

System 009 - Site 501527, Vancouver, WA

Site 501527 is a grocery store located in Vancouver WA. There are two refrigeration circuits: Circuits 8 and 9.

Circuits 9, Low Temperature, Rack "A"

Circuit 9 (rack A) is a low temperature multiplex system with R404a with 3 compressors (212 MBH total compressor capacity) and 189 MBH total design load located in Vancouver, WA. Liquid subcooling is provided by the medium temperature rack (circuit 8, rack B). The discharge line has heat reclaim that allows hot discharge gas to heat hot water and decrease the gas temperature before entering the condenser. The low and medium temperature systems (circuits 8 and 9) share a single Emerson E2 refrigeration system controller.

Table 1. Measured data on Circuit 9

Measured Data	Variable Name(s)	Point Number
Outdoor Temperature	TT_OUTDOOR	--
Discharge Temperatures after Compressors 1 to 5	MISC1 to MISC5	2
Common Discharge Temperature	TT_RCOMP_OUT	2
Common Compressor Suction Temperature	TT_RCOMP_IN	1
Compressor Power, Comp 1 to 3	EP_COMP	--
Low Pressure, Suction Manifold	PT_RLP	1
High Pressure, Discharge Manifold	PT_RHP	2
Condenser Entering Temperature	TT_RCOND_IN	3
Condenser Fan Power	EP_AUX_SECW	--
Liquid Line Temperature entering expansion device	TT_REXP_IN	7

