

resistance of individual water circuits is generally sufficient to effect a satisfactory distribution. In cases such as well water precooling coils, where there may be considerable sand and other foreign matter in the water, provision for cleaning of individual tubes is of advantage. It is important to arrange water coils for drainage if located where they will be exposed to freezing. For this reason the circuits should be so laid out that there are no pockets to hold water. Fig. 2 shows such construction. The drains may be provided in the water piping although they are often arranged in the coil headers.

Direct-Expansion Coils

Coils for volatile refrigerants present more complex problems of fluid distribution than do water, brine or steam. It is desirable that the coil be effectively and uniformly cooled throughout, and necessary that the

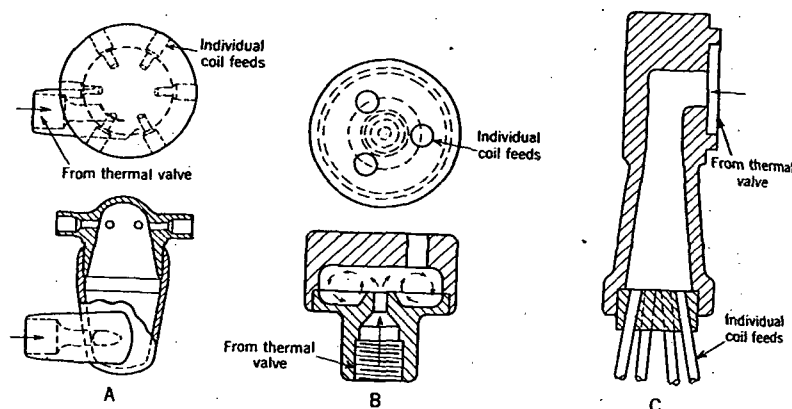


FIG. 5. TYPES OF REFRIGERANT FEED DISTRIBUTING HEADS

compressor be protected from entrained, unevaporated refrigerant. There are two types; namely, flooded systems, and thermal expansion valve systems, as shown in Figs. 3 and 4. With flooded control the coils are supplied with liquid by the same type of circulation that exists in a water tube boiler, while the level in the surge drum is maintained by the action of the float regulator, or by properly charging the plant in the case of the high pressure float drainer. The thermal expansion valve system depends upon the thermal valve automatically feeding just as much liquid to the coils as is required to maintain the superheat at the coil suction outlet within predetermined limits which vary from about 6 to 20 F. The thermal valve arrangement is in common use for the type of coils covered by this chapter, while the flooded system is comparatively rare.

With the flooded system the refrigerant distribution through the tubes depends on properly selecting the length of the feeds and the head of liquid imposed upon the liquid inlets. No auxiliary distributing devices are required. With the thermal valve system there are two factors to consider. There must be, generally, more than one refrigerant feed

through the coil per thermal valve to keep the pressure drop through the refrigerant circuit within practical limits and to reduce the corresponding penalty in increased evaporating temperature. At the same time the coil must be so arranged that the required suction superheat can be attained with a minimum sacrifice in the performance of the coil as a whole. It is general practice to attain this superheat within the coil itself and not by the use of external heat exchangers or other auxiliary devices.

With thermal expansion valves it is advantageous to keep the pressure drop through the refrigerant feeds as low as possible. The feeds are laid out to expose each to the same mean temperature difference so that it handles the same refrigerating load. A distributing means is imposed

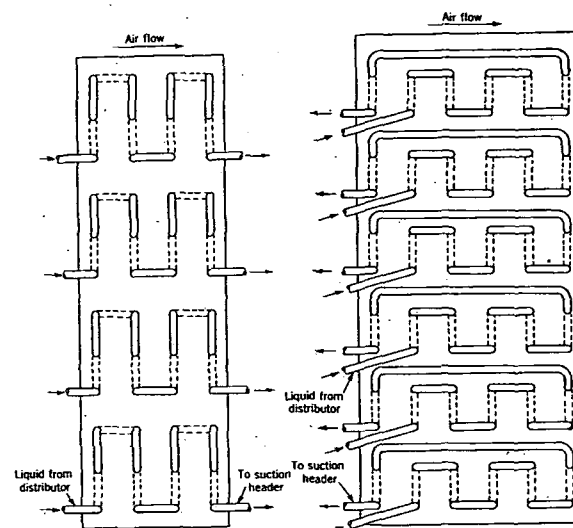


FIG. 6. ARRANGEMENT FOR SUPERHEATING AT AIR OUTLET

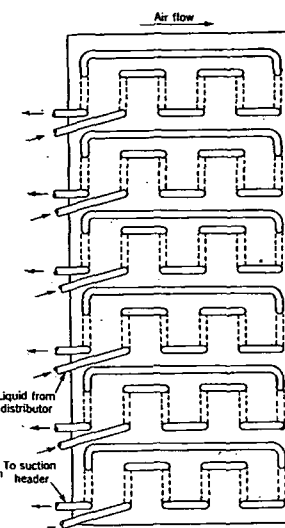


FIG. 7. ARRANGEMENT FOR SUPERHEATING AT AIR INLET

between valve and coil liquid inlets to divide the refrigerant equally among the feeds. Such a distributor shall be effective for distributing both liquid and vapor, since the entering refrigerant is a mixture of the two. Fig. 5 shows three typical types of distributors. In distributor A the liquid and gas mixture from the thermal valve is led tangentially into a chamber. The coil feed connections extend outward radially at the top of this chamber. In distributor B the refrigerant is discharged at a high velocity through a central jet against the end plate, forming a uniform mixture of gas and liquid within the distributor, from which individual connections are led as shown. In type C the refrigerant enters at high velocity from the thermal valve and is discharged against the end plug in which the individual liquid feeds are closely arranged. These distributors can be used in either vertical or horizontal position. Although there