

Intro to AC Systems Training Flyer

Air Conditioning: The process of controlling the humidity, ventilation, and temperature in a building or vehicle.

There are many ways air can be conditioned but generally when people refer to the “air-conditioner” or “AC” they are referring to the system that ***maintains a cool atmosphere in warm conditions***. The process used to achieve this is known as the ***refrigeration cycle***.



From this point on, the flyer will use the terms AC-System and Air Conditioner in reference to ***the system facilitating the refrigeration cycle*** since this is how most people will use the terms. This flyer will serve to give a basic explanation on how AC systems work. It is much more technical than this flyer but this should help give a basic understanding of the system.

The Refrigeration Cycle at a Glance:

Technically, the refrigeration cycle is the process in which heat is withdrawn from a cold body of air and expelled to a hot body of air. Basically, it is the processes that pulls heat from your home and expels it outside; effectively cooling the inside of your home.

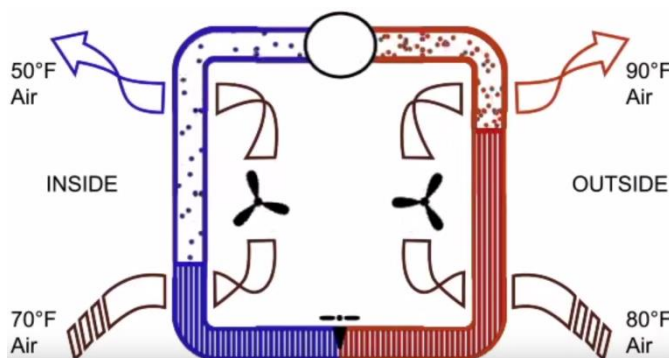
Inside an AC System there is a refrigerant which is a chemical compound that easily changes state from liquid to vapor and back. A common refrigerant name is Freon (R22 is Freon). When a refrigerant is in a lower pressure environment it evaporates and when in a higher pressure state it condenses into liquid. When a refrigerant evaporates into a gas it becomes cold. The refrigeration cycle is entirely based around this concept.



An AC System uses a closed loop of refrigerant in which the part of the loop is indoors and part of the loop is outdoors. The portion of the loop that is inside is kept at a lower pressure which allows the refrigerant to evaporate and become cold. Once it becomes cold it absorbs heat from the indoor air.

Inside The House:

- Lower Pressure
- Refrigerant Evaporates & Becomes Cold
- Indoor Air is ran over it
- Indoor air is cooled & Expelled back into the house.

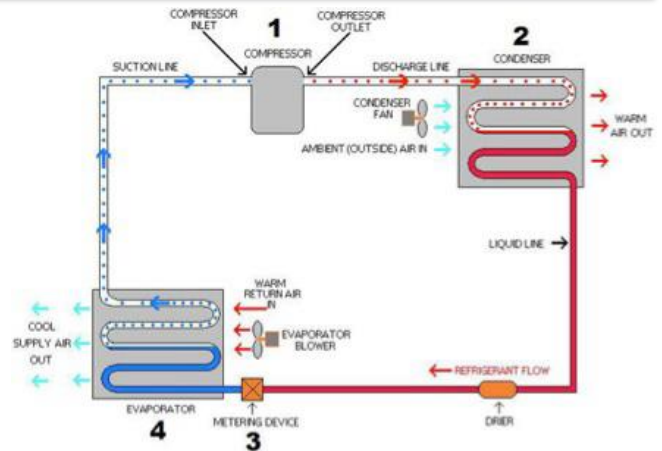


Outside The House:

- Refrigerant is pressurized
- Refrigerant Condenses to Liquid & Becomes Very Hot
- Exterior Air is ran over it
- Exterior air absorbs heat from refrigerant & is expelled back into the outdoors.

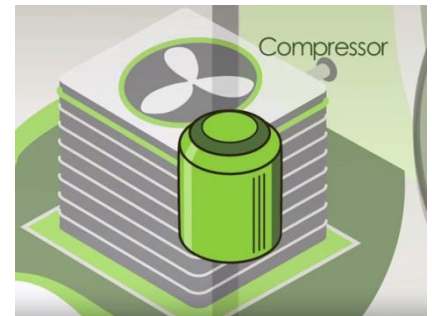
Main Components to the AC System:

In addition to refrigerant, an air conditioning system requires a minimum of four components in order to facilitate the refrigeration cycle; the compressor, condenser, metering device, and evaporator. To the right is a diagram and below is a step by step of the process.

