IES GREEN REVIEW

INTELLIGENT ENERGY SOLUTIONS LLC

WHY IS THE ROOM OVER THE GARAGE COLD?

A building science review of safety, indoor air quality, and energy efficiency

Chances are the room over your garage is colder than the other rooms on the second floor. There is also a good chance that your neighbor's house is the same way and there is a high probability that other homes in your neighborhood have a similar issue. There is hope.

The room is cold for one of two reasons or maybe a little of both. **Not enough heat or too much heat loss.** It's that simple, either the furnace is not suppling enough heated air to the room or the room is loosing the heat quicker than it should.

How do you find out exactly what the problem is; **testing**. If you measure the air flow at the supply and return vents, use an infrared camera and blower door or other testing equipment then you will be able to identify the exact problem. Anything other than testing is guess work. As we are fond of saying;

"if you don't test, you don't know."

What does testing reveal;

- Better than 50% of the time poorly air sealed and insulated floors.
- Walls adjacent to garage attic not properly air sealed and insulated.
- Sometimes poor air flow at supply vents.
- Access panels missing weather-stripping and insulation.
- Lack of Attic insulation
- Occasionally windows are the issue.

Issue: Properly air sealing and insulating at the floor over the garage seems to be a mystery to a lot of people. Insulation alone is not the answer, if the insulation does not completely fill the cavity and has air whistling through it, there is no hope that it will ever perform as intended.

The above picture is the perfect example. The gap between the insulation and the floor is allowing the cold air from the attic to completely bypass the insulation rendering the insulation almost totally ineffective for the floor above. It does work well for keeping the garage warm. This is also the reason why installing a heater in the garage may do little to improve the comfort of the room above.

Solution: First things first, the insulation should be in full contact with the underside of the conditioned floor. Dense packing the cavity with cellulose insulation would solve the first requirement. Second, blocking the floor joist ends and air sealing is essential. Fiberglass and cellulose insulation work by trapping air and holding it. If air can move through the material then it is not longer an insulator, it is now a filter. Access to the perimeter is the wild card, some attics provide easy accessibility while others require cutting and patching drywall from below. Removing all the drywall and installing closed cell spray foam is a great option but is not for everyone.

Issue: Exposed fiberglass walls. Building on the principal of enclosing fiberglass, all too often fiberglass batts are exposed to the open attic. This substantially decreases the effectiveness of the insulation.

Notice how the insulation looks dirty, that's because it is. Through convection and wind, air is moving through the fiberglass thus tuning it into a filter and substantially limiting its ability to be an insulator. Fiberglass insulation will only perform at its stated R-value when fully enclosed and sealed in a six-sided box.

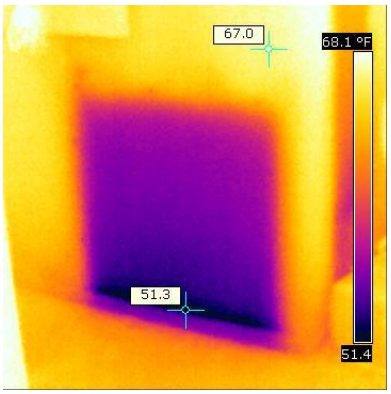
Solution: At a minimum cover the exposed insulation with house wrap paper. Do not use plastic, it will trap moisture. A better solution would be to install foam board. Not only will you stop air flow into the fiberglass you will be providing a thermal break for all the wood framing members.

Issue: The HVAC supply registers are the main source for providing heat to the room. To accurately assess if the room is receiving enough air flow you **MUST** measure the air flow with a flow hood or other calibrated devise. The back of the hand is never going to work. Rooms over garages need more air flow than rooms over conditioned space. How much air flow? We can go though the lengthy process of using the ACCA Manual J calculations or we can measure the air flow in the other bedrooms that are comfortable and use that as a reference. Either way, if you don't test you don't know.

Solution: If it's determined the room is not receiving sufficient air flow there are options, some better than others.

* Start with balancing the system using the inline dampers typically found in the basement close to the main trunk line.
* Adding a booster fan can provide some additional air flow.
* It might be necessary to change the layout of the duct work.
* Air sealing the duct work can improve the overall system performance.
* Installing a larger furnace will only work if the duct work can accommodate it.

Issue: Insulate and weather strip access doors and hatches. Four square feet of non-insulated wall area and lots or air infiltration does not work in your favor.



Solution: Not all access hatches are created equal. Some are easier to address than others but with a little creativity and effort a good solution will arise. Common components include 2" foam board, screws, quick set glue and weather stripping.

Issue: Lack of attic insulation and air sealing can contribute to the lack of comfort you are experiencing but rarely is it the main culprit. How do you know, testing. Inspecting the room with an infrared camera can usually give us a quick read on the situation.

Solution: Air sealing, ventilation and insulation are all necessary for an attic to perform at its best. Following our recommendations laid out in our paper titled *Moisture and Frost in My Attic* will provide all the details. Additionally you may qualify for rebates through the Nicor Gas Energy Efficiency Program. We are an approved contractor and can provide an instant rebate the same day the work is completed.

