Ask Jon Eakes

BASEMENT: FULL HEIGHT OR PARTIAL HEIGHT INSULATION?

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This is the most controversial question about basement insulation. Everyone, however, agrees on two points:-- Outside the wall, go as far down as you can afford to. -- Concrete block walls have large continuous air cavities that run the height of the wall. (The code now requires that this air space be blocked with full blocks or mortar at grade level. Not always done.) When insulated on the inside, this cavity conducts heat from the room, under the bottom of the insulation and up behind the insulation, thus defeating its purpose. The more of the block wall that is left exposed, the more energy lost. You can eliminate this problem if you can fill the cavities (with anything that will not hold water -- like polystyrene beads), not so much to insulate the blocks as to stop the air currents. (search keyword "types" for the title "LOOSE FILL POURED: POLYSTYRENE BEADS")Understand that the building code requirement to insulate only two feet below grade is not an effort to make a comfortable basement, nor to protect against frost. It is simply that the upper portion of the wall must be insulated to make the basement heatable. This is where the greatest heat losses are and after that the soil itself begins to help retain the heat in the basement. So the building code is not taking any sides in the arguments about full height or not full height insulation.For years, government bodies and contractors alike tended to take a conservative approach in recommending that you leave six inches, or sometimes one foot, or sometimes two feet, uninsulated on the bottom of the basement wall when insulating on the inside. The thinking was that this planned heat loss would protect the footings and the wall from ice formation and ice lenses. This was a conservative guess because no-one really knew what was going on in the soil outside the basement. Many contractors still argue that you should not insulate the full height of the basement wall, but they are working out of habit, not building science knowledge. The catch is that without full height insulation, you will never have a truly comfortable living space in the basement.In the late 1980's the National Research Council set up a test in Saskatoon (slightly cold), where they heavily insulated the basement walls on the inside with saturated clay soil all around. They had put many thermometers into the soil to be able to record just what happened. The end results can be summarized as follows:-- The footings are below frost for any given area (building code requirement), so ice forming under the footings is simply not an issue here -- insulation or not. -- More heat sneaks out the edges of the floor slab than was previously thought, and this heat goes right to the footings, protecting them even if unusual frost depths do occur. -- Even with heavy insulation on the wall, some heat does go through the wall, which makes this wall perform very differently than one around an unheated basement. -- This small heat loss causes any ice lenses forming in the soil to grow in horizontal (not vertical) lenses (perpendicular to the direction of heat loss). Horizontal lenses expand upward, not against the wall. -- This small heat loss is just enough to break or weaken the bond between ice lenses and the wall, eliminating the lifting forces that we find on wing walls and fence posts (where there is no heat present at all). -- A poured concrete wall with normal landscaping and drainage will have no frost problems because of full height interior or exterior insulation. (Add to that a drainage layer or air-gap membrane and you have no water problems either.) -- If you have a fragile wall with water present and poor drainage (field stones, or just poor construction) then you should leave some heat loss to protect things.If you have hollow concrete blocks, you must go full height to avoid the by-pass effects of air circulation in the hollow "chimneys" inside the wall. But if you have soil and water problems, this can cause freezing problems. Here you should insulate on the outside, or fill the hollow blocks before insulating inside.Follow this link for more information.

Keywords: