

by Stewart Unsdorfer

Some years in the Cleveland area, it seems we have two seasons: winter and summer. We sometimes go from frigid temperatures and very active use of our furnace or boiler system right into blazing heat and regular use of our air conditioners. While it seems this year that we may actually enjoy some spring weather, we all know that a break in the weather means summer is coming — and coming fast! Very soon, you and many other homeowners will seek relief from the heat that only comes from your central air conditioning system. You want your system to work its cooling magic not only the first time you need it, but every time you turn it on this summer.

### **11 Steps to Follow Before You Turn on the Air Conditioner This Summer**

It's a great idea to check your system now for any problems or needed maintenance. By checking your system now, you can do simple repairs or call for service from a professional before the weather gets warmer. Waiting and crossing your fingers when you go to turn on the system on our first hot day could cause days of discomfort while you wait for repairs. There are some simple steps you can take to visually and physically inspect the different parts of your system to be sure your air conditioning will work when you need it.

Let's get started...We will take a look at both your indoor and outdoor equipment. Before we do that, here are a few basic air conditioning terms you should know...

### **Top 5 Air Conditioning Terms to Get You Through the Season**

1. AIR CONDITIONING - Absolute control of temperature and humidity; removal of moisture by condensation.
2. COMPRESSOR - Component used to change low pressure refrigerant to high pressure refrigerant.
3. CONDENSER - Radiator-type component where refrigerator gives off heat by being changed from a gas to a liquid.
4. EVAPORATOR - Component where liquid refrigerant is changed to a gas as it absorbs heat from inside air.
5. FILTER - A device used with the drier or as a separate unit to remove foreign substances from the refrigerant; installed in series in liquid line on high side of system.

Hometips, one of the internet's top home-improvement sites; which features content surrounding home improvement, remodeling, repair, redecorating, and do-it-yourself projects, displays the two main components a central A/C unit is comprised of:

1. condenser unit (located outdoors)
2. evaporator unit (mounted on the air handler or furnace) Together they "extract heat from room air through refrigeration technology."

Here's how they show it:

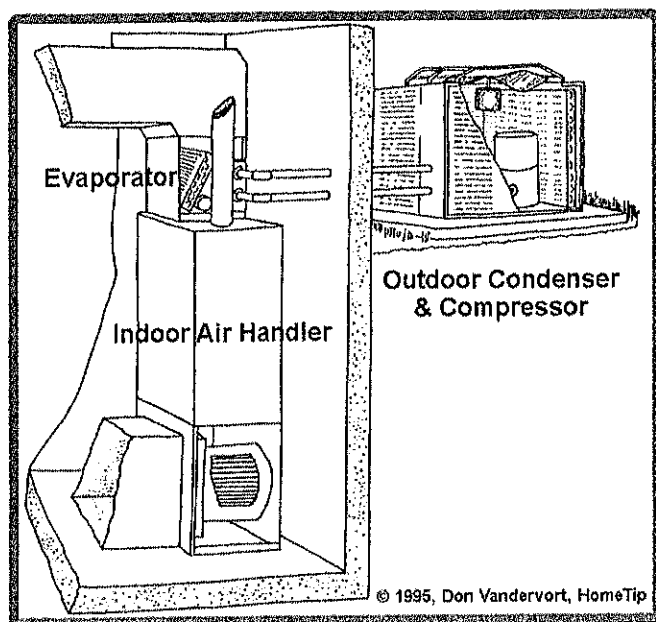


photo credit: HomeTips.com

(air handler commonly known as furnace)

Now on to the 11 things to do before you turn on the A/C for the summer. First let's look at the indoor equipment...

