

losses are expressed by nozzle efficiency, impact loss and diffuser efficiency. The work of compression, however, is performed on the mass of the mixture. Thus, the available work is reduced in proportion to:

$$\frac{M_{\text{primary}}}{M_{\text{mixture}}}$$

The impact loss is commonly determined from the formula:

$$MV_{\text{primary}} + MV_{\text{secondary}} = MV_{\text{mixture}} \quad (8)$$

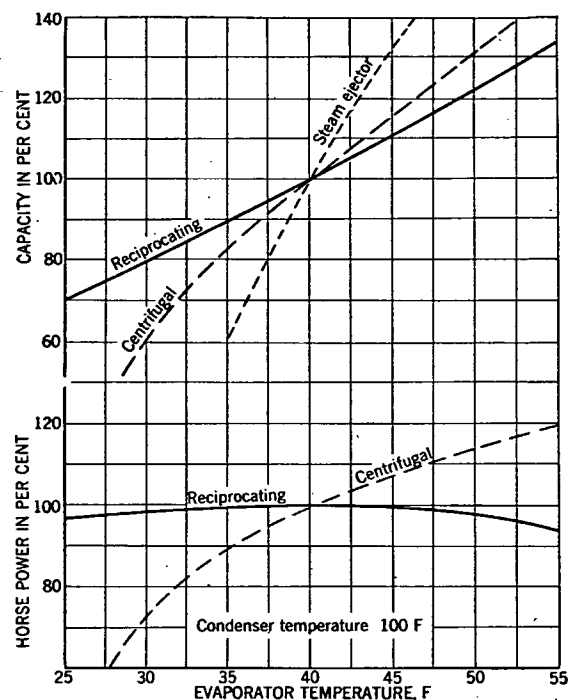


FIG. 6. PERFORMANCE CHARACTERISTICS OF COMPRESSION REFRIGERATION MACHINES AT CONSTANT SPEED

Common efficiencies for commercial ejectors are: nozzle efficiency 90 per cent, diffuser efficiency 60 to 70 per cent. Customary steam rates in pounds per ton are approximately as follows:

Evaporator temp.	50 F	Steam press.	100 lb	Steam press.	12 lb
Condenser temp.	105 F	Steam rate	30 lb per hour per ton	Steam rate	45 lb per hour per ton
Evaporator temp.	40 F	Steam press.	100 lb	Steam press.	12 lb
Condenser temp.	105 F	Steam rate	40 lb per hour per ton	Steam rate	70 lb per hour per ton

The steam ejector uses large amounts of condenser water and steam, and therefore this system has relative advantages when large quantities of water and steam are available at reduced costs. Characteristic curves

show that the ejector performance is independent of condenser temperature up to a certain temperature, depending upon the particular design, and above this temperature the ejector breaks and loses all capacity. (See also Chapter 11.)

Characteristics of Compression Systems

The different types of compression systems have quite different characteristics of capacity and power with varying evaporator temperature and with varying condenser temperature, as will be seen from curves in Figs. 6 and 7.

The capacity of the reciprocating and rotary compressor varies slowly

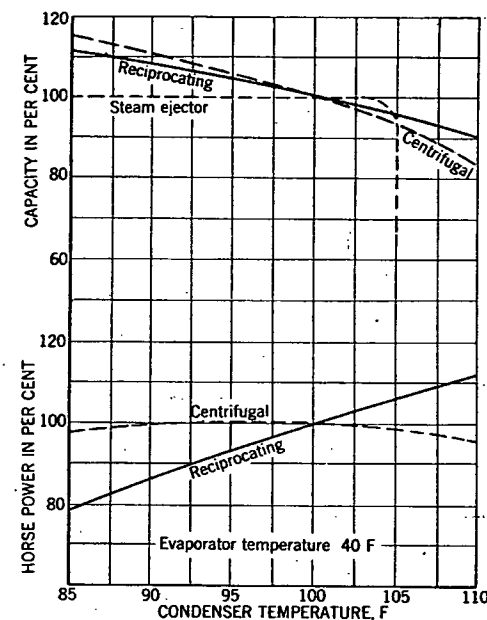


FIG. 7. PERFORMANCE CHARACTERISTICS OF COMPRESSION REFRIGERATION MACHINES AT CONSTANT SPEED

with a change of evaporator temperature, and the variance of power requirements, in the air conditioning range of operation, is small for a change of evaporator temperature. On the other hand, the capacity and power of the centrifugal machine vary rapidly, and the capacity of the steam ejector also varies considerably. Thus, both these latter types tend to be more nearly self-regulating than the reciprocating and rotary compression type. On the other hand, the operating range of the latter near standard capacity is superior. Although the capacity of the reciprocating and rotary compressor is little affected by the condenser temperature, the power of the compressor is greatly affected, while the reverse is true for the centrifugal compressor. As previously indicated, the condenser temperature has no effect on the capacity of the steam ejector type of