

Capacity

System flow requirements are a function of BTU removal, and are typically expressed in gallons per minute (GPM). A common formula used to convert from BTU removal requirements to an approximate flow rate is:

Tons of Refrigeration X Rate of Evaporation (GPM per Ton) X recirculation rate = US GPM

For R-717, the typical Rate of Evaporation, GPM per Ton, ranges from .058 at -40° degrees F. The Rate of Evaporation, GPM per Ton, of .063 is commonly used as an average for the most common range of application temperatures, and allows quick and reasonably accurate calculation of flow rate without referring to published curves or tables.

For R-22, the typical Rate of Evaporation GPM per Ton ranges from .17 at -40° degrees F to .215 at +40° degrees F.

Where refrigerant properties tables are available, the required flow rate can be calculated accurately from the following formula:

$$\text{GPM} = [1496.1 \times \text{Tons} \times \text{Recirc. Rate}] / [(h_g - h_f) \times \text{Density}], \text{ where}$$

TONS = Total tons of refrigeration at a specified evaporating temperature.

1 TON = 12,000 BTU/HR.

Recirc. Rate = Ratio by weight of units of refrigerant liquid entering a heat exchanger to units of refrigerant gas exiting the heat exchanger.

Density = Density of liquid refrigerant at evaporating temperature in LB_m per Cubic Foot.

h_g = Enthalpy of vapor phase of refrigerant in BTU/LB_m.

h_f = Enthalpy of liquid phase of refrigerant in BTU/LB_m.