### **Indoor Equipment Vital to Your Overall Well Being**

Begin with your thermostat in the "off" position with the temperature turned to a high setting (around 80 degrees), then check the following:

1. Look at thermostat. Is it outdated? You could save money and energy by installing a newer, programmable thermostat.

2. Check any exposed ductwork for wear, which could be a source of cooling loss or inefficiency in the home.
3. Look at air vents around the home. Remove any items that could block airflow, such as drapes, furniture or toys.
4. Check the drain line. There is a drain by the indoor cooling coil, typically mounted above the furnace in the basement. If you flush one cup of chlorine bleach down your air conditioning drain and rinse it with a gallon of water, you can keep your drain clear through the summer. Air conditioner drain lines become clogged when there is a buildup of dirt collected by the indoor coil.
5. Change your air filter. The filter should be changed every three months (or as recommended by the manufacturer) and definitely before the start of a new cooling or heating season.
6. Check circuits to be sure electrical connections are on.
7. Be sure the power is turned "on" at the furnace/air conditioning unit.

Next, you can check the outdoor equipment for overgrowth and wear.

#### **Outdoor Equipment Your System Won't Run Without**

8. Inspect the outdoor condenser unit. Make sure there is no blockage in or near the equipment and clean the area around the unit. Leaves, vines or debris can block the interior components and affect performance.

Also you want to check for any missing panels. The panels are designed to enclose the electrical connections.

9. Visually check the refrigerant lines. The lines should be insulated. Proper insulation will improve the efficiency of the system. Repairs to the insulation or refrigerant lines should be done by a professional.

10. Check to make sure there is no wear on the outdoor electrical wiring. If you see damage or wear, call a professional for service before using your system.

11. Know when it's time your air conditioner may have reached retirement age. Air conditioners have a life span. Even if your unit has been properly maintained, it will eventually wear out.

But the grass is greener on the other side...

According to Energy.gov, even if an air conditioner is only 10 years old, you can "save 20% to 40% of your cooling energy costs by replacing it with a newer, more efficient model."

#### **Time to Turn on Your A/C**

After you have checked your indoor and outdoor equipment as described above, you can turn on the system to test it.

Step 1: Lower the temperature on your thermostat to the desired level and turn the system "on" at the thermostat.

Step 2: Go outside and listen to make sure that the fan in the condenser is running and that it doesn't sound irregular. The air coming out of the top of the unit should feel warm, as warm air is being removed from your home by the system.

Step 3: Let the system run for 10 - 15 minutes or more, until you can feel the indoor temperature cooling off in all parts of the home.

### **Troubleshooting and Energy Tips**

In general, you should hire a good service technician at least once per year for regular maintenance to keep your system running efficiently in each season. If you ran into any problems or concerns during your air conditioning inspection, you should call a professional for service in advance of the summer season when you'll want your system to be ready to cool your home.

To help keep your energy bills under control during the summer, you can lower costs by simply increasing the temperature on your thermostat by a few degrees. Here's a related blog post that can help you with additional tips on saving money and energy by using recommended temperature settings.

### **Conclusion**

The last thing you want on a hot, sticky, humid summer day is to flip that switch to "on" and nothing happens. When your air conditioner sits idle for at least half the year, maintenance or a tune up is a necessity. Now is the time to get your A/C system up and running efficiently.



## Definition of Terms - Air Conditioning

[https://www.swtc.edu/Ag\\_Power/air\\_conditioning/terms.htm](https://www.swtc.edu/Ag_Power/air_conditioning/terms.htm)

### A

**ABSOLUTE ZERO** - Complete absence of heat; believed to be  $-459.67^{\circ}(-273.15^{\circ}\text{C})$ .

**AIR CONDITIONING** - Absolute control of temperature and humidity; air conditioning in true sense used only in some laboratories and manufacturing plants where temperature and humidity control are very critical. Ordinary usage in homes, buildings, and vehicles means control of temperature and removal of moisture by condensation; more correct designation is refrigeration.

**AMBIENT TEMPERATURE** - Temperature of surrounding air. In air conditioning, it refers to outside air temperature

**ATMOSPHERIC PRESSURE** - Weight of air and liquid at various altitudes.

### B

**BOILING POINT** - Temperature at which a liquid changes to a vapor.

**BTU** - Abbreviation for British Thermal Unit. Amount of heat required to raise temperature of one pound of water  $1^{\circ}\text{F}$ . All substances are rated in relation to water as standard of measurement.

