**HVAC – Heating, Ventilating, and Air Conditioning** 

**HEAT PUMP** - A heat pump is a device that provides heat energy from a source of heat to a destination called a "heat sink". Heat pumps are designed to move [thermal energy](https://en.wikipedia.org/wiki/Thermal_energy) opposite to the direction of spontaneous heat flow by absorbing heat from a cold space and releasing it to a warmer one. A heat pump uses some amount of external power to accomplish the work of transferring energy from the heat source to the heat sink. In heating mode, heat pumps are three to four times more efficient in their use of electric power than simple electrical resistance heaters. Emergency heat is a resistance coil used when temperatures get too low for the heat pump to provide adequate heating. Resistance is more expensive, not needed often in Tucson.

**FORCED AIR –** Traditional **electric or gas** furnaces (coils or flames) with a blower that forces the air over the coils to pick up the heat and distribute it.

**AIR CONDITIONING** - While [air conditioners](https://en.wikipedia.org/wiki/Air_conditioner) and [freezers](https://en.wikipedia.org/wiki/Freezer) are familiar examples of heat pumps, the term "heat pump" is more general and applies to many [HVAC](https://en.wikipedia.org/wiki/HVAC) devices. When a heat pump is used for heating, it employs the same basic [refrigeration-type cycle](https://en.wikipedia.org/wiki/Heat_pump_and_refrigeration_cycle) used by an air conditioner or a refrigerator, but in the opposite direction - releasing heat into the conditioned space rather than the surrounding environment. In this use, heat pumps generally draw heat from the cooler external air or from the ground.

**COMPRESSOR & CONDENSOR UNIT** – The freestanding outside unit of the air conditioner. [If a Heat Pump, the unit also contains the heating part as one unit.] The evaporator coils are usually located inside the house just above the furnace. The compressor works better the closer it is to the coils/furnace. It cannot be located too far away outside or a lot of heat/cool is lost between the units.



**REFRIGERANTS** – The liquid (and gas) used by the AC system.

**Freon** - Until the 1990s, the [refrigerants](https://en.wikipedia.org/wiki/Refrigerant) were often [chlorofluorocarbons](https://en.wikipedia.org/wiki/Chlorofluorocarbon) such as **R-12** ([dichlorodifluoromethane](https://en.wikipedia.org/wiki/Dichlorodifluoromethane)), one in a class of several refrigerants using the brand name [Freon](https://en.wikipedia.org/wiki/Freon), a trademark of [DuPont](https://en.wikipedia.org/wiki/DuPont). Its manufacture was discontinued in 1995 because of the [damage](https://en.wikipedia.org/wiki/Ozone_depletion) that [CFCs](https://en.wikipedia.org/wiki/CFCs) cause to the [ozone layer](https://en.wikipedia.org/wiki/Ozone_layer) if released into the [atmosphere](https://en.wikipedia.org/wiki/Earth%27s_atmosphere).

Since 2001, In residential and commercial applications, the hydrochlorofluorocarbon (HCFC) **R-22** is still widely used. However, HFC [**R-410A**](https://en.wikipedia.org/wiki/R-410A) does not deplete the ozone layer and is being used more frequently now and has almost totally replaced R-22.

**EVAPORATIVE COOLER** - An **evaporative cooler** (also **swamp cooler**, **desert cooler** and **wet air cooler**) is a device that cools air through the [evaporation](https://en.wikipedia.org/wiki/Evaporation) of water. Evaporative cooling differs from typical [air conditioning](https://en.wikipedia.org/wiki/Air_conditioning) systems which use [vapor-compression](https://en.wikipedia.org/wiki/Vapor-compression_refrigeration) or absorption refrigeration cycles. Evaporative cooling works by employing water's large [enthalpy of vaporization](https://en.wikipedia.org/wiki/Enthalpy_of_vaporization). The temperature of dry air can be dropped significantly through the phase transition of liquid water to water vapor (evaporation), which can cool air using much less energy than [refrigeration](https://en.wikipedia.org/wiki/Refrigeration). In extremely dry climates, evaporative cooling of air has the added benefit of conditioning the air with more moisture for the comfort of building occupants. Very simple – pump, pad & water source. Most use a **“cookie sheet**” or similar plenum device to keep the moist cooler air out of the furnace compartment to prevent rust.

**SEER RATINGS** – Seasonal energy efficiency ratio. The SEER rating of a unit is the cooling output during a typical cooling-season divided by the total electric energy input during the same period. The higher the unit's SEER rating the more energy efficient it is.  In the Southwestern Region (AZ), the minimum SEER Rating for a new AC as of 2015 is 14 SEER. The highest made is 26 but 21 is extremely efficient and highest seen.