Additional Recourses:

https://www.finehomebuilding.com/2012/03/08/how-to-insulate-a-cold-floor

https://www.energystar.gov/campaign/home?s=mega

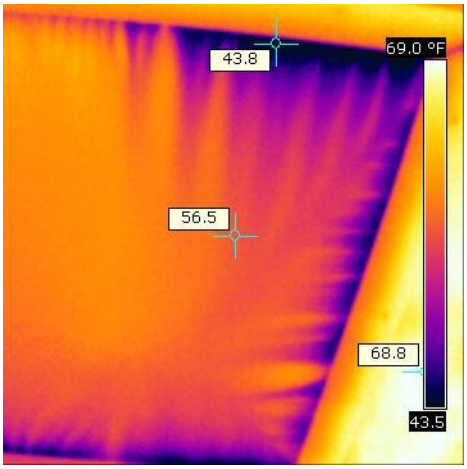
https://nicorgasrebates.com/your-home/rebates-for-home

Other IES Green Review papers: Attic Fans – Moisture and Frost in my Attic – Cellulose Insulation – Why is my Second Floor so Hot?

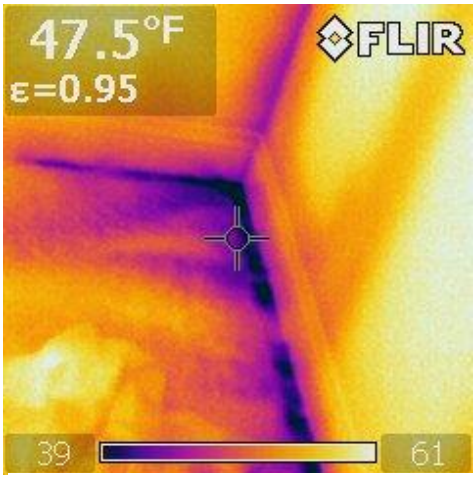
Facts + Experience = Your Solution

Our Services

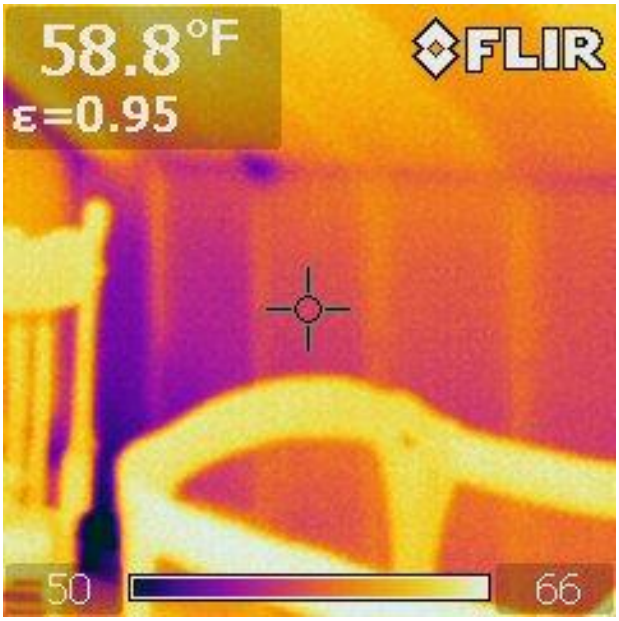
- Testing; Infrared Camera, Blower Door, Duct tightness, Supply and Return Air Flows, Combustion safety.
- Reports from testing with prioritized action plan.
- Energy Modeling using REMRate software. Heating/cooling load calculations ACCA Manual J & S.
- Air sealing, insulation and ventilation.
- Attic HVAC system enclosures.
- Cellulose, Spray Foam and Fiberglass insulation.
- Bath fan upgrades and venting.
- Drop down stairs to attic with properly insulated and sealed covers.
- Crawl space encapsulation and insulation.



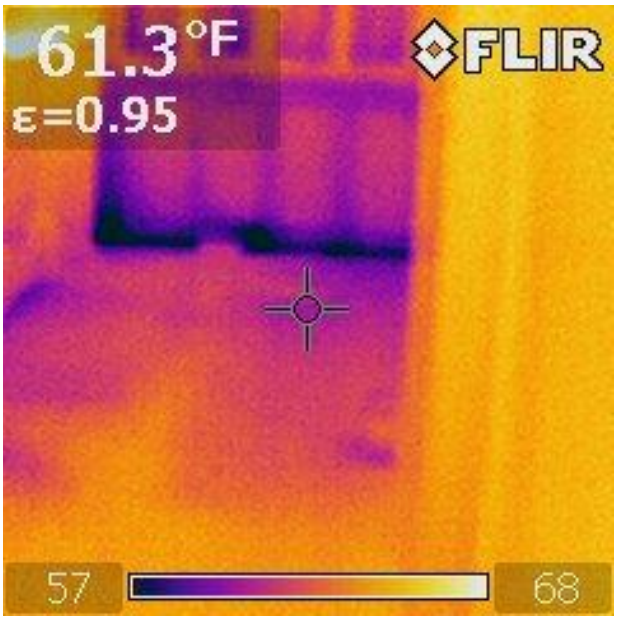
Air infiltration - missing weather stripping



Air infiltration along base boards. Installing an air barrier on the other side of the wall and caulking bottom plate is required



Poorly performing insulation at wall adjacent to open attic with no air barrier on back side.



Cold air is bypassing the insulation in the floor.

Classic case of fiberglass gone wrong. Does not completely fill cavity and no air sealing along perimeter.

Still trying to overcome *"this is how we have always done it*" mentality