

Rim Joists and Sill Plates at the Foundation

Maryland's energy code, the 2015 IECC, requires newly constructed homes to pass an air leakage or blower door test with a limit of ≤ 3 ACH@50Pascals. A failed test can be costly to fix, so it's important to make sure you pay attention to all the air sealing details during the construction process before insulation and drywall. Areas that often get overlooked are the rim joists and sill plates at the foundation. These areas can be major sources of air leakage if not properly air sealed and can result in high infiltration rates and failed tests.

A common way to transition from a concrete or block foundation to the sill plates is by laying a thin layer of foam, often referred to as sill sealer. Sill sealer is primarily used as a capillary break, and does not provide an adequate air seal, particularly when the top of the foundation wall is rough or uneven. For these areas, additional air sealing methods are essential.

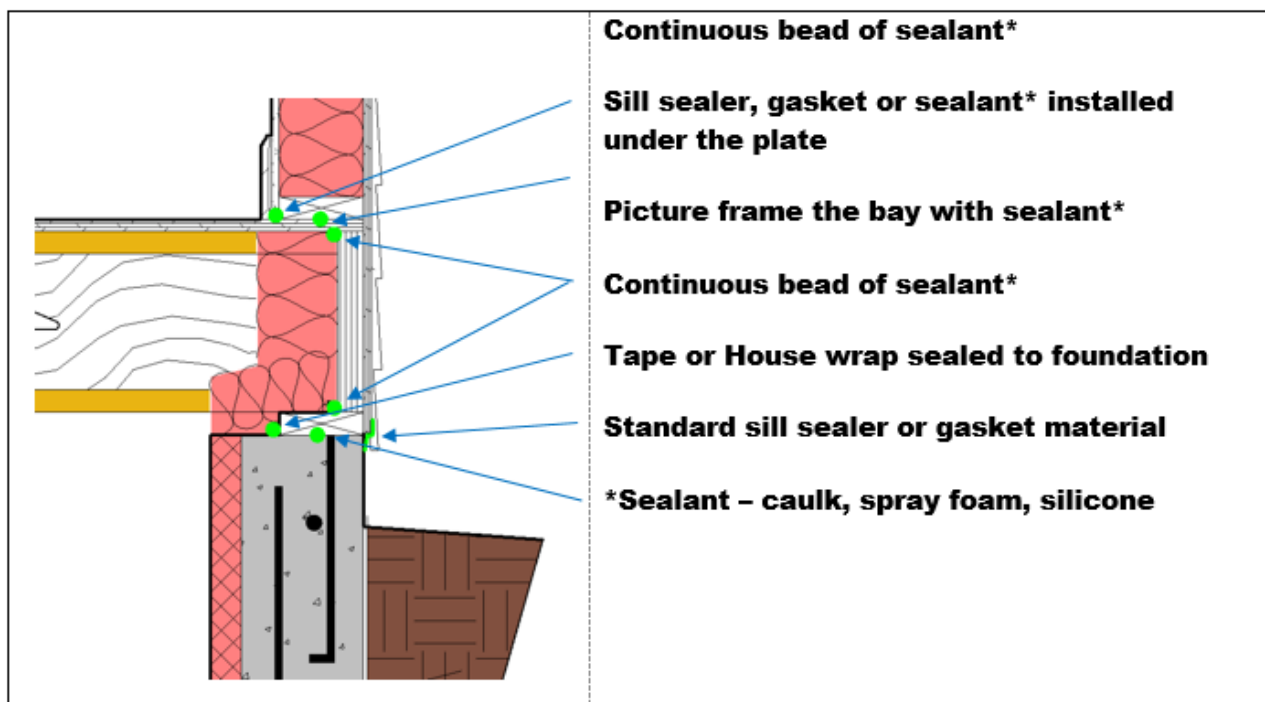
The good news is that these locations are easily accessible. They can be sealed from the outside or on the inside using various approaches and materials.



Figure 1: Flexible foam gasket installed to help reduce air infiltration between concrete foundation and sill plate. Notice the gaps and lack of air sealing.

On the inside of the home the concrete to wood transition can be caulked or foamed to create an air seal. On the outside, before siding is attached house wrap can be adhered down over a wall's sheathing to the foundation with tape or caulk. A flashing tape or ice/water barrier could be used from the outside as well. These measures can be done independent of each other or as a redundant, "belt and suspenders" approach.

Code officials can verify that the inside/outside surface has been air sealed before insulation is installed or before siding goes up. The builder should also verify that this location has been air sealed prior to insulating, as that is the best time to complete the work. If a builder uses spray foam in the rim joist area, then the spray foam should continue down to cover the sill plate as well. In all cases, it's best to caulk the sill sealer to the foundation, but this step is often missed.



Below are examples of sill plate installations and air leakage points. The 2015 IECC requires both the rim joist and the sill plate to be sealed. This applies for all foundation types and on all floors where a rim joist is used.



A nice, clean rim joist ready for air sealing. Caulk and/or spray foam can be used to picture frame the rim joist to the floor joist as well as sealing the sill plate to the foundation. Once sealed, insulation can be installed with the appropriate wall R-Value for the given climate zone. Be careful to consider the thickness of insulation, the location of the dew point, as well as the air and vapor permeability of the material when choosing an insulating product for the rim joist.



Here is an example of spray being used to insulate the rim joist location. The foam as applied covers the sill plate creating a complete air barrier from subfloor to foundation wall. The wood left exposed at the bottom of the foam can be a nailer for insulation, if necessary.



To increase air sealing, house wrap should be installed even with the bottom side of the OSB or even 1-2" onto the foundation where caulk or tapes (like those used around window and door openings) could have been used to seal it to the foundation. *Note: house wrap is often not taped when only used as a weather barrier (this is common) but should be taped if relied on as part of the air barrier. Check the manufacturer's installation details and tape specs for using house wrap as an air barrier.*



This image shows a black rubber gasket adhered to the concrete below with a flexible caulk. A rubber gasket of this type can be an effective air sealing measure between the sill plate and the foundation. Use a caulk that is compatible with the gasket based on manufacturer specs.