Refrigeration 101: Back to Basics

Whether you’re new to Refrigeration or just want to brush up on your basics, the following information may be useful:

**Part One: The Refrigerating Cycle:**
Simply put, refrigeration systems solve a problem. The problem is how to convey heat from an area of a given temperature to an area of higher temperature. As a matter of physics, heat never does this on its own. In order to achieve this, a catalyst must be employed to facilitate the “heat transfer.” Refrigerants known as HFC’s (Hydro-fluorocarbons) are commonly used.

Refrigerants help perform what is called the compression/expansion cycle. Although refrigerants are commonly thought of as gases, they are, for the working cycle, a liquid.

Figure 1 illustrates the thermodynamic cycle of temperature vs. entropy. The thermodynamic cycle consists of four phases:

**Phase 1:** Compression of the low pressure vapor from $P_1$ to the pressure at $P_2$

**Phase 2:** Condensation of the high pressure vapor ($P_2$) to liquid refrigerant at constant pressure $P_1$

**Phase 3:** Isoenthalpic expansion of the liquid from pressure $P_2$ to $P_1$

**Phase 4:** Evaporation of the liquid at constant pressure $P_1$

The refrigerant absorbs a quantity of heat at pressure $P_1$ during phase 4 and then gives off the gained heat quantity when it condenses at pressure $P_1$. The amount of heat transfer accomplished depends on the electric power used to compress the gaseous refrigerant from $P_1$ to $P_2$. 

![Fig. 1](image-url)
Part Two: Basic Components of a Refrigeration Circuit

The components of a refrigeration system, as described in part one (see fig.2), consist of:

- Compressor, the purpose of which is to compress the vapor (Phase 1)
- Condenser, in which the vapor is condensed to liquid (Phase 2)
- Filter Drier, which is used to keep the refrigerant free of moisture and other substances
- Capillary tube or expansion valve where the expansion occurs (Phase 3).
- Evaporator, in which the refrigerant boils off and releases the absorbed heat (Phase 4, back to Phase 1).

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