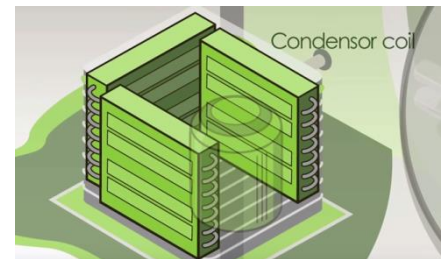


Compressor (Step 1): The compressor is the heart of the system. Just like your heart pumps blood through your body at a specific flow rate and pressure, the compressor pumps the refrigerant through the air conditioning system at a designed flow rate and pressure.

This sits outside. Low pressure, cold, refrigerant from inside is pulled into the compressor where it compresses the refrigerant. This causes the refrigerant to become very hot.



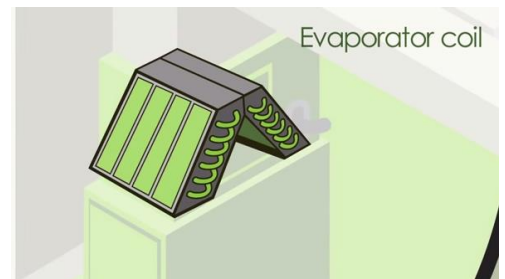
Condenser Coil (Step 2): At this point the high temp refrigerant leaves the compressor and enters into the condenser coil. As the refrigerant travels through the coil at a higher pressure, it becomes a liquid. This is called “changing state”. Then outdoor air is pulled over the coil and the heat is absorbed into the outdoor air.



*You may be somewhat familiar with a typical home system where the condensing unit sits outside. When operating, you can place your hand over this unit and feel the warm air being blown out. The heat being blown from the condensing unit is the heat that was initially in the home.

Thermal Expansion Valve TXV (Step 3): The expansion valve controls the flow of the liquid refrigerant to the next component which is the evaporator. This is a dividing point between the high pressure and low pressure sides of the system. As this high pressure liquid is passing through the metering device and into the evaporator the pressure drops. A piston can also be used to separate high and low pressure systems. These are commonly used in less efficient systems.

Evaporator Coil (Step 4): After passing the expansion valve the refrigerant immediately enters a coil called the evaporator. This coil or evaporator has a fan blowing across it. As the refrigerant enters the coil at a lower pressure it begins to bubble and boil and “change state” **back to a vapor**. During this process the refrigerant becomes very cold allowing it to absorb heat from the air indoors. The heat that was in the air is transferred into the refrigerant. This cools the indoor air.



Now that the heat from the indoor air has been absorbed into the vapor refrigerant it must be transported back to the compressor and pumped into the condenser coil for the heat to be removed.

Recap:

- Refrigerant enters into a low pressure area in the evaporator and evaporates and becomes cold. This allows it to absorb heat from the indoor air.
- It is then transferred to a compressor where it is compressed and the pressure increases. When this happens and the refrigerant is cooled by a fan blowing air over it the refrigerant turns to a liquid and releases heat absorbed from the indoor air.
- It is then pushed back through the high pressure side of the system where it comes into contact with the expansion valve. The expansion valve separates the high and low pressure side.

Next Steps and Couple Questions:

The first next step is to learn more. Below is a short video detailing the information above.

<https://www.youtube.com/watch?v=IFUIA1PZ8U>

TRUE or FALSE: Refrigerant in the condenser coil is absorbing heat from the outdoor air

TRUE or FALSE: Refrigerant becomes cold when it is in a high pressure state.

Notes:

*Heat Pump Systems work with the same concepts in mind only the process is in reverse during the heating cycle.

*If you read this please email Brandon Stone to be entered into a drawing for a Lee polo.

*In order to increase your chances of winning, don't tell people this note is on here.

*ERV's and Humidifiers also condition air and have training flyers available.