

Q We are refinishing a basement in a cold climate. The existing block foundation has no insulation, so we are proposing to build a 2x6 wall and insulate with fiberglass batts. Where should the poly vapor barrier be placed—behind the drywall or against the foundation?

A Clayton DeKorne, editor of JLC, responds: You shouldn't install any polyethylene at all. Moisture is likely coming from both the exterior and the interior, and it will condense on the poly no matter where it is placed.

I would also avoid using fiberglass insulation in a basement, as it will become a sopping mess if the basement ever floods (either from an exterior source of water, such as heavy rainfall, or an interior source, like a burst pipe or leaking water heater). Instead, consider insulating the inside of the foundation with rigid foam board or closed-cell spray foam and building an uninsulated 2x4 wall. You will likely save a little money using 2x4s and will have an open cavity for any wiring or plumbing that runs in the walls.

The amount of insulation is critical and depends on the climate zone. For climate zones 5 to 8, you need at least R-15, such as 3 inches of extruded polystyrene (XPS) or a little more than 2 inches of closed-cell foam. This R-value is consistent with the 2012 through 2021 versions of the International Residential Code.

Code does allow you to install R-19 cavity insulation in a basement wall without any continuous insulation, but I think it's a mistake to add cavity insulation alone without some condensation control. You need to keep condensation from forming on a cool wall surface by keeping that surface warm (above the dew point temperature), and I know of no other material better suited for this than plastic insulation. Rigid and closed-cell foam are Class 1 vapor retarders and provide insulating value, making them ideal choices at the correct thicknesses. This is one place where the extra cost returns value—by the reducing risk of a mold lawsuit.

I do recognize that foam insulation of any type is more expensive than fiberglass and this creates an incentive to use less foam by filling the cavity wall with batt insulation. You can do this, but you need to be careful to use enough foam. Something like fan-fold foam will not do it. You need enough insulating value to keep the surfaces sufficiently warm to prevent them from becoming condensing surfaces.

The safe answer in climate zone 5 is to use at least R-5 continuous insulation (for example, 1-inch XPS) with a 2x4 wall filled with R-13 batt insulation. In climate zone 6, you should bump up to R-7.5 (for example, 1½ inches of XPS) with R-13 in a 2x4 wall. Table 702.7.1 in Chapter 7 of the IRC provides better guidance on this than the insulation requirements of Chapter 11. Condensation control requires the right proportion of air-permeable cavity insulation to air-impermeable "ci" (continuous insulation), and because basements tend to be moist places, I think the 2021 IRC errs in its basement insulation requirements. That version, for the first time, provides split cavity-insulation and ci values; for all cold climate zones, 5 to 8, it requires 13+5. But in climate zones 6 to 8, 13+5 is risky, especially for the above-grade portions of a basement wall. If you are thinking to go above code on the insulation of a finished basement by installing a 2x6 interior wall with R-19 cavity insulation, follow Chapter 7. Namely, add more air-impermeable continuous insulation—R-7.5 in climate zone 5 or R-11.25 (3 inches of XPS, in practical terms) in climate zone 6. This added R-value for the foam layer is keeping that surface above the dew point so you don't have liquid water forming in the wall.

With an old foundation wall that has not been at least damp-proofed on the outside, it's a good idea to install a waterproof coating, such as Sto Watertight Coat (stocorp.com) or Drylok Masonry Waterproofer (drylok.com) before installing the foam. This provides more robust vapor control. But such a coating, while called "waterproofing," will not be a total solution if the site is not well graded and you have roof runoff draining into the basement or have high water tables—conditions that show visible signs of periodic wetting on the basement walls and slab. If any of these conditions are present, you need to do more than just coat the walls; you should also install an interior drainage system that includes a perforated drain pipe buried in gravel along the basement perimeter. The pipe must drain outside to daylight or to a sump pump. For more on this fix, see "Foolproof Cure for Wet Basements," Dec/05.