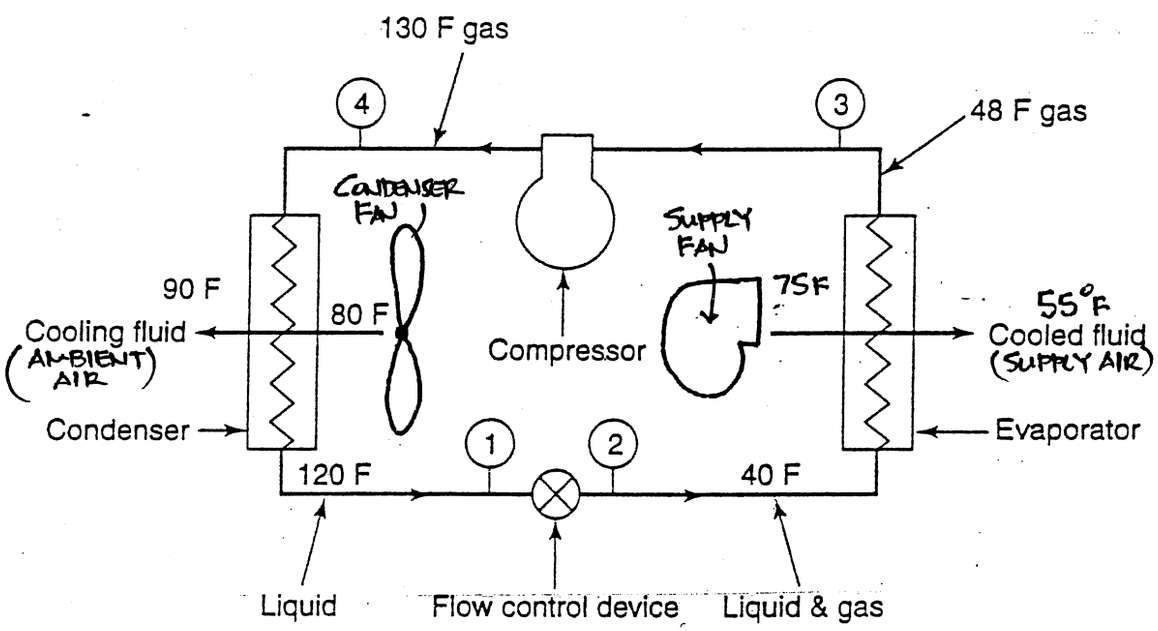
*PROCESS 1-2. At point (1), the refrigerant is in the liquid state at a relatively high pressure and high temperature. It flows to (2) through a restriction, called the* flow control device *or* expansion device. *The refrigerant loses pressure going through the restriction. The pressure at (2) is so low that a small portion of the refrigerant* flashes *(vaporizes) into a gas. But in order to vaporize, it must gain heat (which it takes from that portion of the refrigerant that did not vaporize), thus cooling the mixture and resulting in a low temperature at (2).*

*PROCESS 2-3. The refrigerant flows through a heat exchanger called the* evaporator. *This heat exchanger has two circuits. The refrigerant circulates in one, and in the other, the fluid to be cooled (usually air or water) flows. The fluid to be cooled is at a slightly higher temperature than the refrigerant, therefore heat is transferred from it to the refrigerant, producing the cooling effect desired. The refrigerant boils because of the heat it receives in the evaporator. By the time it leaves the evaporator (4), it is completely vaporized.*

*PROCESS 3-4. Leaving the evaporator, the refrigerant is a gas at a low temperature and low pressure. In order to be able to use it again to achieve the refrigerating effect continuously, it must be brought back to the conditions at (1)—a liquid at a high pressure. The first step in this process is to increase the pressure of the refrigerant gas by using a* compressor. *Compressing the gas also results in increasing its temperature.*

*PROCESS 4-1. The refrigerant leaves the compressor as a gas at high temperature and pressure. In order to change it to a liquid, heat must be removed from it. This is accomplished in a heat exchanger called the* condenser. *The refrigerant flows through one circuit in the condenser In the other circuit, a cooling fluid flows (air or water) at a temperature lower than the refrigerant. Heat therefore transfers from the refrigerant to the cooling fluid, and as a result, the refrigerant condenses to a liquid (1).*

The refrigerant has returned to its initial state and is now ready to repeat the cycle. Of course the processes are actually continuous as the refrigerant circulates through the system.




# The Vapor-Compression Refrigeration Cycle

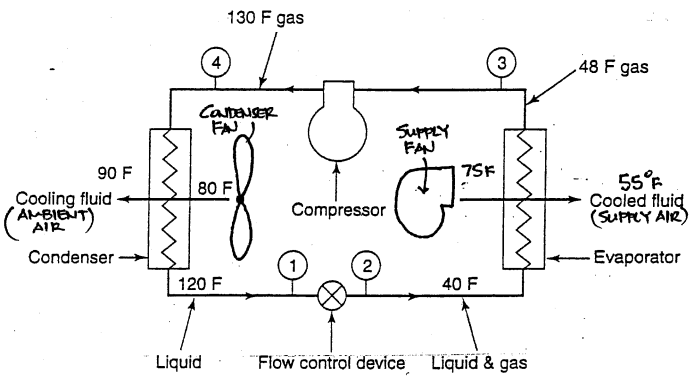
*PROCESS 1-2. At point (1), the refrigerant is in the liquid state at a relatively high pressure and high temperature. It flows to (2) through a restriction, called the* flow control device *or* expansion device. *The refrigerant loses pressure going through the restriction. The pressure at (2) is so low that a small portion of the refrigerant* flashes *(vaporizes) into a gas. But in order to vaporize, it must gain heat (which it takes from that portion of the refrigerant that did not vaporize), thus cooling the mixture and resulting in a low temperature at (2).*

*PROCESS 2-3. The refrigerant flows through a heat exchanger called the* evaporator. *This heat exchanger has two circuits. The refrigerant circulates in one, and in the other, the fluid to be cooled (usually air or water) flows. The fluid to be cooled is at a slightly higher temperature than the refrigerant, therefore heat is transferred from it to the refrigerant, producing the cooling effect desired. The refrigerant boils because of the heat it receives in the evaporator. By the time it leaves the evaporator (4), it is completely vaporized.*

*PROCESS 3-4. Leaving the evaporator, the refrigerant is a gas at a low temperature and low pressure. In order to be able to use it again to achieve the refrigerating effect continuously, it must be brought back to the conditions at (1)—a liquid at a high pressure. The first step in this process is to increase the pressure of the refrigerant gas by using a* compressor. *Compressing the gas also results in increasing its temperature.*

*PROCESS 4-1. The refrigerant leaves the compressor as a gas at high temperature and pressure. In order to change it to a liquid, heat must be removed from it. This is accomplished in a heat exchanger called the* condenser. *The refrigerant flows through one circuit in the condenser In the other circuit, a cooling fluid flows (air or water) at a temperature lower than the refrigerant. Heat therefore transfers from the refrigerant to the cooling fluid, and as a result, the refrigerant condenses to a liquid (1).*

The refrigerant has returned to its initial state and is now ready to repeat the cycle. Of course the processes are actually continuous as the refrigerant circulates through the system.




# The Vapor-Compression Refrigeration Cycle