

POULOS HOUSE CASE STUDY

PROFILE

- o AGE: 92 YRS (BUILT IN 1918)
- o USE: SINGLE-FAMILY
- o RESIDENCE TYPE: TWO-STORY
- o EAST-FACING
- o LAND SQUARE FOOTAGE: 9,250
- o BUILDING SQUARE FOOTAGE: 1,794
- o EXTERIOR CONSTRUCTION: STUCCO
- o CONCRETE FOUNDATION
- o HAS BEEN REMODELED SEVERAL TIMES
- o ORIGINAL WINDOWS AND UN-INSULATED PLASTER WALLS
- o 16 YR OLD BOILER (~1994)
- o 19 YR OLD CENTRAL AIR-CONDITIONING SYSTEMS (~1991)

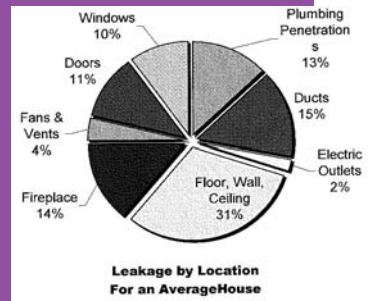


PROBLEM

- o 93% OF HEATED AIR IS LOST PER HOUR THROUGHOUT THE WINTER
- o LITTLE OR NO INSULATION IN ATTIC AND WALLS
- o ONE NATURAL GAS LEAK ABOVE BOILER
- o BASEMENT BOILER AND WATER HEATER ARE NOT ADEQUATE

TESTS PERFORMED

- o INFRARED SCANNING
- o BLOWER DOOR
- o COMBUSTION APPLIANCE SAFETY
- o CARBON MONOXIDE ANALYZER
- o NATURAL GAS DETECTOR
- o SMOKE "PUFFER"
- o COMBUSTION AIR SUPPLY



AIR LEAKAGE CHECKLIST AND RECOMMENDED CORRECTIONS				
Leak Severity is ranked High (1), Medium (2), Low (3), or None (N). Priority Action Levels A, B, or C				
Client: K C Poulos				
AIR LEAKAGE TYPES	Severity	Location(s)	Correction	Priority
Attic/Roof				
Drop-down stair	1	SW Bedroom	Pre-fab insul'd cover @ Insulated-covers.com, or fabricate foam box	A
Eave Vents	1	Main Attic: IF CHOOSE roof insuln strategy	Add blocking to prevent "wind washing" at exposed insuln.	A
Roof Fan		Attic	DISABLE IT!	A
Framing and Chases-- Open to Attic, Basement, or other areas				
Vent or Chimney Chase	1	Attic Floor	Seal at attic floor w/ fire rated materials, eg, metal & foam.	A
Chases (plumbing, electric, HVAC)	1	Attic Floor	Cut/fit foam board & seal edges or spray foam. Many acceptable seal methods & materials.	A
Floor Cavity @ Exterior -- Rim Joist or other type	1	Basement, Crawls -- include with wall insuln at crawls	Cut and fit rigid insulation to fill cavity at exterior; seal edges with spray foam	A
Cabinets & Counters	2	NW corner of kitchen	Seal gaps w/ caulk -- see blue tape	A
Pocket Doors	1	2nd Fl Bathroom	Difficult to correct. Try attic floor.	A
Finishes				
Floor-Wall Junction	1	Throughout 1st and 2nd floors.	Dense packing walls may solve this! Or Caulk with clear silicone, or remove quarter-round, seal behind, & replace.	A
Wood trim	2	Various windows--Lv Rm	Caulk -- see Blue tape	A
Recessed Fixtures	1	Kitchen	Seal behind cover at drywall cut AND add air tight baffle inserts.	A
Recessed Fixtures -- "eyeball" type	1	Dn Rm, Lv Rm	We know of no correction for eyeball or 4 inch types, except replacing with track lighting! Hopefully dense pack cellulose in the walls with eliminate this leak.	A
Fixture Base; Electrical Box	1	Powder Rm wall light	Caulk, or polyiso foam behind & into box. Check w/ electrician	A
HVAC Distribution				
Accessible Ducts	3	1st Fl Living & Dining Rooms	Remove vinyl "duct" tape. Run furnace fan & mark leaks. Seal w/ mastic or UL Listed alum tape.	C
Insulated ducts	1	2nd Fl Supply and Returns at ceiling	Run fan & mark leaks. Seal w/ mastic or UL Listed alum tape.	A

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insulated ducts	1	2nd Fl Supply and Returns at ceiling	Run fan & mark leaks. Seal w/ mastic or UL Listed alum tape.	A
Duct Boots and Registers	1	2nd Fl. Ceiling	Caulk or foam seal betw/ boot & floor/ceiling/wall. Access by removing grill or from attic floor.	A
Vent Connection at Chimney/Chase	N	Good seal in bsmt.	Air seal w/ fire rated sealant, eg, refractory cement or caulk	
Fireplace Damper	1	Living Room	Damper is not well seated. Fabricate temporary blocking w/ foam board or repair damper.	A
Windows/Doors/Skylights				
Window	1	SW Bedroom - casements w/ inter wood storms that leak!	Repair wood storms so they fit tightly in opening. Plane down wood; add plastic V-strip	A
Parting Rail (Lock Stile)	1	Powder Rm, Dining, Living, W. kitchen, others that are loose	V-strip betw/ parting (locking) rails; also repair all latches that do not work or do not tighten sashes.	A
Pulley Seal	1	Throughout 1st and 2nd floors.	"Pulley seal" fits over pulley opening; allows proper function.	A
"Chain Run"--lower sash	1	Throughout 1st and 2nd floors.	Add backer rod to gap in winter and where never open window	A
Sliding Glass Doors	1,2	S. Porch (1) at vertical parting rail; (2) at bottom track & floor junction	Caulk junction at floor and bottom track. Be creative at parting rails.	A
Door(s)	1	Entry at threshold; French Doors at S porch & at entry	V-strip at top and sides and add door sweep (& missing handle)	A
Direct Penetrations to Outdoors				
Kitchen Fan		Need to add fan here.	Caulk at interior or exterior, as appropriate. Evaluate damper.	
Mail Slot	1	Entry Door	Explore magnetic closures or replace with new, insulated door.	B
Air-Conditioning Entrance	1	Basement at plywood window	Spray foam sealant at interior. Caulk at exterior to weatherproof.	A

