4) Design Considerations

–waste heat rejected to the outside air

–The refrigerant leaves the evaporator superheat by 2.7°C.

–Sub–cooled by 6.3°C at the exit of the condenser.

–Isentropic efficiency at the compressor is 80%

5) Data and Variables

$\dot{Q}_{room} = 72{,}000$ Btu/hr

$\dot{\forall} = 500$ CFM

$T_{wb} = 75°F$

$\eta = 80\%$

$\phi = 50\%$

evaporator temp = 2.7°C (superheated)

condenser temp = 6.3°C (subcooling)

6) Procedure

A) The evaporator pressure should be set so that the refrigerant boils at a temperature 10—15°F below the indoor air temperature, ensuring effective heat absorption. Similarly, the condenser pressure should be selected so that the refrigerant condenses at a temperature 20—30°F above the outdoor air temperature, allowing for efficient heat rejection to the environment.