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

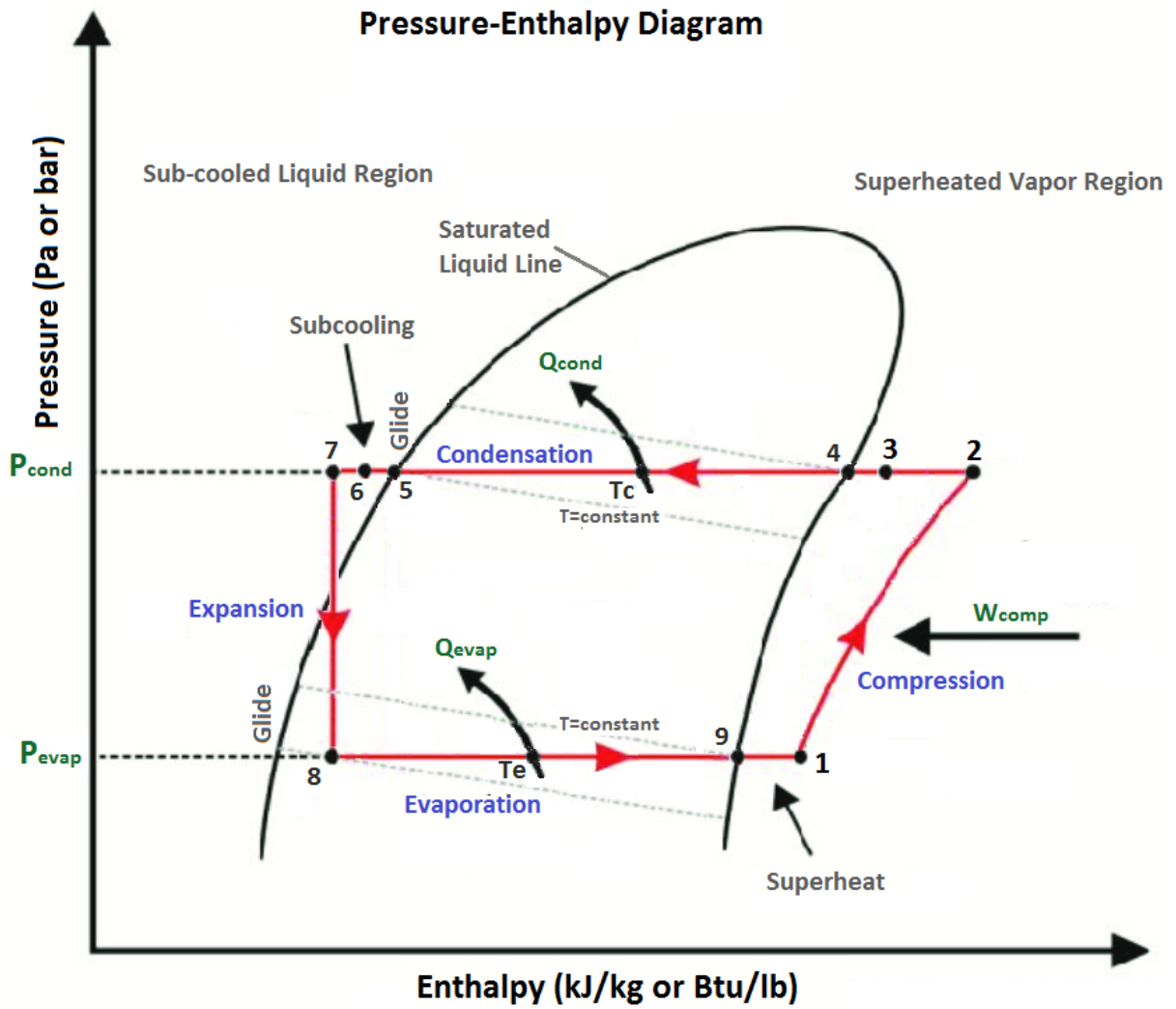


Figure 2. Circuit 9 ClimaCheck system diagram

CIRCUIT 9 (501527), LOW TEMPERATURE

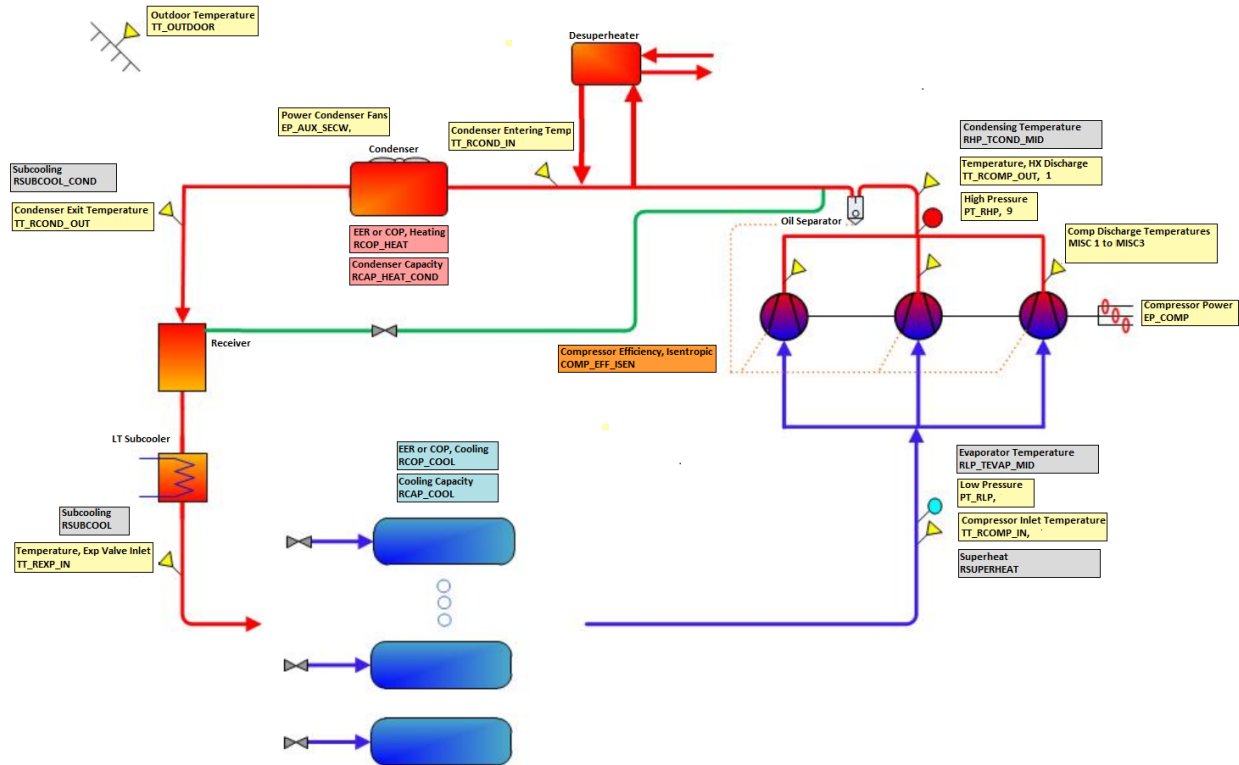


Table 2. Calculated values on Circuit 9

Calculated/Derived Values	Variable Name	Measured Temperatures Used in Calculations	Point Number/ Process
Isentropic Compressor Efficiency	COMP_EFF_ISEN	Discharge and suction manifold conditions	1 to 2
Condensing Temperature	RHP_TCOND_MID	Dew point and bubble point temperatures at PT_RHP	c
Evaporator Temperature	RLP_TEVAP_MID	Dew point and bubble point temperatures at PT_RLP	e
Heating COP	RCOP_HEAT	TT_REXP_IN, Discharge and suction manifold temperatures	3 to 6
Heating Capacity	RCAP_HEAT	TT_RCOND_IN, TT_REXP_IN	
Cooling COP	RCOP_COOL	TT_RCOND_IN, TT_REXP_IN, Discharge and Suction Temperatures	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

Superheat	RSUPERHEAT	Suction temperatures, Dew point temperature at PT_RLP	9 to 1
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Table 3. Compressor design data, Circuit 9

COMPRESSOR DATA, Medium Temperature, Circuit 9, Rack A			
Compressor Model Number	Capacity (Btu/h)	Total Heat of Rejection* (Btu/h)	Type
Rack "A"			
3DHHF28KL	43,400	51,500	RECIP
3DA3F28KL	43,400	51,500	RECIP
3DF3F40KL	63,000	74,000	RECIP
