



4.2.3 Evaporator

The evaporator cools the air or water by evaporation of the refrigerant. The liquid refrigerant which is released in pressure

through the expansion valve (or the capillary tube) evaporates in the evaporator, taking heat from the air or water while passing through the evaporator. The refrigerant becomes low temperature and low pressure vapor.

Both the evaporator and the condenser are called "heat exchanger".

The evaporator can be classified into two types according to its cooling methods, water cooling type and air cooling type. Water cooling type is further classified into several types.

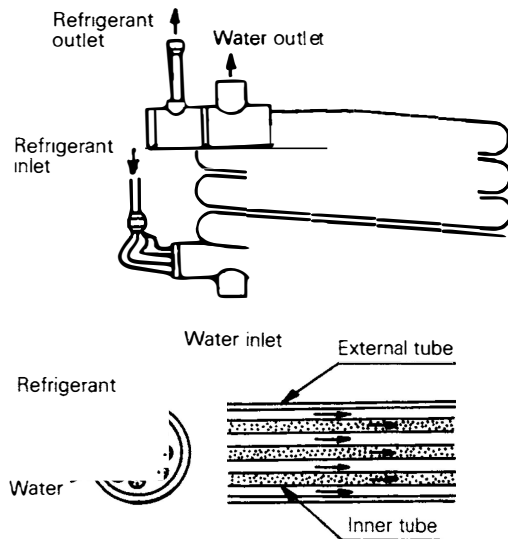
- Water cooling
 - Multiple tube-within-a-tube type(1)
 - Shell and tube type
 - Dry expansion shell and tube type(2)
 - Flood shell and tube type(3)
 - Plate type(4)
- Air cooling
 - Cross fin coil type.....(5)

(1) Multiple tube-within-a-tube-type

This type is adopted in smaller capacity models of water chillers. Several tubes are inserted within a single tube.

The refrigerant flows through the inner tubes and water flows outside the inner tubes in the opposite direction. (See Fig.4-25)

Fig.4-25 Multiple tube-within-a-tube type



(2) Dry expansion shell and tube type

The following types are adopted in middle and larger capacity models of water chillers.

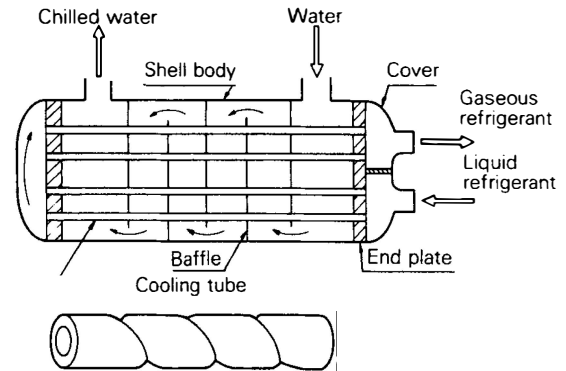
(1) Dry expansion shell and corrugated tube type

Corrugated copper cooling tubes are fixed to the end plates at both ends by enlarging the tube ends, and are neatly

encased in a steel shell body as shown in Fig.4-26.

The liquid refrigerant is circulated in the cooling tubes, taking heat from water which flows in contact with the cooling tubes, and evaporates.

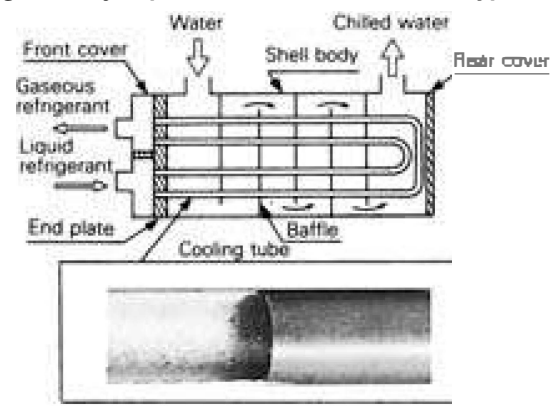
Fig.4-26 Dry expansion shell and corrugated tube type



(2) Dry expansion shell and Hi-X tube type

The dry expansion shell and Hi-X tube type is almost the same as the dry expansion shell and corrugated tube type except that Hi-X copper cooling tubes are used instead of corrugated copper cooling tubes.