### C

**CELSIUS** - Thermometer scale based on  $0^{\circ}\text{C}$  as freezing point of water and  $100^{\circ}\text{C}$  as the boiling point.

**CHARGE** - Specific amount of refrigerant by weight or volume.

**COMPRESSION** - Reduction in volume and increase of pressure of a gas or vapor.

**COMPRESSOR** - Component used to change low pressure refrigerant to high pressure refrigerant.

**COMPRESSOR CLUTCH** - An electromagnetic coupling that engages or disengages the belt-driven compressor pulley to the compressor shaft.

**COMPRESSOR DISPLACEMENT** - Figure obtained by multiplying displacement of compressor cylinder or cylinders by a given rpm, usually average engine speed.

**COMPRESSOR SHAFT SEAL** - A seal surrounding the compressor shaft that permits the shaft to turn without loss of refrigerant or oil

**CONDENSATION** - Process of changing a gas to a liquid.

**CONDENSER** - Radiator-type component where refrigerator gives off heat by being changed from a gas to a liquid.

**CONDENSING PRESSURE** - Head pressure read from gauge at high side service valve; pressure from discharge side of compressor into condenser.

**CONDENSING TEMPERATURE** - Temperature at which compressed gas in condenser changes from gas to a liquid. Affected directly by quantity and temperature of ram air passing through condenser.

**CONDUCTION OF HEAT** - Ability of substance to conduct heat (metal and glass conduct heat more readily than insulating material such as spun glass).

## **D**

**DENSITY** - Weight or mass of a gas liquid or solid.

**DESICCANT** - A drying agent used inside air conditioning systems to absorb and hold moisture. Silica-Gel and Molecular-Sieve are most widely used.

**DISCHARGE LINE** - Line connecting compress outlet to the condenser inlet.

**DRIER** - A device containing a desiccant placed in series, usually in the liquid line, to absorb and hold excess moisture. Usually called receiver-drier.

## **E**

**EVACUATE** - To create a vacuum to remove air and moisture in the system.

**EVAPORATION** - Process of changing a liquid to a gas.

**EVAPORATOR** - Component where liquid refrigerant is changed to a gas as it absorbs heat from inside air.

**EXPANSION** - Reduced pressure on liquid refrigerant lowers boiling point and refrigerant changes to a gas and absorbs heat.

**EXPANSION VALVE** - Device which restricts flow of high pressure refrigerant thus lowering refrigerant pressure.

## **F**

**FAHRENHEIT** - Thermometer scale based on 32°F as freezing point of water and 212°F as the boiling point of water.

**FILTER** - A device used with the drier or as a separate unit to remove foreign substances from the refrigerant; installed in series in liquid line on high side of system.

**FLOODED EVAPORATOR COIL** - Too much liquid refrigerant in evaporator coil resulting in poor cooling.

## **G**

**GAS** - A vapor having no particles or droplets of liquid.

**GAUGE SET** - A set of gauges attached to the compressor service valves for testing or measuring pressure or vacuum.

## **H**

HEAD PRESSURE - Pressure of refrigerant from discharge reed valve through lines and condenser to expansion valve orifice.

Hg. - Chemical symbol for mercury. Inches of mercury is a measure of pressure or vacuum.

HIGH SIDE - Same as head pressure; side of system which includes vapor into condenser and liquid to expansion valve. (Also see Low Side.)

HOT GAS BYPASS LINE - Line connecting compressor outlet to evaporator inlet.

HYDROLIZING ACTION - Corrosive action within the air conditioning system induced by a weak solution of hydrochloric acid formed by excessive moisture in the system reacting chemically with the Refrigerant-12.

## J

JOULE - In air conditioning it is the metric unit of energy or heat (1J = 1055 Btu).

