System 006 - Site 501534, Canby OR

Site 501534 is a grocery store located in Canby, OR. There are seven refrigeration circuits that have been monitored. Circuits 1 and 2 (medium temperature Rack 1) and Circuit 3 (low temperature Rack 2) were installed in the 1990s. Circuits 4 and 5 are new medium and low temperature racks, respectively, installed more recently. Circuits 6 and 7 are medium temperature circuits, each with one compressor. Circuits 1, 2 and 3 share a single Emerson E2 refrigeration system controller.

Circuits 6 & 7, Medium Temperature

Circuit 6 with compressor "A" serves the beer and soda line up. Circuit 7 with compressor "B" serves the deli and beer walk-in coolers and cheese island.

Table 1. Measured data on Circuit 6

Measured Data	Variable Name(s)	Point Number
Outdoor Temperature	TT_OUTDOOR	--
Discharge Temperature	TT_RCOMP_OUT	2
Compressor Suction Temperature	TT_RCOMP_IN	1
Compressor Power	EP_COMP	--
Low Pressure, Suction Manifold	PT_RLP	1
High Pressure, Discharge Manifold	PT_RHP	2
Liquid Line Temperature entering expansion device	TT_REXP_IN	7
Condenser Cooling Temperature, In	TT_SECW_IN	--
Condenser Cooling Temperature, Out	TT_SECW_OUT	--
Evaporator, In	TT_SECC_IN	--
Evaporator, Out	TT_SECC_OUT	--

Table 2. Calculated values on Circuit 6

Calculated/Derived Values	Variable Name	Measured Temperatures Used in Calculations	Point Number/ Process
Isentropic Compressor Efficiency	COMP_EFF_ISEN	Discharge and suction manifold temperatures	1 to 2
Condensing Temperature	RHP_TCOND_MID	Dewpoint and bubble point temperatures at PT_RHP	c
Heating COP	RCOP_HEAT	TT_RCOND_IN, TT_REXP_IN, Discharge and suction manifold conditions	3 to 6
Heating Capacity	RCAP_HEAT	TT_RCOND_IN, TT_REXP_IN	
Cooling COP	RCOP_COOL	TT_REXP_IN, Discharge and suction conditions	8 to 1
Cooling Capacity	RCAP_COOL	TT_REXP_IN, Suction Temperatures	
Subcooling	RSUBCOOL	TT_REXP_IN, , Bubble point temperature at PT_RHP	5 to 7

