Home Energy Experts

Presents…

…..your guide to Saving Energy

"Saving You Energy. It's What We Do Best!"

Almost Half The Energy You Use Goes To Your Home Comfort System.

Your Home Comfort System is More Than A Box

It's important to understand that a furnace and air conditioner is much more than a box that attempts to make you comfortable in your home while devouring your hard earned money. While manufacturers have made unbelievable strides in creating more efficient and reliable equipment, they have failed to educate contractors that advanced training and special instruments is a must to deliver the designed energy efficiency from today's high efficiency equipment.

There Are 9 Components That Make Up A Home Comfort System.

They Are…

1. **Correct Room by Room Sized Furnace**
2. **Correct Room by Room Sized Air Conditioner**
3. **Correct Room by Room Ductwork Design**
4. **Correct Ductwork Installation**
5. **Adequate Amount Of Ductwork Insulation**
6. **The Right Sized Grills & Registers**
7. **Air Filters That Don't Restrict Air Flow**
8. **Proper Combustion Balance**
9. **Proper Refrigerant Balance**

If you pay to watch and listen to the New York Philharmonic orchestra at Avery Fisher Hall and one of the musicians (components) is completely out of sync, would you agree that you wouldn't be getting your moneys' worth?

With your home comfort system, when any of the 9 components is not working in perfect harmony with the others, you are *not* getting your moneys' worth from your Home Comfort System.

Furnace and Air Conditioning Equipment
"Bigger Is Not Better"

Many furnaces and air conditioners are installed without first determining the proper equipment size that is needed ***For Your Home***.

To size a furnace or air conditioner, many contractors in our area use the "rule – of - thumb", to determine what size of equipment they should install. This type of sizing is nothing more than 40 BTU's for every square foot of living in a home. But when researchers visited these homes, they found equipment was as much as 50% bigger than needed!

If you care about comfort and saving energy, your equipment must be properly sized using the industry standard Manual J or equivalent to meet room-by-room heating and cooling demands.

Because of solar gain, the size of windows in each room and their location (North, East, South or, West) is very important in addition to whether your home is a one, two, or three story, built out of wood, brick, or block and the amount of insulation in the walls, attic, and crawl space. The data gathered from this important information is used when selecting the proper sized furnace and air conditioner needed for your home?

Consumer Reports stated: "***Beware of being sold over-sized equipment. Over-sized equipment will cycle on and off more frequently, causing noticeable temperature swings, higher energy costs and putting more wear on the equipment.***"

According To The EPA: "***EPA believes that contractors who have participated in advanced training on installation practices will be able to install better performing systems that save energy and produce less air pollution than many who do not.***"

Food for thought…

The auto industry advertises miles per gallon (MPG) in two ways, city and highway. City means stop and go (high fuel use), highway very little stop and go (lower fuel use). It's no different with high efficiency equipment, stop and go (short cycles) equals high energy use. Without stop and go (longer cycles) equals lower energy use. Manufacturers have designed their equipment to deliver lower energy use because of longer cycles.

Correct Ductwork Design Is A Must To Satisfy The Air Flow Needs Of Both The Furnace And Air Conditioner

In order to achieve the designed efficiency for today's modern equipment, all Manufacturers require their heating equipment move a given amount of air (CFM) through a furnace and into the ductwork. This given amount is based upon the rated efficiency and rated BTU's of their heating equipment.

For example….

The supply side of ductwork: A Mid-Efficiency (sheet metal flue) furnace needs to move 150 CFM per 10,000 BTU through the furnace… (100,000 BTU furnace x 150 CFM = 1,500 CFM) and into the ductwork.

The supply side of ductwork: A High Efficiency (PVC flue) furnace needs to move 180 CFM per 10,000 BTU through the furnace (100,000 BTU furnace x 180 CFM = 1,800 CFM) and into the ductwork.

The ductwork for a 4-ton air conditioner must be designed to carry a minimum of 350 CFM per ton (4-ton x 350 CFM = 1,400 CFM).

This holds true for the return air side of the ductwork. For a 4-ton air conditioner, there must be 1,400 CFM going to the furnace.

NOTE: Because of our high altitude, ductwork should be designed to carry 400+ CFM per ton (1,600 CFM).

Example: Ductwork for a home with a high efficiency 100,000 BTU Furnace and a 4-Ton A/C needs to carry 1,800 CFM.

Minimum number of supply runs in a home with a 100,000 BTU furnace.

