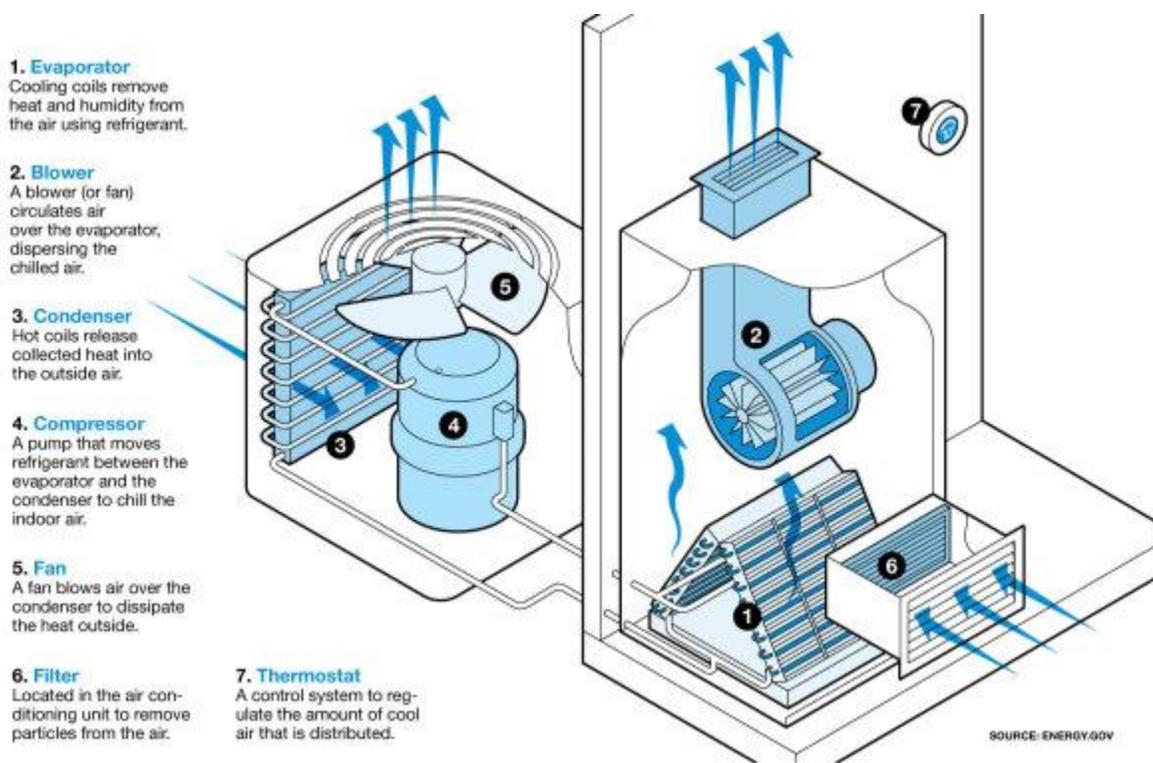


STRUBER

Learn some basics about heating and cooling.

A Basic Unit:



How it works:

Step 1: The thermostat will call for heating or cooling based on the settings (#7)

Step 2: Then, your return will draw in air from inside your home, so it can be either heated or cooled (#6).

Step 3: If you are cooling, the return air will pass across the coil (#1) to be cooled. If you are heating, the return air will pass across either a heating element or a heat exchanger to heat the air...this will depend on whether you have electric or gas heat.

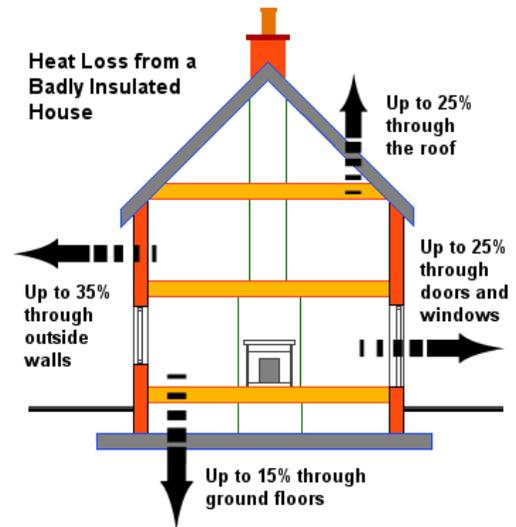
Step 4: Finally, the blower will redistribute the cooled or heated air back into your home (#2)

What factors effect my heating and cooling?

