SUMMARY OF TESTING RESULTS FOR:

Leafygreen.info

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CERTIFIED BUILDING ANALYST

Infiltration/Ventilation Results

Home ASHRAE Standard is 62.2 P		Your Home's Testing Results:	
Avg. Air Exchange Rate of Fresh Outside Air Per Day	8.0	Avg. Air Exchange Rate of Fresh Outside Air Per Day	8.9
Avg. Air Exchange Rate of Fresh Outside Air Per Hour	.35	Avg. Air Exchange Rate of Fresh Outside Air Per Hour	.37

Infiltration is a key component to proper ventilation provided it is entering the building shell from the outside. However, when the infiltration air is excessive and is entering the home from un-conditioned areas such as attics, crawlspaces, knee-walls and attached garages, this causes major comfort, operating cost and indoor air quality issues. Therefore, it is critical that areas such as un-insulated wall cavities, electrical and plumbing penetrations, recessed lighting fixtures and attic/knee-wall access doors and hatches be protected by air and thermal barriers.

Mechanical and Air Distribution Overview

Air distribution is another key component to comfort, indoor air quality and energy usage. The air distribution system (ductwork) needs enough static pressure to deliver conditioned air to the supply outlets and the return air distribution system needs to bring only house air back to the mechanical system. Supply static pressure is compromised when the air distribution system in not properly sealed. This causes basements to be over-conditioned (hot in winter, cold in summer) and typically the second floor suffers from lack of air flow.

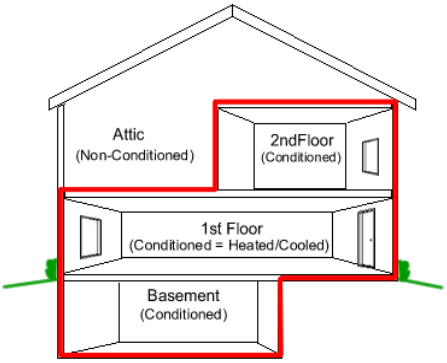
Additionally, the return air distribution systems use un-insulated wall cavities that pull attic air in the envelope of the home. This attic air is very hot (summer time) causing additional heat gain that the air conditioning system cannot overcome and excessive heat loss in the winter time causing high operating costs, comfort issues and ice damming. More importantly, this attic air can contain insulation fibers, mold, dust and other air born contaminants that potentially can cause major health concerns. Finally, duct leakage is under much higher pressures than house leaks, therefore one square inch of duct leakage has approximately the same as 30 square inches of house leakage.

Home Performance Summary

Energy usage, comfort and good indoor air quality are all directly related to the building envelope and the integrity of its components. Some of these components include; mechanical systems, thermal insulation, air barriers, framing and air distribution. Our testing process specifically examines the home's air and thermal barrier's, infiltration and ventilation rates of homes including the integrity of the air distribution system.

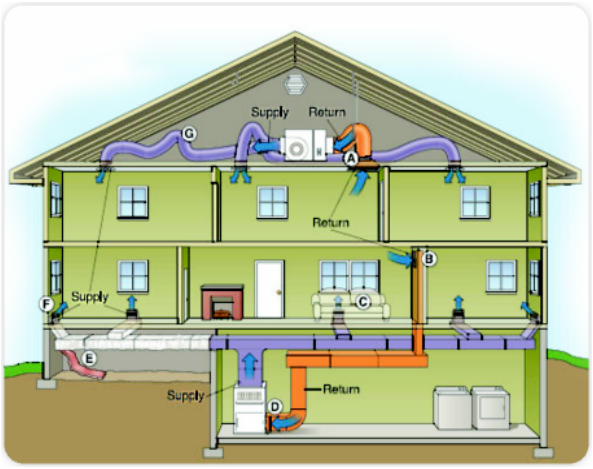
Air Barrier

Comfort and operating cost issues in homes are directly related to the excessive size "hole" in the air barrier of your home. These holes can consist of electrical/plumbing penetrations. Air movement is based upon pressure differences between the inside and outside of the homes envelope. High pressure (hot) will always go to low pressure (cold), therefore, the larger the hole in the house, the more expensive heated (high pressure) air escapes to the outside. As that conditioned air exits the home, the same amount of un-conditioned air must enter which then must be heated resulting in excessive energy usage as well as comfort issues. Reducing the overall building leakage by air sealing will reduce the amount of heat loss, thus reducing operating costs. Additionally, the smaller the hole in the home reduces drafts and increases overall comfort within the entire home.