3 – 10" ducts at 250 CFM each = 750 CFM
7 – 8" ducts at 130 CFM each = 910 CFM
2 – 6" ducts at 75 CFM each = 150 CFM

Total CFM = 1,810 CFM

Note: The return air ductwork must be designed to move 1,810 CFM to the furnace.

Correct Ductwork Design Must Not Over Look
"The Granddaddy Of Them All" Static Pressure

"If We Don't Test. You Don't Know"

Every time you visit your doctor, either your doctor or someone qualified in his office automatically tests your blood pressure for your physical condition. If your test shows you have 120 over 80, you have normal blood pressure. But if your test shows you have higher than normal, your doctor would recommend a blood test to help him pinpoint the problem or problems so he can help you lower it.

All manufacturers have attached their "Engineering Data Plate" to the inside of a furnace and under "Air Specifications" they have listed .05 (TESP) on your furnace as maximum static pressure.

Like your doctor, we test your ductwork for its overall condition; our test is called Total External Static Pressure (TESP). When our test shows your ductwork is over the manufacturers' maximum static pressure, we recommend further testing to pinpoint the problem or problems so we can lower it.

It's not uncommon for ductwork with high static pressure to turn a high efficiency furnace and air conditioner into the efficiency of a 30 year old piece of equipment. That's why it's important for us to test your ductwork for static pressure.
The Department Of Energy states: *"Duct repairs could be the most important energy improvement measure you can do in a home."*

Food for thought….

You're a rated world class marathon competitor and you've entered the Boston Marathon. At the starting line an official walks up and hands you a straw and tells you that in order to compete in the race, you must use the straw to breathe in and out.

Like a world class marathon runner breathing in and out of a straw while competing, your Home Comfort System cannot compete with improperly sized ductwork. You're guaranteed to lose the energy efficiency you bought and paid for!

Proper Ductwork Installations

Flex duct is an amazing product because in comparison to metal duct, it's cheaper; easier; and faster to install and without the use of skilled labor.

The unskilled labor force and the companies they work for is the reason why furnaces and air conditioners are only delivering 43% of their designed rated BTU capacity.

Here's what they **have not** been trained to do:

1. Pull the flex duct tight between connections (no sagging and no ripples in the outer plastic layer known as the vapor barrier).

2. "Tight is Right". Seal all joints and connections with approved mastic, attach a draw band and fasten with a minimum of three screws. Flex duct 12 inches and bigger requires a minimum of 5 screws.

3. Flex duct out of plenums, distribution junctions and boots need to be at least 12 inches long before making a bend in the flex duct.

4. Support flex duct horizontally at intervals of not more than 5 feet.

5. Avoid bending flex duct across or around framing members, pipes and other objects. Such bends will decrease the size of the duct at its bend point.

The energy savings from properly installed ductwork is enormous. Sad but true; for most companies the "Do it right" is not in their "tool box".

Installing Flex Duct the "Right Way" is simple. So why is it done wrong so often? The answer is… **Lack of TRAINING!**

Adequate Amount Of Ductwork Insulation

Properly insulating ductwork located in unconditioned spaces such as attics, crawl spaces, garages, or unfinished basements can help improve your home's efficiency, reducing your energy costs.

Ductwork insulation is important because it ensures that the air traveling through the ductwork will stay at the desired temperature, and that the air won't be absorbed from solar gain and thermal loss within those spaces.

If the ductwork is losing conditioned air, your Home Comfort System will have to work even harder. This causes high energy bills because of wasted energy, and this is not good for your wallet.

Without proper ductwork insulation, it's estimated that you could be losing 10-30% of the energy used to heat or cool your home.

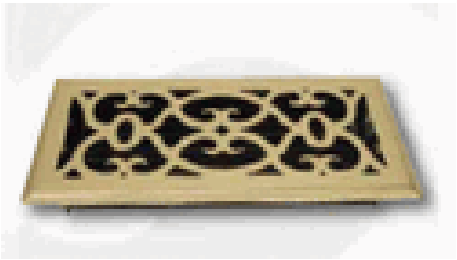
Ductwork located in the crawl space:
Unlike the attic, solar gain and thermal loss in the crawl space is dictated by the fresh air vents as well as the un-insulated hot water loop system. We use R-6 to R-11 that follows the guidelines from ASHRAE, "Impacts of Residential Duct Insulation on Energy Use and Life Cycle Cost to Consumers," *Transactions (#AT-96-13-4)*

Cost Savings from Duct Insulation:
Utilizing R-6 to R-11, a Home Comfort System will be allowed to perform using less energy required to maintain a comfortable temperature inside your home. With the system running efficiently, the major components of the system will have a longer operating life and the overall maintenance costs will also be reduced.

