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UNDERSTANDING INSULATION & VAPOR BARRIERS

Standards for the amount of insulation required in homes has increased drastically as the cost of using energy to keep a home comfortable in Winter (heating) and Summer (cooling) has increased. While the cost of using energy can be unpredictable in the future as costs rise, sometimes drastically, having a fully insulated home can mitigate these costs, especially as one approaches retirement and fixed incomes.

First the recommended R-Values: (R-Value is the capacity of an insulating material to resist heat flow. In the winter, a higher R-Value will better resist one's interior heat from escaping to the exterior while in the summer it will help keep the hot outdoor air outside and help keep your cool air conditioned air inside). The higher the R-Value number the greater the insulating power.

Example: a typical 1970's home might have a 2x4 exterior stud wall with about an R-13 batt type of insulation (pink fiber-glass that comes in rolls) stuffed between the studs. A 2x4 has 3.5 inches of space between the interior and exterior or about which means there is about 3.75 R-Value per inch.

Wall Insulation:

Today we want walls to have an R-19. Since one can't just stuff more batt insulation into the cavity because squashing it would lose its R-Value, we have to either use another insulation type or increase the stud wall depth.

Option A, Increasing the Stud Wall Depth to keep using Batt Insulation: To accomplish an R-19 Value, one would need a stud wall that is a little over 5 inches in depth, or a 2x6 stud. If you keep the original 2x4 stud wall, one could add an adjacent 2x2 stud wall to get close to the proper depth ($3.5" + 1.5" = 5"$).

Option B, removing the existing insulation and use an Expandable Foam Insulation: To achieve an R-19 Value of insulation within the existing 3.5" stud wall (without adding an additional stud wall as in Option A), you'll need a professional to spray in an insulation that has an R-Value of 5.4 per inch.

Option C, adding Foam Board Insulation under the existing exterior siding: This is an excellent option if one is considering changing the siding on their house. By using foam board one can keep their existing R-13 batt insulation and add just another R-6 to the exterior side to achieve R-19 in the Walls. Also, by having continuous foam boards wrapping the exterior that aren't interrupted by studs the resulting insulation is better than just using batt insulation. It also offers an opportunity to redesign the look of one's house by varying the depth of the foam board, like creating a thicker base to the house,

etc. With this option one has to consider how to resolve details around windows/doors, etc. as well as how to attach the siding, and how to keep the exterior fire-proof.

Ceiling/Attic Floor Insulation:

It is recommended to try to achieve an R-49 for the Attic Floor.

Roof Insulation

If your interior spaces abut the roof structure, one needs the same amount of insulation as they do for a ceiling/attic, as noted above. IMPORTANT NOTE: If you are going to add insulation between the rafters (rafters are the diagonal beams of the roof structure, which support the plywood sub-surface and shingles), then one has to add a baffle that keeps all insulation about 1 inch away from the plywood sub-surface. This 1 inch continuous space between the baffle and plywood will allow air to flow from the eave (bottom) to the ridge beam (top) to help keep the underside of the plywood dry. Add the baffles from the top down, overlapping by an inch or so and taping the seams.

Garage, Mechanical Rooms and other miscellaneous exterior walls/ceilings.

If any miscellaneous spaces abut to an interior space they need the same exterior insulation as a typical exterior wall or roof. For instance, one's garage might be under one's bedrooms of a house; therefore, the ceiling of the garage should have an R-Value of 49. This is especially important if there is a bathroom, in order to prevent pipes from freezing.

Vapor Barriers:

Vapor Barriers do two important things: help keep your insulation dry and help prevent air flow through exterior surfaces. By keeping the insulation dry one also prevents the conditions for mold growth.

What is it made of? It can be a sheet of clear plastic, or part of batt insulation which comes with a paper backing on one side coated in tar.

Where is it located in the wall? It is important to have the vapor barrier between the sheetrock (interior plaster wall sometimes referred to as wallboard) and the stud. This is to prevent the migration of interior moisture through the sheetrock and into the insulation, which would compromise the R-Value and possibly create conditions for mold. Remember, it is interior moisture and not exterior humidity one needs to prevent, so if you remove your sheetrock to install insulation, cover all the studs with a vapor barrier before putting the wallboard back. Never put an impermeable vapor barrier on the exterior surface of a house, as moisture needs to migrate out and away from both insulation and materials. House wraps do allow moisture to escape, so these are okay to use over your exterior plywood underneath your siding.