3DF3F40KL	63,000	74,000	RECIP
CAPACITY:	212,800		

Table 4. Case descriptions and design parameters, Circuit 9

S Y S	Case Descriptions, Low Temperature Systems, Rack A							Design parameters			
	SYSTEM DESCRIPTION	Line UP	L	W	H	Qty	Model Number	Bt u/ft	Suct Temp	Type	Total Btuh
	RACK "A" @ -20F										
A-1	DELI FREEZER		8'	8'	10'	1	Bohn LLE-068		-17	EL	6,600
A-2	DELI BLAST CHILLER (DUAL TEMP)					1	Alto-Shaam QC-100/Remote		-5	N/A	20,900
A-3	ICE MACHINE					1	How e 2000RLE		-5	NA	16,000
A-4	BLAST CHILLER					1	Envro-Pak CVU-200E-BC		+20	O/C	4,000
A-6	(NEW) F.F. / I.C. REACH-INS	4DR		1		1	ZZ RVZC30T2	1100	-16	EL	4,400
A-7	FROZEN MEAT	5DRS	1			1	Hill 6RZLH	1534	-17	EL	7,670
A-8	PET FOOD FREEZER	1DR			1-1DR	1	True GDM-23F	1200	-11	EL	1,200
A-9	PROOFER/RETARDE R #1					1	Hobart HRPW2S		+20	O/C	6,000
A-10	PROOFER/RETARDE R #2					1	Hobart HRPW2S		+20	O/C	6,000
A-11	F.F. / I.C. REACH-INS	10DRS	1		1/1	3	Hill 6RZLH/ONRZH	1534	-17	EL	15,340
A-12	F.F. / I.C. REACH-INS	17DRS	3		1-2DR	4	Hill 6RZLH	1534	-17	EL	26,078

A-13	F.F. / I.C. REACH-INS	17DRS	3		1-2DR	4	Hill 6RZLH/ONRZH	1534	-17	EL	25,628
A-14	F.F. / I.C. REACH-INS	12DRS	2		1-2DR	3	Hill 6RZLH/ONRZH	1534	-17	EL	17,958
A-15	F.F. / I.C. REACH-INS	6DRS			2-3DR	1	Hill 6RZLH	1534	-17	EL	9,204
A-16	GROCERY FREEZER		30'-10"	10'-5"	10'	2	Bohn LL3-136		-17	EL	22,300
TOTAL LOAD =											189,278