Product Name : " MULTIPLE EVAPORATOR TRAINING KIT "
Product Code : " R.A.C 02 "

Description :

MULTIPLE EVAPORATOR TRAINING KIT:-

AIM:-

- Especially designed for educational and training purpose.

INTRODUCTION:-

Refrigeration is required at different temperatures. For example, in a typical food processing plant, cold air may be required at –30^{o}C for freezing and at +7^{o}C for cooling of food products or space cooling. One simple alternative is to use different refrigeration systems to cater to these different loads. However, this may not be economically viable due to the high total initial cost. Another alternative is to use a single refrigeration system with one compressor and two evaporators both operating at ?30^{o}C. The schematic of such a system and corresponding operating cycle on P-h diagram are shown in Figs. 13.1(a) and (b). As shown in the figure the system consists of a single compressor and a single condenser but two evaporators. Both evaporators-I and II operate at same evaporator temperature (-30^{o}C) one evaporator (say Evaporator-I) caters to freezing while the other (Evaporator-II) caters to product cooling/space conditioning at 7^{o}C. It can be seen that operating the evaporator at –30^{o}C when refrigeration is required at +7^{o}C is thermodynamically inefficient as the system irreversibilities increase with increasing temperature difference for heat transfer.

In addition to this there will also be other difficulties such as: evaporator catering to space cooling (7^{o}C) may collect frost leading to blockage of air-flow passages, if a liquid is to chilled then it may freeze on the

evaporator and the moisture content of air may become too low leading to water losses in the food products. In such cases multi-stage systems with multiple evaporators can be used. Several multi-evaporator combinations are possible in practice. Some of the most common ones are discussed below.

1.1. Individual expansion valves:

Figures 1.1(a) and (b) show system schematic and P-h diagram of a multi-evaporator system that uses two evaporators at two different temperatures and a single compressor. This system also uses individual expansion valves and a pressure regulating valve (PRV) for reducing the pressure from that corresponding to the high temperature evaporator to the compressor suction pressure. The PRV also maintains the required pressure in high temperature evaporator (Evaporator-II). Compared to the earlier system, this system offers the advantage of higher refrigeration effect at the high temperature evaporator [(h_6-h_4) against (h_7-h_5)]. However, this advantage is counterbalanced by higher specific work input due to the operation of compressor in superheated region. Thus ultimately there may not be any improvement in system COP due to this arrangement. It is easy to see that this modification does not result in significant improvement in performance due to the fact that the refrigerant vapour at the intermediate pressure is reduced first using the PRV and again increased using compressor. Obviously this is inefficient. However, this system is still preferred to the earlier system due to proper operation of high temperature evaporator.

TECHNICAL SPECIFICATION:-

1/2 HP hermetic compressor - high back pressure, fan-cooled condenser, two fan-cooled evaporators, two adjustable thermostatic expansion valves, temperature controller, solenoid, filter-drier, low-pressure control, main circuit breaker, duplex receptacle, compressor start switch, pilot light, two evaporator fan speed controls, hardware kit, cold box, and courseware.

The unit is supplied with a mobile storage cabinet of code-gauge furniture stock steel with 4-inch swivel rubber-tired casters. The unit is charged with R-134a HFC refrigerant.