

Example of a Home Energy Audit

Special Report

The following is a sample energy audit performed on my parents' home (Mr. & Mrs. John Hodge, Jr.), in Elkton, MD. The energy audit was performed by Alpha Engineering, Inc. of Bear, DE, and is recognized by the State of Maryland.

Sample Residential Energy Audit

Dear Mr. & Mrs. Hodge:

Alpha Engineering, Inc. is pleased to provide this report for your review.

Summary

This home energy performance evaluation reveals a profound thermal envelope breach at the ceiling/attic interface in the return air wall cavity near the foyer. This condition is a gross energy waste as well as a fire stop breach. Other shortcomings typical of construction practices 11 years ago offer several energy saving opportunities as outlined in "Recommendations" of this report.

Background

A two-story, framed, colonial residence with a finished full basement and an attached garage is heated with a gas-fired hot-air furnace. The central air conditioner appears to be a four-ton 10-SEER unit, and the hot water heater is also gas-fired.

Alpha Building Inspectors was contracted to perform a full energy performance test.

Nine photographs accompany this report and document its findings. Each photo is captioned for clarity.

Findings



Photo 1 - Front view of Hodge household.



Photo 2 - The front downspout upper level should be extended around the corner. The present arrangement offers a greater potential to leak at the flashing. Also, a deflector attached to the gutter at the valley will prevent overflow during heavy rains.



Photo 3 - Downspout discharges should be extended below grade to avoid soil saturation at the foundation.



Photo 4 - All exterior penetrations should be sealed. Also, the sill plate and box plate (rim joist), should be sealed using spray foam insulation.



Photo 5 - The insulation used on the suction line for the AC is haphazardly installed. This should be removed and replaced with a foam insulation to match the existing black foam. Include a short piece on the liquid line at the housing.



Photo 6 - Existing blown insulation is an average 10 inches thick. However, the effective R-value is estimated to about nine inches. Adding more insulation to achieve R-38 or better will exceed today's code requirements. R-50 is not unreasonable and is in line with Energy Star recommendations. It is also recommended to add rafter vents

near the soffits to avoid blocking the soffit ventilation.



Photo 7 - The fiberglass insulation on the skylight shaft will need removal to seal the gypsum board seams using spray foam insulation. Then re-apply R-19 (6" thick fiberglass batt), 2 layers (minimum).



Photo 8 - With the return air grille removed, it was revealed that the attic space is totally open to the conditioned space, as can be seen in the inset photo taken from the attic looking down on the ceiling. This opening must be sealed using a plywood or gypsum cover cut to fit and sealed.

Analysis

An analysis of the combustion gases reveals that the hot water heater burns efficiently, however, the furnace is due for a tune-up. The utility room balance is adequate even with all exhaust fans in the house on. This may change once all recommendations to tighten up the house are complete. Retesting at that time is prudent.

The degree of house leakage is tested by using a blower door assembly designed to exhaust enough air to achieve a specific negative pressure inside the house envelope (see photo 9 for set up). An exhaust range (cubic feet per minute - CFM), is calculated using prescribed parameters. This is compared to the measured air flow.



Photo 9 - Arrangement of the blower door test includes an adjustable fan with a differential pressure gauge adjusted to a specified level.

For this application, the actual value exceeds the highest calculated value by 12.6%. Obviously, there is ample opportunity to seal air leaks throughout the house. However, the most prevalent opening exists at the return air opening at the attic (see Photo 8).

Conclusion

In my professional opinion, this residence energy performance is less than expected of an eleven-year-old dwelling. By completing a few simple fixes as outlined in the recommendations below, it is likely that the performance will improve considerably.

Recommendations

1. Close off the return air shaft in the hallway. Cut to fit and fasten in place a cap (plywood or gypsum), at the top (attic), of the shaft. This will prevent the furnace fan from pulling unconditioned air from the attic. This is also a code requirement to prevent easy flame spread.
2. Add foam insulation at the perimeter sill plate. This seals the air leaks and reduces infiltration of unconditioned air.
3. Seal all accessible duct joints in the basement utility room and in the attic. Use mastic putty or proper duct tape.
4. Replace the Master Bath recessed light over the shower stall with a vented light suitable for wet locations. Seal at interface with the gypsum penetration.
5. Tune-up furnace and add insulation on the AC suction line at the furnace and a short (about 1"), on the liquid line at the furnace housing.
6. Seal the skylight shaft at the insulated walls using spray foam insulation.
7. Add attic insulation. Current ceiling insulation installed efficiency is estimated to meet an average R-9. Another 8 -10 inches of blown insulation will provide better than R-38 (recommended for this region). Consider R-50 to be consistent with Energy Star recommendations. The soffits must be prepared for adding the insulation by extending the rafter vents between each rafter by 18".
8. Consider replacing the existing 10-SEER AC unit with a more efficient 13 SEER or better.
9. Consider replacing or eliminating the existing older refrigerator in the lower level. Other older appliances can be replaced for improved efficiency.
10. On the exterior: add deflectors to gutters at roof valleys; extend the upper-level front downspout to direct water around the corner.
11. Seal all exterior wall penetrations, particularly at the AC lines.

General Recommendations:

1. Consider replacing existing windows with "Low-E" triple pane windows. This is a large expense and should be analyzed for economic payback by an independent professional.
2. Replace all incandescent light bulbs with the newer compact fluorescent lights.
3. Add foam seals behind every exterior wall electrical outlet cover and use plastic plugs in all unused outlets.
4. Turn off all appliances and their associated transformers when not in use. "Ghost Amp Robbers" such as telephone chargers still draw a small current when left plugged into the outlet even when the phone is not connected.
5. Other good energy saving tips and tax credits can be found on www.energystar.gov .

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