

Cold Floors – Bonus Rooms & Beyond

Cold floors are not just found in bonus rooms (rooms over garages) anymore; today's home designs are becoming more ambitious, with new opportunities for cold floors to develop over such unconditioned spaces as porches, crawl spaces, or even floors cantilevered beyond the exterior wall of the building. The push for more durable floor finishes like hardwood & tile are making the problem even more noticeable because these materials have a low R-value.

Most builders understand that bonus room floors require substantially more attention, if these rooms are to be made as comfortable as the rest of the house. In reality, standard construction practices simply do not provide a sufficient level of performance or durability to justify the additional cost. The end result is a compromise; the builder does his best to keep the job affordable for the homeowner, and the homeowner accepts that the bonus room will not be as comfortable as the rest of the house.

Why are the Floors Cold?

Even with building codes in many areas dictating that these floors be insulated to R-25 ($R_{SI}=4.3$), it is common to find floors that are 10° F (5.5° C) cooler than the room. Why? Because it is virtually impossible to install an insulation batt so that it is in contact with, and stays in contact with, the floor above.

Unless continuous contact can be maintained, void spaces will exist between the batt insulation & the floor above. These void spaces can range in size from small pockets to, in some cases, the entire length of the room. Cold air that penetrates the insulation can flood the void space between the insulation and the floor, rendering the insulation ineffective. Complicating matters is the necessity to accurately install the insulation around bracing and bridging between joists. The use of air permeable friction fit insulation system relies on an effective air barrier system being

installed on both the underside of the insulation and at the exterior wall, at a cost that most builders cannot justify.

Heated Plenums

Some designers and builders have tried to overcome the weaknesses of this system through the use of a heated plenum space; a dropped ceiling is installed in the garage and insulated with a fiber batt. Heated house air is then ducted into the space created under the floor. While this is a more reliable means to keep the floor warm, experience proves it does not address all related problems. When water pipes are run within the plenum, frozen pipes are still commonplace. One common reason is there is no code requirement for the proper insulation & air-seal at the exterior wall of the heated plenum, allowing cold air to infiltrate under certain weather conditions.

In the plenum, failure to properly air-seal the insulation allows the heated humid air to move through the insulation and come in contact with the exterior plenum wall. This can result in condensation in the insulation and on the cold exterior plenum wall, creating the potential for a long-term structural problem. To compound the issue, if a return air duct is installed to recycle the heated air, it runs the risk of conveying glass-fiber particles to the house.

While it is possible to design the heated plenum system to prevent these problems, the amount of labor involved makes the solution cost-prohibitive. Instead, builders may opt to ignore the additional detailing necessary in order to get the system to work. The inferior design will cost the building owner in higher energy bills for the life of the building.

Air Barrier Systems

The ideal means to supply occupant comfort to bonus rooms is to install a combined insulation

and air barrier system in direct contact with the underside of the floor, while the insulation prevents conductive heat loss from the room above. And unlike the use of a heated plenum, this system does not require a continuous source of heat, or risk either condensation damage or reduced air quality.

Icynene®

Icynene LD-C-50® is a perfect solution for bonus room and floors exposed to cold air. It is a low-density (0.5-lb/ft³) combined air barrier and insulation system that forms a continuous, reliable bond without sagging, settling, shrinking, or debonding from the substrate. Icynene® eliminates the possibility of short-circuiting and the need for heated plenum systems. Thousands of floors over porches, garages, crawl spaces & cantilevers have been successfully insulated & air-sealed with Icynene®, and many more existing cold floor issues have been resolved by an Icynene® retrofit.