Heating and cooling can be effected by the various insulation factors in your home. This includes your...

- **Roof**
- **Attic**
- **Walls**
- **Windows**

These areas of your home can allow both hot and cold air to enter and escape, which ultimately effects your systems. Shading by trees and what direction your windows face also makes a difference.



What can you do to help?

Start by considering what type of insulation your home has in regard to your roof, attic, walls, and windows.

Roof – Proper insulation will help with heat gain in the summer and heat loss in the winter.

Attic – Proper ventilation and radiant barriers can manage the temperature of your attic which directly affects your heat gain and loss.

Walls – Like your attic, your walls also experience heat gain and loss and proper insulation will minimize its affect.

Windows – Energy efficient windows are an important area to consider upgrading if you currently do not have double-panes and Low-E features.

Note: If you are interested in upgrading these areas in your home, contact us at **512-528-5091** and we can provide you with a variety of options.

Do you need service?

Take a little time before you call for service and you could save money by fixing the problem yourself or minimizing the amount of time it takes to repair the issue.

1. Perform basic troubleshooting tactics (see below).
2. Know where all of the units in your heating and cooling system are located.
3. Make sure the system is accessible by the tech. If there is something blocking any of your systems, please move it out of the techs way for easier access.
4. If your system is in an attic or crawl space, please make it easily accessible.
5. Write down/take pictures of model numbers on all your equipment.
6. Message us with what symptoms or problems you noticed leading up to failure.
7. Know how long ago your problems began.
8. Lock pets in a separate room so they don't get in the way or get hurt.
9. Make sure there's an adult (18 or over) home to legally allow entry to your home.
10. If you rent your home, your landlord must contact our office to ensure permission and confirm method of payment.
11. If you see any part of the system is frozen, shut it off immediately. This will thaw it and make it ready for service when a technician arrives.
12. If possible, make available a file containing information on all prior services performed on your system. We recommend all our customers to keep a folder with all sales, service information, and receipts.

Troubleshooting:

There are a few areas to investigate before you contact us. These areas sometimes can be repaired by a homeowner without fear of injury.

1. **The Main Breaker Panel** – Check to see if a breaker tripped. Typically, the breaker will be labeled so you know what goes with what. If you can positively identify the breaker, exam and note its state. Does it appear completely normal or is it not fully in the on position? Some fuses will have a clear panel where an orange tab will become evident when the breaker is tripped. Is there a fuse with orange? In any of these instances, turn the breaker to the **OFF** position and then back to the **ON** position.



A typical Fuse Box



An Example of a tripped fuse

- 2. Return Filter/Air Restrictions** – A dirty air filter can cause the system to shut down due to air restrictions. If your filter is dirty, replace it. It is highly recommended that your air filter be replaced monthly to ensure your heating and cooling system is continuously working at its optimum performance.



Dirty filters can lead to your indoor coil and outdoor coils looking like this...



Evaporator Coil (Indoor coil) because of dirty filters. This can lead to major service issues and home damage.



Condenser coil (Outdoor coil) that is not maintained can cause part failure and inefficient operation.



Dirty Filters and restricted air flow can lead to freezing. This can lead to water damage in your home and failure of many components.

3. Evidence of water – Check to see if there is any evidence of water around your air handler (the inside unit, also known as the furnace with gas systems). Many homes and businesses will have water safety devices installed to protect from flooding and water damage. These devices are called float switches. If your heating and cooling system is producing more water than it can expel, it will back up into a drain pan and the PVC drain line. When the water backs up, the float switch will shut down your heating and cooling equipment to prevent water damage. If your drain pan has any evidence of moisture, that is not normal or there is any kind of moisture that can mean one of two reasons:

A. There's an air flow restructure causing your evaporator coil to freeze up which will produce a lot of water as it begins to melt.