Thermal Barrier

The thermal barrier of the home is also a critical component which if properly installed, will slow down the movement of conditioned air to or from the outside of the building envelope. The more dense the insulation in the home the slower the movement of either conditioned air out (winter/stack effect) or into the home (summer/infiltration). Any areas above grade must contain a properly installed thermal barrier including basement ban-joist, buffered walls/ceilings and attic/knee wall access doors.



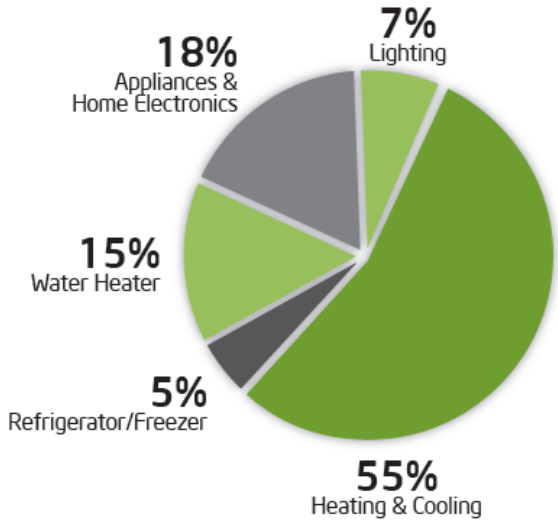
Air Distribution

The air distribution and return system (duct work) is a vital component of the mechanical system and its overall performance and efficiency ratings, which is typically overlooked by the HVAC trade. On average, most duct systems contain roughly 30-40 square inches of leakage which severely degrades the performance of the heating and air conditioning system. Additionally, return air leakage will pull un-conditioned and dirty air back to the system causing poor indoor air quality and performance issues. If return air leakage is dominant in the basement, a negative pressure within that area can cause back drafting of the domestic hot water tank. One square inch of duct leakage has roughly the same impact as **30 square inches** of house leakage due to the pressure from the furnace therefore sealing duct work is one of best energy/comfort improvements that can be made.

Stack Effect Illustration

This illustration shows how conditioned air is lost and unconditioned air enters the building.

Energy Usage and Home Performance



Heating and air conditioning accounts for roughly 55% of the energy used in a typical home .Improving the air / thermal barrier of the home is the first step to greater heating and air conditioning performance. Improving volume and velocity of conditioned air by properly sealing the duct work with will also be a positive energy improvement as well as decreasing indoor air quality issues and building durability issues. Additional energy saving measures include CFL /LED lighting, appliances and electronics that are Energy Star rated.

Electronic Diagnostic Results Summary

Energy usage, comfort and good indoor air quality are all directly related to the building envelope and the integrity of its components. Some of these components include; mechanical systems, thermal insulation, air barriers, framing and air distribution. Our testing process specifically examines the home's air and thermal barriers. Testing includes infiltration and ventilation rates of the building and integrity of the air distribution system.

Infrared Thermal Scan

The infrared scan some minor insulation voids between your attic and the second floor. It also showed that your attic hatch is allowing heat to move into and out of your home. This causes dryness in the winter and difficulty in cooling second floor rooms during the summer.

Air Barrier

- The attic hatch is allowing hot attic air into the second floor of your home during hot weather and cold air infiltration during the winter. The cold air causes condensation to form when the hot and cold air meet and has the effect of lowering humidity. Both of these situations carry health and comfort concerns.
- Plumbing and electrical openings were showing large amounts of air flow. This air is coming from your attic and or basement and has the effect of bringing dust and non-conditioned air into your home.
- The rim joist, while insulated with fiberglass batts, does not have an air barrier. This constitutes a hole in the thermal barrier of your home.

The Air Distribution System

The ductwork system was found to be leaking both on the return and delivery ducts. This can easily be reduced by applying mastic to all accessible duct joints and connections.

Recommendations / Correction Strategies

- Based upon our testing protocols and visual inspections of the home and its major components we have determined that there are several improvements which once completed will remedy your concerns and may reduce energy usage. Each recommendation is listed in order of priority. It is in our opinion that it is best to complete all recommendations to gain optimal performance and achieve desired savings/improvements.