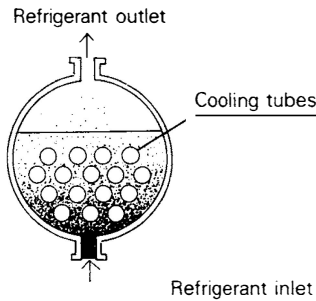
Fig.4-27 Dry expansion shell and Hi-X tube type



(3) Flooded shell and tube type

This type is adopted in centrifugal water chillers. In contrast with the dry expansion shell and tube type condenser, water flows through the tubes and the refrigerant flows outside the tube.

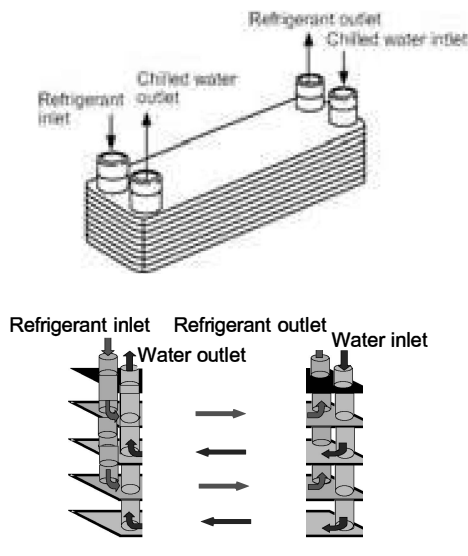
Fig.4-28 Flooded shell and tube type



(4) Plate type

This plate type of condenser is used for small-sized chillers, which have a compact structure and a high level of heat exchanging efficiency compared to other water-cooled-type heat exchangers. It consists of numbers of hollow aluminum plates, through which water and refrigerant flows alternately.

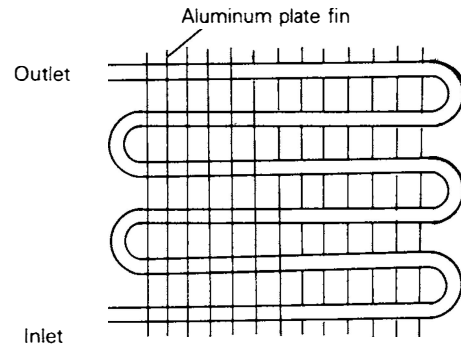
Fig.4-29 Plate type



(5) Cross fin coil type

This type is adopted in air conditioners of nearly all sizes. The cross fin coil type evaporator consists of U shaped copper tubes inserted in aluminium fins to have large heat transferring area. Some recent evaporators have waffle louver fins or multi-slit fins and Hi-X tubes, the internal surface of which is modified by serration. They increase the heat exchange coefficient and reduce the size of unit.

Fig.4-30 Cross fin coil type



The cross fin coil type of evaporator has a wide variety of applications corresponding to the shape of indoor unit. Fig. 4-31 shows a coil incorporated in the ceiling recessed cassette type of indoor unit, which is configured in the manner to enclose the turbo fan.

Fig.4-31

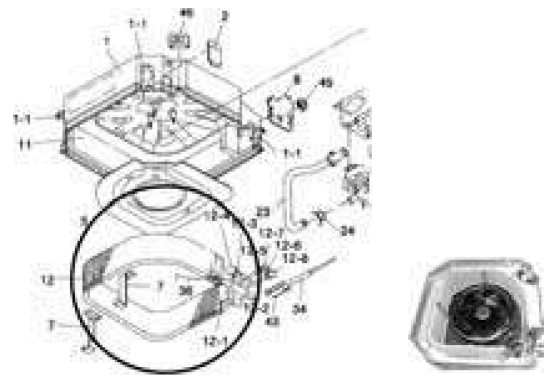


Figure 4-32 shows a cross fin coil incorporated in the wall-mounted type of indoor unit. It is in the shape of segment and configured in the manner to enclose the cross flow fan.

Fig.4-32