B. The drain line (the PVC pipe coming off your air handler) is plugged. Over time, without proper maintenance, your heating and cooling system will produce a lot of dirt and grime that bleeds into your PVC drain line.



Improper drainage can cause your drain pan to rust and that can lead to future water damage.



Example of an inline float switch

Common Terms and Definitions:

A

AC (Alternating Current): A type of current where the polarity is perpetually reversing, causing the directional flow in a circuit to reverse at regular intervals.

ACCA: ACCA is a non-profit association whose membership includes more than 60,000 professionals and 4,000 businesses in the indoor environment and energy services community. Their website can be found at www.acca.org.

Acoustical: Relating to sound, the science of sound, or a sense of hearing.

AFUE: Annual Fuel Utilization Efficiency is a measurement used to rate furnace efficiencies by dividing the ratio of heat output by heat input.

AGA: American Gas Association, Inc.

AHRI: The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) is the trade association representing manufacturers of HVACR and water heating. Their website can be found at www.ahrinet.org.

Air Conditioner: A device that changes humidity levels, temperature or quality of air.

Airflow Volume: Measured in cubic feet per minute (cfm), this is the amount of air circulated in a space.

Air Handler: Indoor part of the air conditioning system including the circulating fan and evaporator (summer) / condenser (winter) coil.

ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers is a global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Their website can be found at www.ashrae.org.

B

BTU: A British Thermal Unit is a measurement of the amount of heat required to raise or lower the temperature of one pound of water one degree Fahrenheit.

BTU/h: British Thermal Units per hour

Burner: The device that facilitates the combustion of air and gas.

Burner Orifice: The opening in the burner through which the gas or fuel passes prior to combustion.

C

Capacity: HVAC capacity is the output produced by the heating or cooling unit and is measured in BTUs per hour.

Celsius: A temperature scale that registers the freezing point of water as 0° and the boiling point as 100° under normal atmospheric pressure.

CFM (Cubic Feet per Minute): A measurement of airflow volume.

Charging a System: Adding coolant, or refrigerant, to an HVAC system.

Coil: The coil, or evaporator coil, is connected to the airflow outlet of the furnace. Conditioned refrigerant is circulated through the coil to cool the structure in the summer and heat in the winter. As warm indoor air passes through the indoor or evaporator coil, temperature and humidity are removed creating cooler indoor air. Installing a correctly sized and rated evaporator coil is essential for getting the highest performance and comfort from your central air conditioning or heat pump system.

Compressor: A pump that increases the pressure of refrigerant gas.

Condensate: As warm air is pulled or pushed across the cool evaporator coil the coil perspires, creating liquid, or condensate which is mechanically drained away from the equipment.

Condenser Coil: Generally the outdoor coil, it removes heat from the refrigerant in the summer months, allowing the refrigerant to be converted from vapor to liquid and complete the refrigeration process.

Condenser Fan: A fan that accelerates the movement of air over the condenser coil, facilitating the removal of heat from the refrigerant.

CSA: Canadian Standards Association

D

DC: Direct Current. A type of electrical current that only flows in one direction.

Damper: Found at the junction points of ductwork, these sheet metal plates can be opened or closed to control the flow of air into a zone.

Degree-Day: Calculated by subtracting the average outdoor temperature for an area from 65° Fahrenheit. This measurement is used to estimate the amount of heating or cooling a home or building will need.

Dehumidifier: A device that removes humidity, or moisture, from the air.

Diffuser: A grille over an air supply duct with vanes that distribute the discharging air in a specific pattern or direction.

DOE: Department of Energy. Their website can be found at www.energy.gov.

Downflow Furnace: A furnace with an intake on the top and an air discharge at the bottom.

Drain Pan: Also a condensate pan. As the refrigerant vapor is liquefied, the drain pan collects the condensate and funnels it to the drain line.

Dry Bulb Temperature: The temperature as measured without the consideration of humidity.

