CHAPTER 8

CALCULATIONS OF ANCILLARY EQUIPMENT (DEVICES SECONDARY)

INTRODUCTION

For a good air conditioning system to operate and safety should have equipment connected to the main equipment such as: compressor, condenser, evaporator. In addition, the ancillary equipment help to get the high effective, and it's can automated as a part of HVAC systems.

The ancillary equipment in the HVAC systems includes oil separator, liquid separator, filter, filter dryer, high-pressure receiver, heat recovery, low-pressure receiver, valve, pump, and relays... etc. These are necessary in the HVAC systems. However, in the cooling machine system doesn't necessarily.

8.1 SUCTION HEAT EXCHANGER.

8.1.1 Introduction

In the cycle of the cooling systems, to ensure that the suction vapour come back to the compressor haven't liquid exiting, the evaporator requires certain degree of superheat. For refrigeration systems using refrigerant freon, usually located on the suction line of the compressor the heat recovery equipment to perform that superheat.

Heat recovery equipment used with the following functions:

+ Improving the thermal efficiency of the cycle.
+ Make suction vapor compressor to superheat, and it's prevents liquid existing in compressor's suction line.
+ Make too cold liquid agent after the condenser to prevent evaporation of the agent when through the throttle valve.

8.1.2. Classification:

Suction heat exchanger equipment used in many types of air conditioning systems:

a) Straight pipe suction heat exchanger tank.

Often use suction heat exchanger device straight tubes in large refrigeration systems, refrigerating capacity of system: Qo> 130 kW. With this type, which are
composed of a shell-coated beam pipes, liquid agent are in pipes and outside are vapor agent.

b). Tank coil suction heat exchanger.

For tank coil suction heat exchanger system is often used for refrigerating yield average, refrigerating capacity: \( Q_o = 40 \div 130 \text{ kW} \). Tank is made of the tube inside which is wrapped around the core cylindrical. Liquid motion in the tube and vapour agents moving outside pipe.

c). Suction heat exchanger tank tube by pipe.

suction heat exchanger tank tube by pipe type systems used for refrigerating small size, often yield

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Q_o = 6 \div 40 \text{ kW}.
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In this kind, the liquid motion in the tube and vapour agents moving outside of the tube. Outside tube can make the wing to turbulent flow in order to increase heat transfer of the equipment.

From the above analysis, we see cooling systems designed for buildings with large refrigerating capacity \( Q \sim o = 2860 \text{ kW} \). Therefore, we use a suction heat exchanger device for the system design is the Straight pipe suction heat exchanger tank.

8.1. OTHER ANCILLARY EQUIPMENT:

8.1.1. Oil separator:

The task of oil separator to limit oil circulating in the system by pulling a refrigerating agent. Vapor mixed with oil after through an oil separator, a part oil is condensed and in the oder return to compressor, steam out of the tank to the condenser.

8.1.2. Desiccant filters:

Filter located before the throttle valve to prevent dirty make throttle valve off. With the arrangement in the steam and the liquid line that filter to ensure reliable operation and safety systems. In the system to prevent icing-up, we have to arrange the filter dryer to remove moisture from the system.

With the system using freon, due to the use of lubricating oil so when the temperature in the system in excess of certain regulations, the ability to produce many kinds of acid. Therefore, we have to removal this acid to prevent corrosion of equipment and parts of the system.
8.1.3. **One-way valve:**

One-way valve is installed on the line from the compressor to the condenser. With the task of preventing the solvent condenses back to the compressor in case that compressor stop, repair the compressor or compressor has problem.

One-way valve only allow the fluid flow in a certain direction, the opposite direction is hampered.

8.1.4. **Check valve, Cutoff valve:**

Structure of the Check valves, Cutoff valve depends on the functions and uses of valves, valve size and flow through the valve.

When operate, maintenance, repair air conditioning system we need to lock or unlock the solvent flow in the refrigerant cycle. At that time the Check valves, Cutoff valve undertake that task.

8.1.5. **Thermal-expansion valve:**

Thermal-expansion valve used to throttle the liquid agents from pressure condensing pk to the boiling pressure po and to control the flow in the evaporator to the load at the time. Thermal-expansion valve have two types:

- Thermal-expansion valve direct impact
- Thermal-expansion valve indirect impact

8.1.6. **Safety valve:**

To ensure the safety of the pressure equipment and the top speed compressor, Safety valve is used. Safety valve has two type is spring valve and plate valve, with the task of controlling the pressure in the pressure equipment and compressors. When the pressure in the pressure equipment exceed the permitted value, the safety valve will open and discharge the part of agents outside.

For compressors, when top speed pressure exceeds the allowed, at which the safety valve open and discharge vapour to suction line. Discharge pressure reduced to the extent specified, safety valve automatically closes. To be able to converting safety valves, it is installed in parallel on each device pressure 2 valve safety are linked together by three-way valve