## K

kPa - Symbol for kilopascal which is the metric measure of pressure (1 psi = 6.895 kPa).

## L

LATENT HEAT - Amount of heat energy required to change a substance from one state of matter to another without changing its temperature.

LATENT HEAT OF CONDENSATION - Quantity of heat energy given off while changing a substance from a vapor to a liquid.

LATENT HEAT OF FREEZING - Heat given off as a liquid and changed to a solid.

LATENT HEAT OF LIQUIDATION - Heat that must be added to change a solid to a liquid.

LATENT HEAT OF VAPORIZATION - Quantity of heat energy required to change a liquid into a vapor without raising temperature of vapor above that of original liquid.

LIQUID LINE - Pipe or hose connecting condenser to expansion valve.

LOW SIDE - That portion of system from orifice in expansion valve through evaporator line or lines through compressor service valve to compressor reed valve. Also called suction side.

## M

MODULATOR VALVE - Device which limits and maintains minimum pressure in the evaporator.

## P

PRESSURE - Force upon a body, as force upon a liquid, increases the liquid's boiling point.

PRESSURE DROP - Difference in pressure between any two points caused by friction, restriction, etc.

PSI - Abbreviation for pounds per square inch above atmospheric pressure. "G" added designates gauge pressure.

## **R**

**RADIATION** - Heat flow through space, traveling and acting much like light rays.

**RAM AIR** - Air that is forced around the condenser coils as the vehicle travels in a forward direction.

**RECEIVER-DRIER** - See "Drier."

**RECOVERY EQUIPMENT** - Usually a mechanical system that consists of an evaporator, oil separator, compressor, and a condenser which draws refrigerant out of a refrigeration system and stores it in a container.

**REFRIGERANT** - Liquid used in refrigeration system producing cold by removing heat.

## **S**

**SCHRADER VALVE** - Spring-loaded valve similar to the tire valve, located inside the gauge hose fitting on service valves and certain controls. Will hold refrigerant in the system but can be opened by installing a special adapter with the gauge hose.

**SENSIBLE HEAT** - Heat which causes a change in temperature of a substance but not a change in state.

**SIGHT GLASS** - Window in receiver-drier or in liquid line to observe refrigerant flow.

**SPECIFIC HEAT** - Quantity of heat required to change the temperature of some amount of a substance.

**STANDARD TON** - Amount of heat released while changing one ton of 33°F (1°C) water to 32°F (0°C) ice in a period of 24 hours. 288,000 Btu (304 MJ) per 24 hours or 12,000 Btu (12.7 MJ) per hour.

**STARVED EVAPORATOR COIL** - Not enough refrigerant supplied to the coil, resulting in poor operation and too-low heat exchange.

**SUBSTANCE** - Any form of matter that can be weighed or measured; may be solid, liquid, or gas.

**SUCTION LINE** - Line connecting evaporator outlet to compressor inlet.

**SUCTION SIDE** - Low side pressure (from expansion valve orifice to intake reed valve in compressor) .

**SUCTION THROTTLING** - Control used to regulate flow of refrigerant from the evaporator to condenser.

**SUPERHEAT** - Added heat intensity to a gas after complete evaporation of a liquid; controlled by increasing pressure in air conditioning systems.

## **T**

**TAIL PIPE** - Outlet pipe from evaporator coil.

**TOTAL HEAT LOAD** - Human heat load plus heat entering through floor, glass, roof, and sides of vehicle.

**TORQUE** - Rotating power required to properly tighten a bolt or nut expressed in pounds-foot or pounds-inch (newton-meters).

## **V**

VACUUM - Referred to as less than atmospheric pressure and expressed as inches of mercury in Hg or kilopascals kPa.

VISCOSITY - The measure of resistance of a fluid to flow.

**W**

WATT - In air conditioning, capacity is shown in Btu or Watts ( $1 \text{ Btu/hr} = 0.293 \text{ W/hr}$ ).