Pro Energy / Comfort Action Plan

- Air seal and insulate the rim joist. The rim joist is located at the top of the concrete basement walls and when not air sealed and insulated causes air to move within your walls. This can be accomplished by cutting foam core board to fit in the pocket formed by the rafters, rim joist and top of the foundation wall. Use nonexpanding foam to glue these pieces in place and fill any gaps.
- Repair (using nonexpanding foam) all damaged, gapped or missing fiberglass batt insulation.
- Install an Attic Tent above the pull down attic stairs to provide a thermal and air seal between the attic and second floor.
- Using a nonexpanding foam product or silicone caulking to seal around plumbing penetrations.
- Using a non-expanding foam product or silicone caulking to seal around electrical boxes / penetrations.
- Using a non-expanding foam product or silicone caulking to seal between AC delivery and return vents and the surrounding sheet rock or floor.
- Use a nonexpanding foam product to seal around the room air conditioner
- Seal the gap between the recessed light and the ceiling.
- Place foam sealing pads behind electrical outlets.
- Apply mastic to all accessible HVAC duct joints.
- Replace incandescent lights with compact fluorescent or LED.

Long Term Recommendations

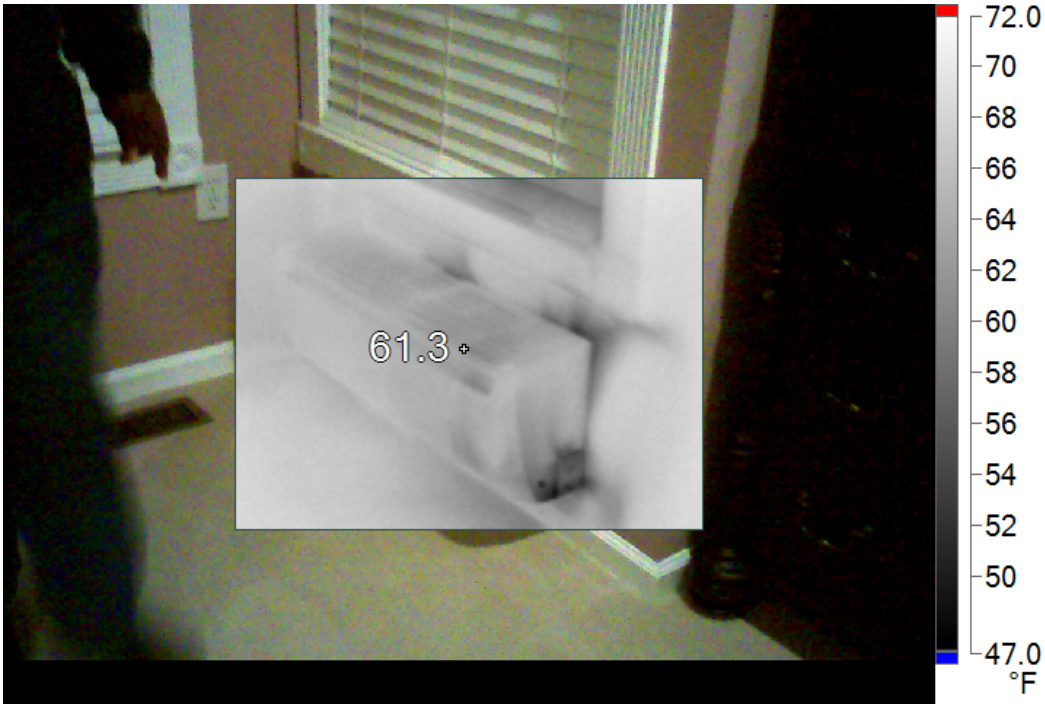
- When replacing your hot water heater, consider moving to an instant heat (gas or electric replacement). This will not waste energy when you are not using hot water and will provide unlimited hot water on demand.
- When replacing you furnace, consider moving to a condensing sealed combustion furnace. This unit will be both safer and more efficient.
- Consider replacing the attic floor insulation with foam or a blown in product. The fiberglass batt insulation has many gaps around the edges which greatly reduces the r value.

Photographs

Basement rim Joist insulation

Hole in attic insulation for recessed light

Thermal and air leak at attic hatch



Thermal and air leak around room AC unit

Missing insulation