

Liquid Overfeed Systems

This type of system was developed to overcome the shortcomings of the DX system.

Evaporator: Essentially this is the same as in the DX system except that the means of distributing the liquid among the circuits of the coil may be somewhat different.

Overfeed implies that more liquid is fed to the coils than will be evaporated (or boiled off), and in fact, the *overfeed rate* is typically about 3:1. The overfeed rate is the ration of units of liquid that exit the evaporator to units of vapor that exit the evaporator. This is as compared with the *recirculation rate* which is the ration of units of liquid that enter the evaporator to units of vapor that exit. The recirculation rate is most commonly used to specify the amount of liquid to be fed. The various references and tables are generally set up in terms of recirculation rate. By overfeeding the coils it is assured that the inner surfaces will be thoroughly wetted and will thus have the optimum heat transfer.

Overfeeding also assures that the vapor that does exit the coil will be close to saturation, not superheated, and this will ensure lower compressor temperatures and more efficient operation of the condenser. Furthermore, by feeding considerably more than will be evaporated, it becomes unimportant that the feed be precisely controlled – there is great latitude without any significant effect on the temperature control of the refrigerated space. So, since there is liquid exiting the coil, how does the compressor operate without damage? Protecting the compressor is the primary function of the *dump trap*, more commonly referred to as the *receiver*.

Low Pressure Receiver: This is simply a tank placed in the compressor suction line between the outlet of the evaporator and inlet of the compressor. Its function is to separate the excess liquid from the vapor, thus it is sometimes also known as a *separator*. The diameter and volume of the receiver are carefully designed to ensure disengagement of the liquid droplets from the vapor so that is a true vapor that enters the compressor rather than an aerosol.

A secondary function of the receiver is that it helps to ensure that the vapor is saturated and not superheated – any superheat in the vapor tends to transfer into the adjacent liquid and boil it off, thus maintaining saturation.

There is an outlet at the top of the receiver that takes the vapor to the compressor and an outlet at the bottom of the receiver that takes the liquid to the pump. There is an inlet, know as a *wet return* or *wet suction* which brings the liquid and vapor form the evaporator into the receiver. There is also a line form the high-pressure side, the condenser, through which the high pressure, high temperature liquid is flashed back to low pressure, low temperature liquid and vapor in the low-pressure receiver. This line is equipped with a solenoid valve that is opened or closed by a signal from a liquid level control column (float switches) on the low-pressure receiver. In series with the solenoid

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