Duct work: A network of metal, fiberboard or flexible material flowing throughout a space which delivers air from an HVAC unit to the respective zones of a home or office.

E

EER: The Energy Efficiency Ratio of a particular cooling device is the ratio of output cooling energy (in BTU) to input electrical energy at a given operating point.

Energy Star®: ENERGY STAR is a U.S. Environmental Protection Agency (EPA) voluntary program that helps businesses and individuals save money and protect our climate through

superior energy efficiency. Energy Star's website is www.energystar.gov.

EPA: The United States Environmental Protection Agency is an agency of the US federal government which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress. Their website can be found at www.epa.gov.

Evaporator Coil: Also an indoor coil. A device that is designed to absorb heat in the air in order to change the liquid refrigerant that flows through it into a vapor initiating the cooling process.

Expansion Valve: A valve that meters the levels of refrigerant through a temperature or pressure control.

F

Fahrenheit: A temperature scale in which water freezes at 32 degrees and boils at 212 degrees at normal atmospheric pressure.

Fan: A device consisting of a motor and a blower wheel that creates air flow.

Filter: A central heating and cooling system may use multiple filters. The air filter is integral to the system intake ducting, prevents contaminants from entering the equipment and must be maintained or replaced at regular intervals. There is also a filter in the refrigeration system, also referred to as a drier, which acts like a strainer to remove dirt and undesired particles from the system.

Flue: A vent that removes the byproducts of combustion from a furnace.

Furnace: The major gas fired component in for heating a home. A device that facilitates the combustion of fuel and air to create heat and then circulates it through the home by means of a fan.

Fuse: A delicate metal strip connecting two parts of an electrical circuit. This strip works as a safety, or circuit protector, and breaks, or melts, in the event of excess electrical charge, breaking the electrical circuit.

G

GAMA: Gas Appliance Manufacturers Association

H

Heat Exchanger: A device through which heat is transferred to a cold or warm area or surface.

Heat Gain: The amount of heat added or created in a designated area.

Heating Coil: A coil that acts as a heat source for a heating system.

Heat Loss: The amount of heat lost or subtracted from a designated area.

Heat Pump: A device used for either the heating or cooling of a space by transferring heat between two reservoirs.

Heat Transfer: The flow of heat from one area to another by conduction, convection, and/or radiation. Heat flows naturally from a warmer to a cooler material or space.

HSPF The Heating Seasonal Performance Factor (HSPF) is a term specifically used to define the

measurement of efficiency of a residential heat pump system.

Humidifier: A device that adds humidity, or moisture, to the air.

Humidistat: The device that measures humidity and turns the humidifier on and off.

Humidity: Dampness in the air caused by water vapor.

I

Ignition: Elevating the temperature of a substance to the point of causing a combusive reaction.

Interconnection Agreement: A connection or link between power systems that enables them to draw on each other's reserve capacity in time of need.

K

Kilowatt (kW): 1,000 watts.

L

Latent Heat: Is energy released or absorbed, by a body or a thermodynamic system, during a constant-temperature process that creates a change of state. An example is the latent heat of evaporation which creates a phase transition from liquid to a vapor at a specified temperature and pressure.

M

Media: The fine material of a filter that traps dirt, dust, mildew or bacteria.

Manufacturer Approved System: If replacing a condensing unit, furnace or air handler, the system must be manufacturer approved and Air Conditioning, Heating and Refrigeration Institute (AHRI) matched. NOTE: Installation of unmatched systems is strongly discouraged.

N

NATE: North American Technician Excellence is the nation's largest non-profit certification organization for heating, ventilation, air conditioning and refrigeration technicians. NATE is the only technician certification organization governed, owned, operated, developed and supported by the HVACR industry. NATE's website can be found at www.natex.org.

NEC: National Energy Council / National Electric Code

NEMA: National Electrical Manufacturing Association

O

Orifice: An opening or hole.

P

Package Unit: A heating and cooling system contained in one outdoor unit.

Particulates: The fine liquid or solid particles contained in combustion gases. The quantity and size of particulates emitted by cars, power and industrial plants, wood stoves, etc are regulated by the U.S. Environmental Protection Agency.

