As we sell more and more Appliances it becomes increasingly important for all of us to learn more about how they work. One type of Appliance we sell a lot of are refrigerators. This flyer will serve as a follow up to the Intro and cover how a refrigerator works and some of the different variations.

If you have not read the Intro to Refrigerators or Undercounter Refrigeration Training flyers yet you are encouraged to.

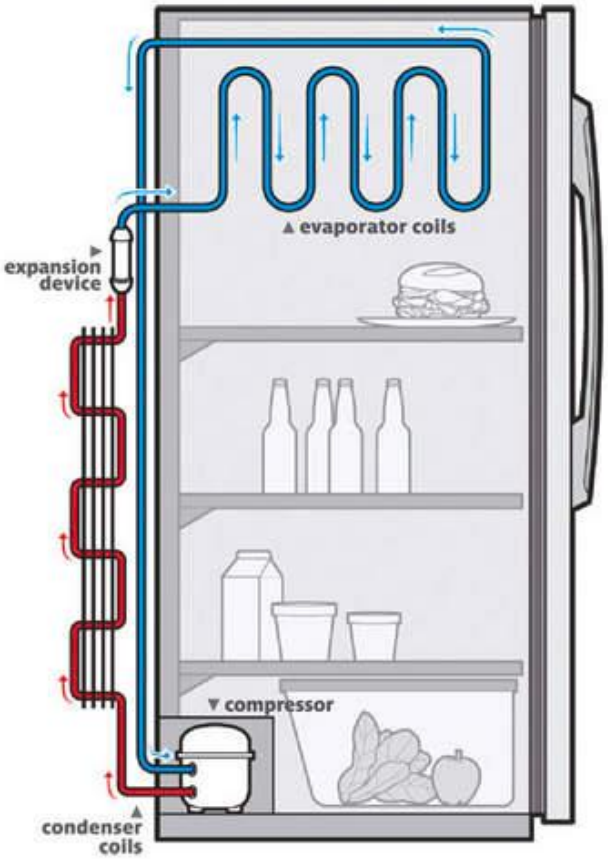
How does a Refrigerator Work?

Refrigerators cool the inside of the fridge by using a process called the refrigeration cycle. This is the same process covered in the Intro to AC Systems Training flyer.

Inside a refrigerator there is a closed loop of refrigerant which is a chemical compound that easily changes state from liquid to vapor and back. When a refrigerant is in a lower pressure environment it evaporates, and becomes cold and when in a higher-pressure state, it condenses into liquid and becomes hot.

The refrigerator keeps the low pressure (cold) side of the loop on the inside where it absorbs heat from the warming inside air. It is then transferred to the high pressure (hot) side of the loop on the outside of the fridge. This is where the heat absorbed from the inside is released outside the fridge.

The same four main components used in AC systems are used in this process. The compressor compresses the refrigerant and sends it in the hot side of the loop or the condenser coil. The expansion device controls the release of refrigerant back into the cold side of the loop or evaporator coil.



Typical Entry Level Refrigerator:

An average entry level refrigerator has a single compressor and a single evaporator. The evaporator (cooling section) is in the freezer section, with a circulation fan and a duct that blows a portion of the air into the refrigerator section to cool it. There are some opportunities for improvement created by this design.

- Because of the duct between the freezer and the refrigerator, air, and moisture can potentially be mixed between the two sections. This means that odors from the fridge can possibly be transferred to the freezer section. Moisture transfer can lead to freezer burnt food and ice or food spoiling quicker.

Typical Entry Level Refrigerator (cont.):

- Because there is only one cooling unit for two different temperature areas the temperature control is not as precise as other options.

What are some other options?

There are a variety of options outside the single compressor single evaporator style refrigerator that try and correct for the issues noted above. Below is quick overview of each.

- ***Single Compressor – Dual Evaporator:***
  - A single compressor / dual evaporator unit has a separate evaporator and circulation fan in each section (one in the freezer and one in the refrigerator), and a single compressor running both coils. A diverter valve controls whether only one, or both, are active at any given time by routing the refrigerant (Freon) accordingly.
  - Because each side is cooled separately there is no need for a duct between the two compartments. This eliminates the transfer of air or moisture between the freezer and the refrigerator. It is also a more efficient system because if only one side calls for cold air only that side is cooled.
  - Samsung, GE and other manufacturers have single compressor – dual evaporator models available.

- ***Dual Compressor – Dual Evaporator:***
  - A dual compressor / dual evaporator unit has a separate evaporator and circulation fan in each section ***and*** a dual compressor running one coil each.
  - This system also maintains two compartments separately and eliminates the transfer of air or moisture between the freezer and the refrigerator.
  - It is also a more efficient system than the typical fridge because if only one side calls for cold air only one side is cooled.
  - Because there are two compressors they are each used less frequently than the compressor in a single compressor refrigerator. This can lead to longer life of compressors themselves.
  - Most dual compressor – dual evaporator refrigerators will have variable speed motors. This means they can adjust the level of output they produce and operate at the lowest level of energy possible to meet the demand. This is a more efficient system than a non-variable speed compressor that is either On at 100% or Off. (Inverters are also covered in the Mini-Split Training Flyer.)
  - These are typically higher end refrigerators like Miele, Blue Star, and Subzero.

Next Steps:

The first next step is to learn more. Below is a link to a video of a GE Dual Evaporator Ad.

https://www.youtube.com/watch?v=8MPFbZYcOKU