a long blade keyhole saw. The EPS foam should be cut and the sleeve positioned so that the sleeve is slightly higher on the inside face of the wall. This will enable water to run out of the building should any water work its way into the sleeve. The sleeve should be sealed with caulk to avoid the intrusion of water. The sealant is the primary defense against moisture and the sloped angle of the sleeve is the secondary means of protection. Once the concrete is placed, the Reward iForm wall provides a stable support for the sleeves.

**Windows and doors.** A wood buck is typically used to frame out window and door openings in the Reward iForm prior to placing concrete. Bucks are positively anchored into the concrete by anchor bolts or other suitable means. Concrete will corrode non-galvanized screws in a short period of time. Nails do not provide adequate resistance to pullout during the life of the structure. Rough bucks should be constructed using high-quality pressure treated lumber. Untreated wood in direct contact with concrete will rot and decay.

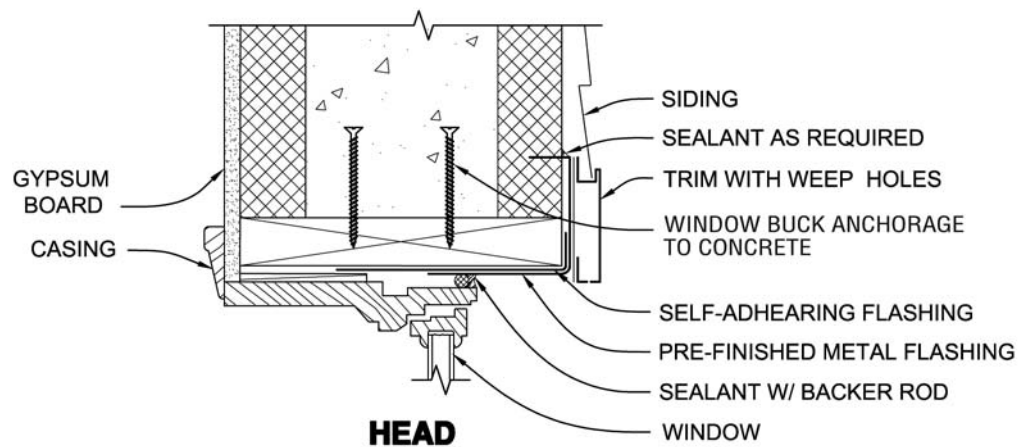
Recessed windows are preferred over flush-mounted because recessed windows are more protected from rain and snow. Overhangs also provide more protection from rain and snow.



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Caulk (sealant) is employed as the primary means of defense against water intrusion, but a secondary means of defense is also required. Caulk is fragile with a limited life estimated at 5 to 20 years. Homeowners and building owners generally neglect maintenance of caulking and are often unaware of its importance. Flashing below the window and a metal drip with end dams are required above the window as a secondary means of defense against moisture intrusion. Details for various window placements (recessed or flushed) and exterior finishes are available.<sup>1</sup>

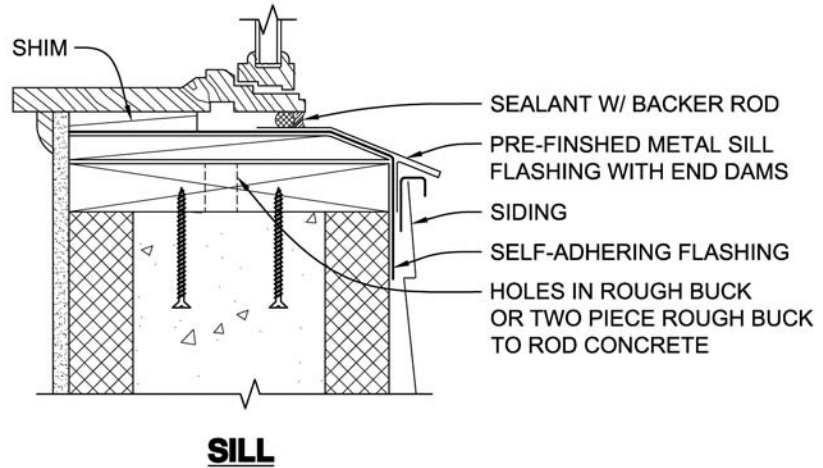
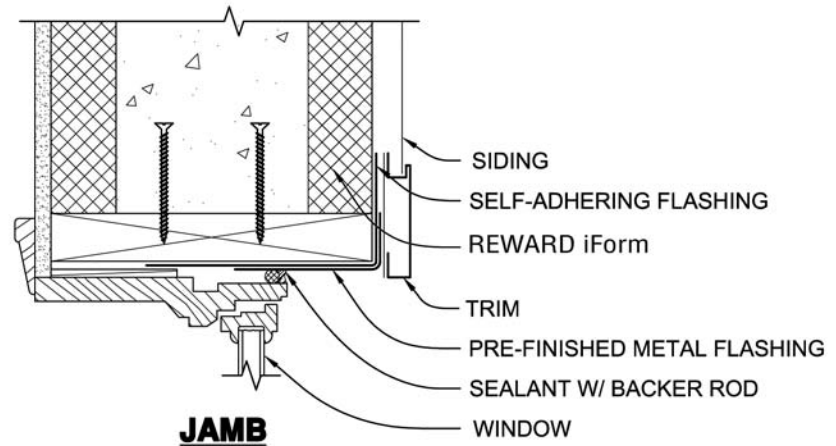
**The benefit of visible moisture.** The sealant and secondary means of defense against moisture intrusion generally prevent moisture from entering through penetrations, windows, and doors. However, in the unlikely event moisture should enter through the Reward iForm wall, it generally flows through to the indoors, leaving puddles on the floors. This is a preferred mechanism, since it is visible and draws attention to the problem. The Reward iForm does not have wall cavities where moisture can remain hidden for long periods of time. Wood and metal frame walls have cavities where moisture that enters through gaps around doors, windows, and penetrations can remain unnoticed and cause deterioration and indoor air quality problems.



<sup>1</sup> Gajda, J. and VanGeem, M. "Moisture in ICF Walls," PCA SN 2190, Portland Cement Association, Skokie, IL, 2002. www.cement.org,



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Due to manufacturing processes, EPS thickness, EPS type and the uniqueness of the Reward iForm, this analysis, information and report is only to be used with Reward iForm and is not to be used with any other ICF system



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