Plenum: A pressurized housing containing a gas (typically air) at positive pressure (pressure higher than surroundings). One function of the plenum is to manage and equalize pressure for more even distribution.

Programmable Thermostat: A type of thermostat that allows the user to program into the devices' memory a pre-set schedule of times and temperatures enabling or disabling the HVAC equipment.

PSI: A pound per square inch is a unit of pressure resulting from the force of one pound-force applied to an area of one square inch.

PSIA: Pounds per square inch, absolute is used to clarify that the pressure is relative to a vacuum rather than the ambient atmospheric pressure. Since atmospheric pressure at sea level is around 14.7 psi, this will be added to any pressure reading made in air at sea level.

PSIG: Pounds per square inch gauge designates that the pressure is relative to atmospheric pressure.

Psychrometric: The analysis of atmospheric conditions, particularly moisture in the air.

PVC: Polyvinyl chloride; a type of plastic.

R

Radiant floor: A type of radiant heating system where the building floor contains channels or tubes through which hot fluids such as air or water are circulated.

Radiation: The transfer of heat through matter or space by means of electromagnetic waves.

Reciprocating Compressor: A type of compressor used in cooling systems to compress refrigerant by using a piston action.

Refrigerant: The compound (working fluid) used in air conditioners, heat pumps, and refrigerators to transfer heat into or out of an interior space. This fluid boils at a very low temperature enabling it to exude and absorb heat.

Refrigerant Charge: The amount of refrigerant in a system.

S

Scroll Compressor: Used in both lower and higher efficiency air conditioners, scroll compressors are popular because they feature fewer moving parts than reciprocating compressors. This translates to more efficient operation, higher tolerance to liquid refrigerant, less mechanical failure and smoother, quieter operation.

SEER The efficiency of air conditioners is often rated by the Seasonal Energy Efficiency Ratio which is defined by the Air Conditioning, Heating, and Refrigeration Institute as the cooling output during a typical cooling-season divided by the total electric energy input during the same period.

Self-contained System: A package unit.

Sensible Heat: Heat added or subtracted that causes a change in temperature.

Sensor: A device that reacts to a change in conditions.

Single-Speed: A single-speed motor runs at top speed until it satisfies your temperature setting and then shuts off. They're generally louder at start-up, consume more energy than alternative motor types and can cause more stress on mechanical parts.

Split System: An outdoor unit combined with an indoor unit (as opposed to a package unit), generally providing more efficiency and configuration options.

T

Thermostat: A wall mounted device that monitor and controls the output of an HVAC system.

Thermostatic Expansion Valve: A device that creates a constant evaporator temperature by regulation of refrigerant flow through the system.

Ton: One ton is 12,000 BTUs per hour.

Two-Speed: The base required for a high-efficiency air conditioner, two-speed motors cycle on in low gear and attempts to satisfy the cooling load for the home, shifting to high gear if necessary. Once it reaches the desired temperature, it cycles back down to low before shutting off. With just two speeds, it reduces start-up noise, operates with greater energy efficiency and causes less stress on mechanical parts compared to single-speed motors.

U

Upflow Furnace: A furnace that pulls in air from the bottom and releases it through the top.

V

Vacuum: A space where the pressure is significantly below that of standard atmospheric pressure.

Variable-Speed: Ideal for high-efficiency air conditioners, a variable-speed motor functions much like a two speed, only with several speeds of operation. When compared with single- or two-speed motors, it facilitates smoother cycling and more precise performance control, as well as the most quiet operation, highest energy efficiency and least stress on mechanical parts.

Ventilation: The process of moving air (changing) into and out of an interior space either by mechanically induced (forced) means.

Volt: Is the derived unit for electrical potential and electromotive force.

Voltage: The force pushing electrical current along wires and cables.

W

Watt: Is defined as joule per second and can be used to express the rate of energy transformation with respect to time.

Wet Bulb Thermometer: A thermometer that measures the relative humidity in the air.

Z

Zoning: A system that divides a home, office or space into different regions in order to better control the temperature and effectiveness of a heating and cooling system.