AIR LEAKAGE MEASUREMENT				
Client: K C Poulos				
Date:	12/11/2009			
Outside Temp.	15 degrees F			
Indoor Temp.	65 degrees F			
Wind Speed	0 - 5			
House P (Pa)	Fan P (Pa)	Ring O or ABC	Flow (CFM)	
@50	O	O	4400	
23.8	O	O	2607	
33.7	O	O	3290	
Note				
House Volume Calculations:				
Floor	Sq. Ft.	Height	Cu. Ft.	
Bsmt	705	7.4	5217	
1st	768	8.4	6451	
2nd	893	8.5	7590	
3rd				
Other				
Other				
Total Volume: 19,258				
Air Tightness				
Severity of Air Leakage Through the Thermal Boundary				
ACH50 or Air Changes per Hour at 50 Pascals fan pressure				
ACH50: 13.70				
ACH50 Rating: Ratings reflect the condition of your house compared to what is typically seen.				
Excellent 0-2 Good 2-4 Avg 4-8 Poor >8 Your ACH50 rating: Poor				
ACH Natural (ACH _n), or natural air changes per hour is the average house air leakage rate, useful for estimating heating cost due to leakage. ACH _n is calculated as an adjustment to the ACH50 rate, taking account for local climate, height of the house, and wind shielding provided by the surroundings.				
ACH natural: 0.93				
Effective Leakage Area (sq. in.): 575 or 24" x 24"				
A common misconception is that house leakage is the same as ventilation. A leaky house is not a means of providing ventilation, except on windy days. We recommend direct fan-forced ventilation for every house so that occupants may ventilate when they need to and not depend on the wind. In tight houses, mechanical ventilation is essential even on a windy day.				
Insulation Conditions and Recommendations				
Surface to be Insulated	Location	Area (sq. ft.)	Current R-Value	Recommended R-Value
Pitched Roof, Rafters/Ceiling	Main Attic	48	1.0	13.0
Attic Floor, Below Flooring	Main Attic	48	0	13.0
Walls, Basins, No Windows	Basement	48	1.0	13.0
Wall, Frame w/ Sheetrock	1st and 2nd Floors	18	0	13.0
Floor above Unheated	2nd Fl Below SW	30	0	13.0
Floor above Unheated	Basement porch	30	0	13.0
Floor above Unheated	W. porch/entrance	25	0	13.0
Floor Cavity Penetrator	Basement	18	0	13.0
Floor Cavity Penetrator	Basement	18	0	13.0
Basement Wall	Unfinished Basement	11	0	13.0
Basement Wall	South & West Ceilings	11	0	13.0

1. DID YOU FOLLOW ANY OF THE SUGGESTIONS ON YOUR ENERGY AUDIT RESULTS GIVEN BY EZING? IF SO, WHICH ONES AND WHY?
WE HAVE NOT YET, BUT WE WILL WORK ON FOLLOWING THEM SOON. WE HAD THE AUDIT DONE IN JANUARY.
2. DO YOU FEEL LIKE THE MONEY YOU SPENT ON THE ENERGY AUDIT WAS WORTH IT?
YES. I WOULD DEFINITELY RECOMMEND FAMILIES TO HAVE ENERGY AUDITS DONE SINCE KNOWLEDGE OF HOW THEIR HOUSE (ENERGY-CONSUMPTION-WISE) IS IMPORTANT FOR MINIMIZING COSTS. IT IS GREAT TO HAVE THE INFORMATION ACCESSIBLE.
3. WHY DID YOU DECIDE TO GET AN ENERGY AUDIT? WERE THERE ANY NEGATIVES?
MOSTLY ECONOMICAL REASONS. EVERYONE LIKES SAVING MONEY WHENEVER POSSIBLE. THIS WAS A GOOD WAY TO SOLVE SHORT-TERM AND LONG-TERM ISSUES WITH THE HOME. THE ONLY BAD THING THAT HAS COME OF THE AUDIT IS THAT IT HAS MADE ME SAD TO KNOW HOW POOR IN CONDITION MY HOME IS.
4. HOW LONG DID YOUR ENERGY AUDIT TAKE? (HOURS/DAYS?)
IT WAS VERY SHORT, ONLY FOUR HOURS!
5. HAS THE EXPERIENCE OF THE ENERGY AUDIT CHANGED THE WAY YOU THINK AND ACT? YOUR FAMILY?
YES, ABSOLUTELY! WE ARE A LOT MORE AWARE OF THE ENERGY WE USE & THE WAY THAT OUR HOME FUNCTIONS THROUGHOUT THE DAY.