

The Case Against Partially Conditioned Basements

When building a basement home, it's important to give careful consideration to the location of the thermal boundary. If the basement will be either fully conditioned or fully unconditioned, the thermal boundary is self-evident. However, if the basement potentially includes both conditioned and unconditioned areas, the partition between these areas becomes the thermal boundary. Depending on room layout, a partially conditioned basement may not be the best choice.

In general, it's good building science to extend the thermal envelope to the furthest extent of the basement perimeter. Since below-grade walls form a natural air barrier, this approach is consistent with the recommended practice of aligning the thermal boundary with the air barrier.

Keep in mind that just because an area will remain unfinished doesn't mean it must be excluded from the thermal envelope. If the unfinished area is fully below grade, as is often the case with basement mechanical or storage rooms, it may actually be less expensive to include the area in conditioned space. This can be accomplished by insulating below-grade walls in the unfinished area rather than insulating and air sealing the floors above as well as the partition wall.

On the other hand, if an unfinished basement area has significant above-grade exposure with windows and/or exterior doors, it may be preferable to define the thermal boundary at the partition wall, leaving the area unconditioned. Local building codes may also factor into this decision.

The economic rationale for extending the thermal boundary to the below-grade walls depends mostly on the relative cost of insulating the partition wall and floors above, vs. insulating the below-grade walls. Fully below-grade areas have small heating loads and virtually no cooling loads, so the additional cost to condition these areas can usually be ignored.

When considering the relative costs, consider the following:

- It's difficult to properly install batt insulation in floor cavities (e.g., in full contact with floor, without compression). Alternative approaches such as spray foam alleviate quality issues but the cost is higher.
- Energy Star requires partition walls to be constructed like an exterior wall. That is, they must be fully sheathed on both sides (six-sided encapsulation) and doors must have gaskets and a threshold. (Note: These same requirements also apply to attic knee-walls.) Thermo-ply Green is an inexpensive material that can be used to back partition walls and knee-walls.
- If the room contains a furnace, air handler or large amount of ductwork, there's usually no need for a supply outlet.

There are several ways to insulate below-grade walls in unfinished areas. Most jurisdictions prohibit exposed (uncovered) foam boards due to smoke spread issues. Instead, foil-faced foam boards such as Dow Thermax Sheathing (polyisocyanurate) may be attached to unfinished masonry or concrete walls. Dow also makes a fire-rated version with a more attractive white finish. Depending on local prices and availability, it may only be slightly more expensive to finish a wall with conventional fiberglass batts. When choosing an R-value, there's little benefit to exceeding local codes since the heat loads are relatively small.