PHI Professional Home Inspection Co.
www.phiinspect.com

Our Mission Statement:
To Help People Make Informed Real Estate Decisions

Air Conditioning Efficiency, Operation & Maintenance

Efficiency History

Air conditioner cooling efficiency is measured by a "Seasonal Energy Efficiency Ratio" or "SEER". SEER is the amount of cooling delivered per watt of electricity. The higher the SEER number the greater the energy efficiency. The minimum SEER was raised from 8 to 10 in 1992, then to 13 in 2006. Improvements in efficiency can be attributed to additional expansion valves, increased coil surface areas, upgraded indoor air-handler motors, the addition of two-stage or duel compressors, improved fan-blade designs, variable speed furnace blower motors that are able to remove more humidity from the air, and larger or multiple-coil surfaces have all contributed to higher SEER ratings. A 13 SEER rating will generally provide adequate efficiencies in northern climates that do not require year round cooling. A home with zoned ductwork, compressor insulation, and a variable-speed furnace blower will also add to higher SEER numbers. 13 SEER will. To qualify for the "Energy Star" program, the system must have a 14-SEER rating.

Operation (Coils, Compressor, Valves & Freon)

The cooling process begins with mid temperature low pressure Freon gas passing through a compressor where it is physically compressed to a high pressure, high temperature gas. The Freon gas next passes through the outside coil (condenser coil) where it is cooled slightly turning into a liquid. This is important since Freon, besides transferring heat and humidity, also carries lubricant for the compressor. An inefficient dirty condenser coil will lead to high Freon temperatures, lower efficiency and added wear/tear on compressor part(s). High pressure high temperature liquid Freon next passes through an expansion valve lowering the temperature and pressure of the liquid Freon. The evaporator coil (A coil) is next converting the low temperature liquid Freon into a mid temperature gas. The temperature increase in the Freon is achieved by extracting the heat and humidity from the interior supply air as the air passes over the evaporator coil. The suction line (compressor sucking the Freon) exiting the evaporator coil is larger in diameter to accommodate the larger volume mid-temperature Freon. The gas returns to the compressor where the process repeats.

Maintenance / Options

System efficiency and durability is dependent on surface cleanliness:

- Dirty outside coils will increase heat and wear/tear on the compressor. Keep plants away from the compressor. If a dryer vent is close to the compressor (which draws air from the sides out the top), monitor the coils for lint.
- Dirty inside coils will impede airflow and may contribute to furnace heat exchanger overheating and cracking. Change furnace filter regularly.

Properly sized unit: An undersized unit is preferred to an oversized unit. Oversized units will/may:

- Be noisier & less comfortable: A larger unit requires greater airflow. The increased airflow (speed) in the ductwork will increase noise levels and decrease comfort levels as frigid air blasts out of the supply registers.
- Short cycle (on-off short intervals): Air conditioners become more efficient the longer they run. A system should both cool and dehumidify the air. Dehumidifying the air takes more time. The on/off cycling (often not reaching design capacity) is more expensive to operate while also removing less humidity from indoor air.
- Moisture Buildup: The longer an air conditioner runs, the colder the evaporator coil will become. To remove moisture from indoor air, the evaporator coil must be colder than the dew-point temperature of the air passing over it. When it is colder, condensation will form on the evaporator coil decreasing indoor humidity levels. The liquid formed will drain out of the furnace through a condensate drain. An oversized unit will operate at shorter intervals stopping more often and leaving extra moisture to evaporate back into the interior ductwork of the home.

Freon: (R22 verses 410A):
R22 is an older type of Freon operating around 250 PSI. Newer Freon 410A operates around 400 PSI. 410A by not using chlorine is more environmentally friendly. 410A is slowly replacing R22. 410A's higher operating pressure requires a stronger physical connection for the copper tubing. A brazing type alloy is stronger and preferred to a soft solder connection. R22 and 410A are not interchangeable. When updating a system, it is preferred to remove and replace all tubing components.

Need More Information?

Please visit www.phiinspect.com click our "Post Inspection Support" page and request additional documents.

The NAHI Forum Spring/Winter 2010 / The Journal Of Light Construction CD Rom
Construction Product Review: Air Conditioners Oct 2006 / Carson Dunlop & Associates Ltd (The Illustrated Home)

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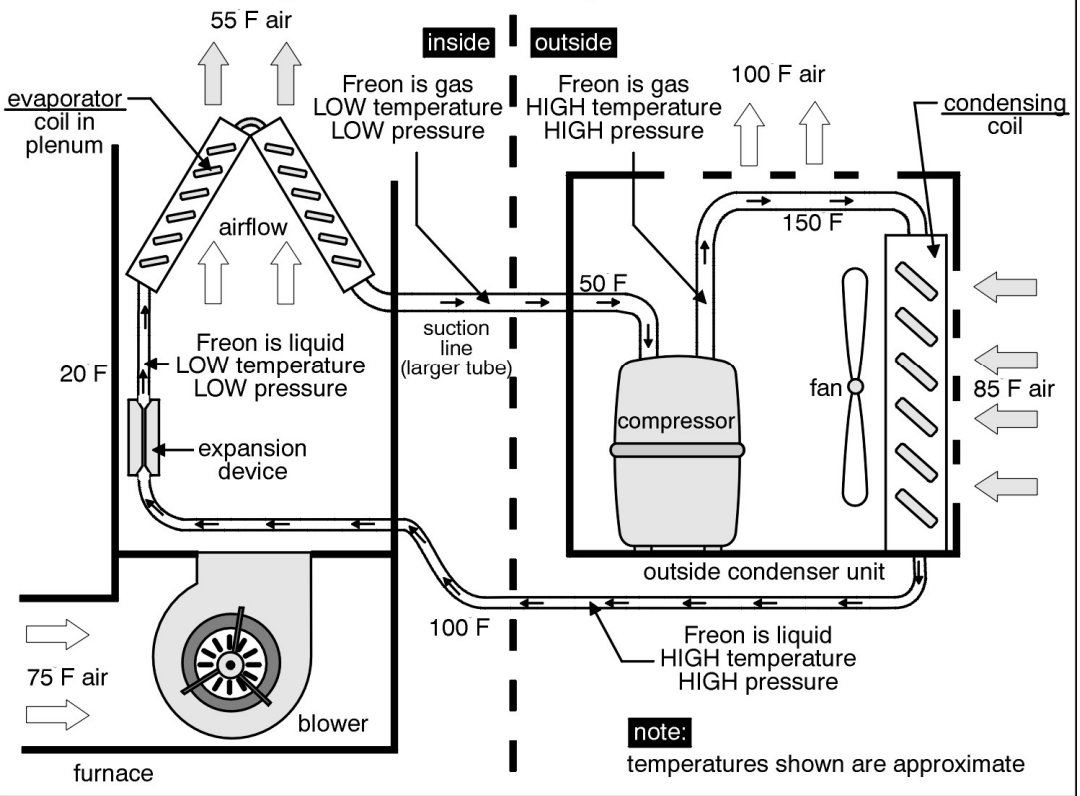
Air conditioning - schematic of system



Discharging condensate