The Right Size Grills & Registers

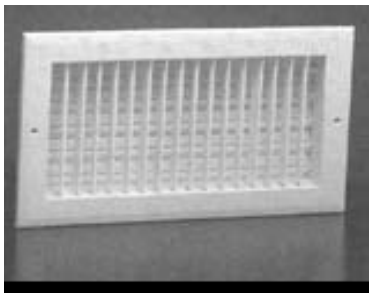
You can have a world class designed, installed and insulated ductwork system, but if your furnace can't breathe in and out with its required airflow because of registers and grill restrictions… you are wasting energy!

Example of floor registers **we won't use** because of air restrictions


Example of return air grills **we won't use** because of air restrictions


Examples of high volume airflow grill and floor registers **<u>we do use</u>** because they don't restrict the air from the ductwork

Air Filters…What's Best For Your Home Comfort System

The air filters that are used in your Home Comfort System are becoming more and more efficient every year. Marketing brochures from filter manufacturers' do a great job raising our awareness of all the horrible unseen airborne enemies that threaten your peace and tranquility at home.

What they don't tell you is that the fan in today's typical modern day furnace is designed to deliver the rated BTU's capacity with a standard store bought blue filter. Equipment manufacturers' do not design their equipment to run with a "Big Box Store" high efficiency pleated filter.

When homeowners install this type of filter it can easily turn your high efficiency furnace and air conditioner into the efficiency of a 30 year old piece of equipment.

There are high efficiency filter systems available today that can greatly improve the air you breathe inside your home and without restricting airflow.

One fine example is the Whole House HEPA True Air Cleaner. This motor driven self-contained system attaches to the outside of your ductwork and cleans air in your home 24/7/365 for just pennies a day.

Home Energy Experts recommends 6 annual replacements with standard blue filters and a thorough cleaning of your Home Comfort System twice a year if you have air conditioning.
If you're trying to control the dust in your home and filters aren't doing the job, it's best to look at your ductwork for leakage.

Proper Combustion Is Important For Energy Savings

Many contractors install a furnace like it's a TV, where they take it out of a box, plug it in and turn it on, but the similarity stops there. Tests show that without a proper combustion balance, the design rated heat (BTU's) delivery of a high efficiency furnace drops as much as 30%!

It takes an investment in a Computerized Combustion Analyzer as well as training in both field and classroom settings in order to complete a proper combustion balance.

A combustion analyzer measures the flue gases in the flue as they leave the furnace burner and they tell the story of how efficient or in many cases, inefficient a furnace is operating. Correct setting and fine tuning today's high efficiency furnace requires a seasoned technician that knows how to evaluate these measurements.

The analyzer tells the technician what field adjustments he needs to make on the furnace burner so that it will deliver its designed rated heat (BTU's) to the ductwork. At the same time, he ensures that the poison gas (Carbon monoxide) is properly venting up through the flue and not entering your home.

There's an old saying in the HVAC industry, ***"The most important day in the life of your furnace and air conditioner is the day it's installed."***

Consumer Protection Division states: ***"Most homeowners are simply not getting the efficiency from high efficiency Furnaces!"***

Proper Refrigerant Charging Is More Than You Realize

Unlike a furnace, it takes 5 special instruments to properly charge an air conditioner… They are: A Micron Gauge, Electronic Scale, vacuum pump, manifold gauges, and electronic thermometers.

Without these special instruments it's not uncommon to use the "Guess and by Golly" method. This poor method is nothing more than charging an air conditioner with refrigerant until one of the copper lines running to the outside unit feels cold!

This means an air conditioner with a mere 15% under-charge can result in a 25% decrease in its energy efficiency. As the charge drops further, the energy efficiency decreases faster - to 50% or more.

Can you imagine paying for a high efficiency air conditioner and only receiving the efficiency of a 30 year old air conditioner?

Similar losses of efficiency result from over-charging the compressor as well, including premature failure of the compressor!

A study by a utility company (Nevada Power) found that 79% of newly installed air conditioners had either significantly too much or too little refrigerant. This problem causes excessive energy usages, reduces the amount of cooling it created, and often causes premature compressor failure.

It takes time, training and special instruments to correctly charge an air conditioner. Very few contractors know how to do it properly, and even if they do know how, many don't invest in the time or the instruments that are needed to do their work properly.