TABLE 7. BASIS OF EQUIPMENT SELECTION

CAPACITY TONS	MAJORITY USED	SOME USED	FEW USED
0 to 5	Unit systems in conditioned space.	Unit central systems using duct distribution.	Built up central systems.
5 to 25	Built up central systems using reciprocating compressors.	Unit central systems using duct distribution.	Unit systems in conditioned space. Built up systems using absorption and adsorption systems.
25 to 50	Built up central systems using reciprocating compressors.	Built up central systems using centrifugal compressors.	Central systems using adsorption systems.
50 to 400	Built up central systems using reciprocating compressors.	Built up central systems using steam jet and centrifugal compressors.	
400 and Over	Built up central systems using centrifugal compressors.	Built up central systems using steam jet.	

Centrifugal compressors are used for large installations, and usually where the indirect system is required. The driving mechanism can be a steam turbine or electric motor. The steam jet system is used where steam is available and cooling water can be had in large quantities.

It will be noted by referring to Fig. 12 that all systems using compressors have a common characteristic, namely, that the capacity varies with the evaporating temperature. Not only can the equipment be selected to produce a given result, but the performance can be predicted under varying load conditions by the simple expedient of using the variable of evaporating temperature as the abscissa, and the load or capacity as the ordinate in a series of curves.

Manufacturers of compressors and cooling coils furnish performance data for apparatus that can be plotted in the form of curves similar to those shown in Fig. 14. The performance of a compressor is plotted as a series of curves, each curve being drawn for a given condensing pressure.

TABLE 8. TYPICAL OPERATING CONDITIONS FOR TWO TYPES OF LOAD

TYPE OF ENCLOSURE	LOAD, BTU PER HOUR			RATIO SENSIBLE TO TOTAL	AIR ENTERING COIL		OPERATING BALANCE POINT		
	Sensible	Latent	Total		F Deg	Per Cent R.H.	Evaporator Temp F Deg	Condenser Pressure Lb per Sq In.	Per Cent Sensible Heat
Restaurant	103,000	45,000	148,000	0.695	82	45	34.4	123	69.9
Office	121,000	27,000	148,000	0.820	82	45	42.2	100	82.1

The performance of a direct expansion coil at two different air velocities is plotted on the same graph. The operating point will be, of course, where the two curves cross.

Data given in Table 8 illustrate two types of conditioned enclosures having the same total load of 148,000 Btu per hour, but with two different ratios of sensible to total heat. In the case of the office with a ratio of 82 per cent sensible to total heat, the operating point *A* in Fig. 14 is found to be 42.2 F evaporating temperature, with a face velocity of 500 fpm. In the case of the restaurant, with a ratio of 69.5 per cent sensible to total heat, the air velocity is lowered to 300 fpm, and the evaporating tempera-

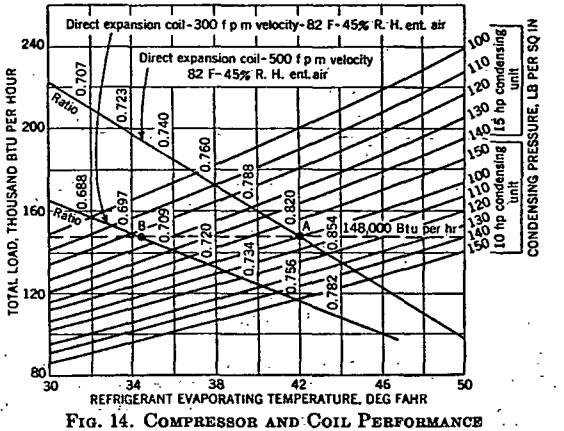

FIG. 14. COMPRESSOR AND COIL PERFORMANCE

ture is lowered to 34.4 F as shown in point *B* of Fig. 14. In order to obtain the same capacity, a larger condensing unit is used. This illustration assumes zero pressure drop through the suction line. The pressure drop can be taken into account by shifting the compressor performance curves by the amount of pressure drop expressed in Fahrenheit degrees.

ABBREVIATIONS AND SYMBOLS IN CHAPTER

(CP) = coefficient of performance, ratio of refrigerating effect to the heat equivalent of the compressor work.
(CVE) = clearance volumetric efficiency.
d = internal diameter in inches.
H_t = cooling load in tons.
h_d = enthalpy of vapor at condition of discharge from compressor.
h_{f_e} = enthalpy of liquid at discharge from compressor.
h_{fd} = enthalpy of liquid at discharge of expansion valve.
h_{f_s} = enthalpy of liquid at entrance to expansion valve.
h_m = enthalpy of mixture.
h_r = enthalpy of saturated vapor.
h_{rd} = enthalpy of saturated vapor at discharge of valve or compressor.
h_{r_s} = enthalpy of saturated vapor at state s entering compressor.
hp = horsepower.
p_d = pressure of saturated liquid and vapor at discharge of compressor.