Figure 1. Pressure-enthalpy diagram for basic refrigeration cycle, neglecting pressure losses.
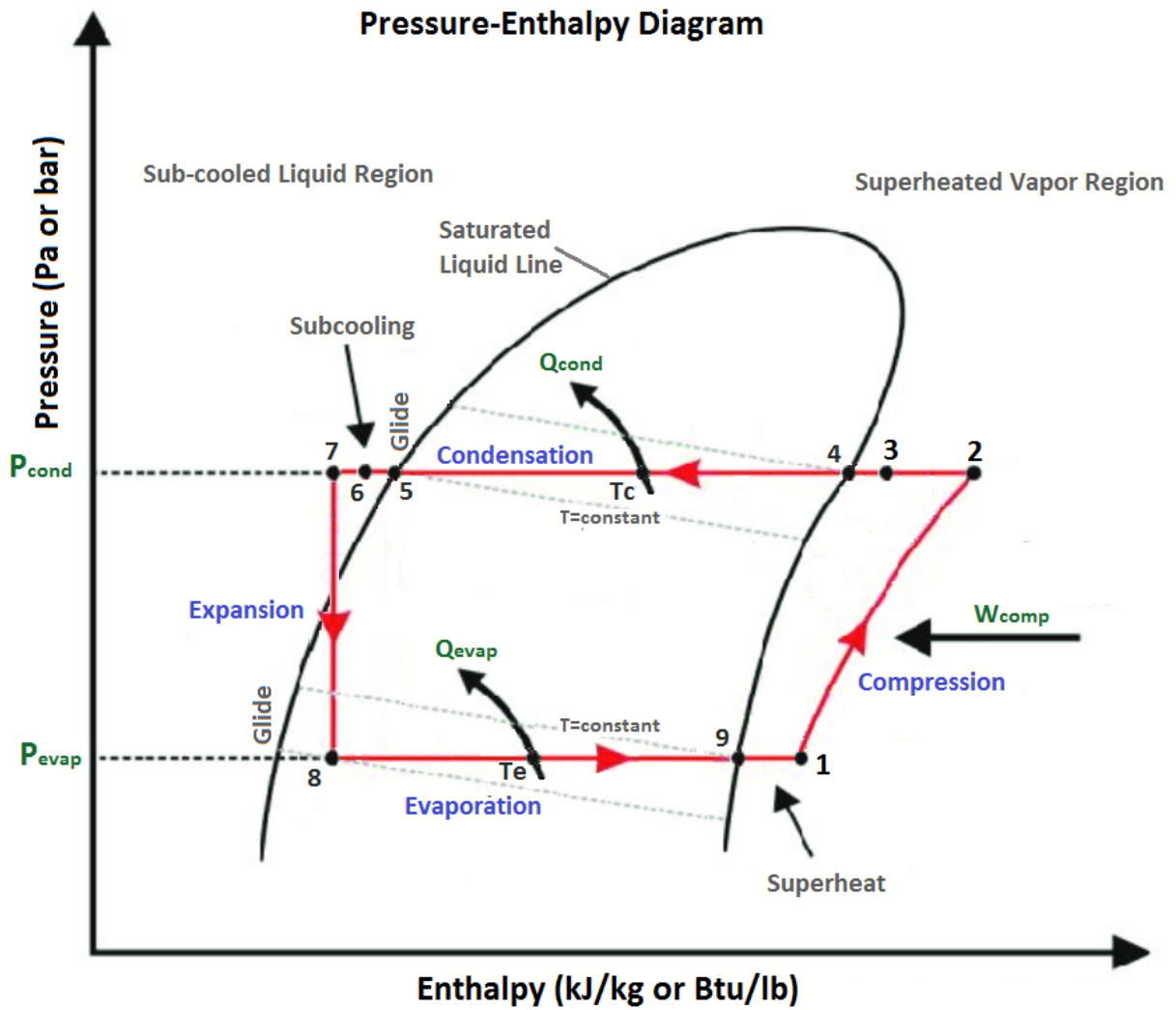

Figure 2. Circuit 6 & 7 ClimaCheck system diagram

CIRCUIT 6 (501593) & CIRCUIT 7 (501583#1)

Outdoor Temperature
TT_OUTDOOR

Temperature, In
TT_SECW_IN

Temperature, Out
TT_SECW_OUT

Condensing Temperature A
RHP_TCOND_MID

Condensing Temperature B
RHP_TCOND_MID

EER or COP A, Heating
RCOP_HEAT

EER or COP B, Heating
RCOP_HEAT

Comp Discharge Temp A
TT_RECOMP_OUT

Comp Discharge Temp B
TT_RECOMP_OUT

Heating Capacity A
RECAP_HEAT

Heating Capacity B
RECAP_HEAT

High Pressure, A
PT_RHP

High Pressure, B
PT_RHP

Compressor Power A
EP_COMP

Comp Efficiency, Isentropic A
COMP_EFF_ISEN

Compressor Power B
EP_COMP

Comp Efficiency, Isentropic B
COMP_EFF_ISEN

Subcooling A
RSUBCOOL

Evaporator Temp A
RLP_TEVAP_MID

Evaporator Temp B
RLP_TEVAP_MID

Temp, Exp Valve In, A
TT_REXP_IN

Low Pressure A
PT_RLP

Low Pressure A
PT_RLP

Subcooling B
RSUBCOOL

Comp Suction Temp A
TT_RCOMP_IN

Comp Suction Temp A
TT_RCOMP_IN

EER or COP, Cooling A
RCOP_COOL

EER or COP, Cooling B
RCOP_COOL

Superheat A
RSUPERHEAT

Superheat B
RSUPERHEAT

Temp, Exp Valve In, B
TT_REXP_IN

Cooling Capacity A
RCAP_COOL

Cooling Capacity B
RCAP_COOL

Temperature, Out
TT_SECC__OUT

Temperature, In
TT_SECC_IN