

System 008 -Site 501527, Vancouver, WA

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

Circuit 8, Medium Temperature, Rack “B” Chilled Water System

Circuit 8 (rack B) is a medium temperature chilled water/glycol system with R404a refrigerant, 5 compressors (1,070 MBH total capacity) and 951 MBH total design load located in Vancouver, WA. The system has a subcooler circuit that provides liquid subcooling for the low temperature rack (circuit 9, rack A) and serves two glycol chillers that provide chilled fluid to the medium temperature cases via a single fluid loop. The low and medium temperature systems (circuits 8 and 9) share a single Emerson E2 refrigeration system controller. 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 condenser has five banks of two fans per bank, which are staged on as needed by a proportional signal.

Table 1. Measured data on Circuit 8

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_COMP_IN	1
Compressor Power, Comp 1 to 5	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
Suction Temperatures after Evaporator Coils	AI_X13	
Glycol temperature, supply to cases	TT_SECC_OUT	
Glycol temperature, return from cases	TT_SECC_IN	
Temperature, LT Subcool	AI_X14	

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

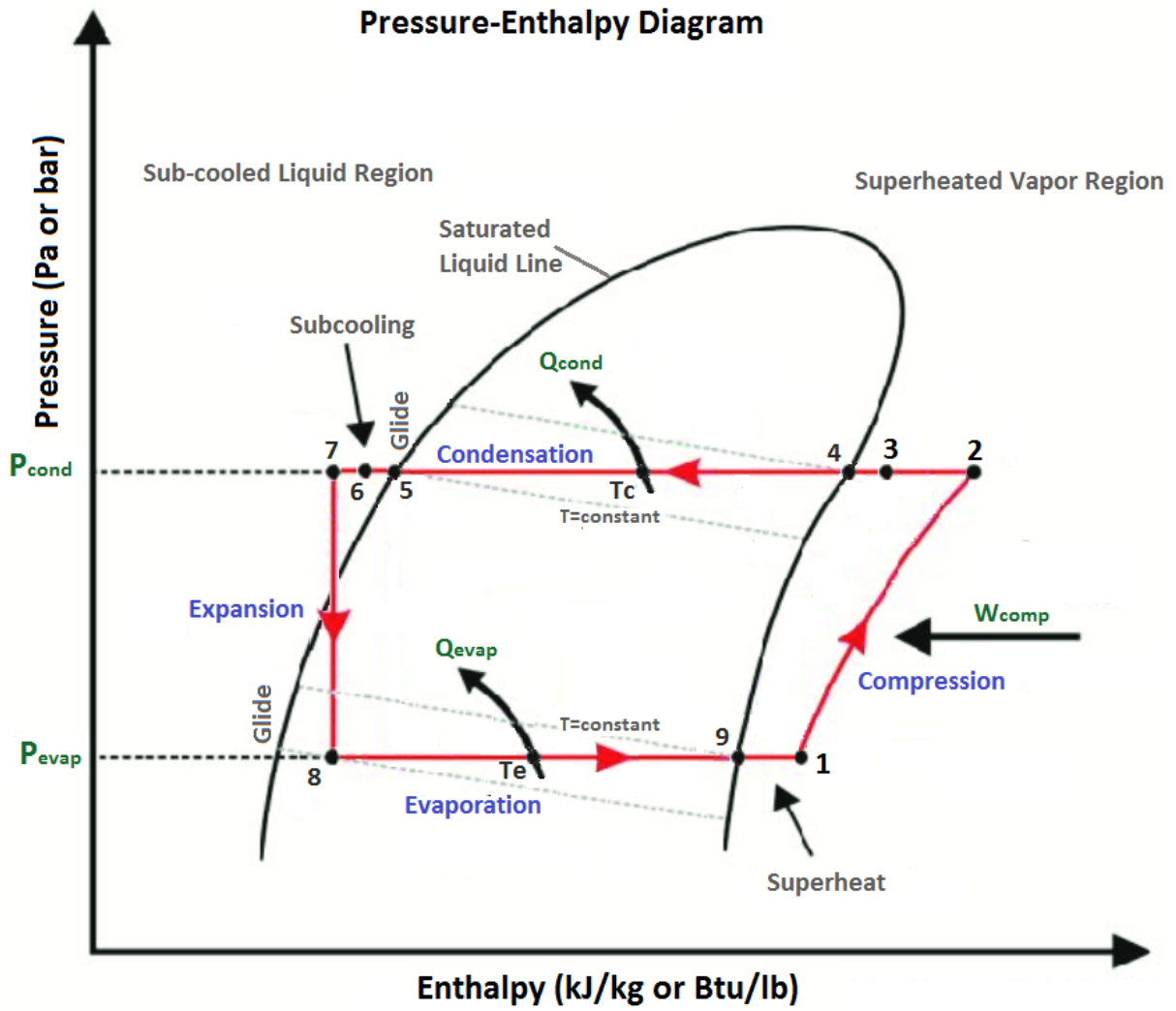


Figure 2. Circuit 8 ClimaCheck system diagram

CIRCUIT 8 (501527), MEDIUM TEMPERATURE

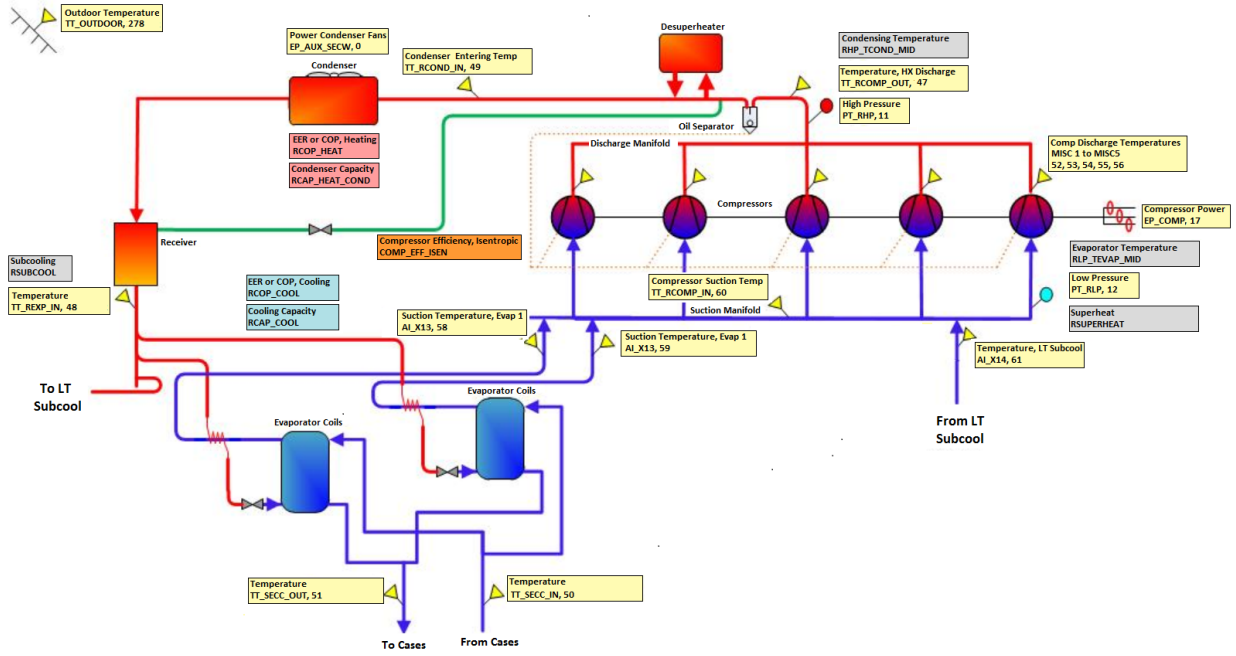


Table 2. Calculated values on Circuit 8

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 temperature at PT_RLP	e
Desuperheater Capacity	RCAP_DESUPERHEAT	TT_RCOMP_OUT, TT_RCOND_IN	--
Heating COP	RCOP_HEAT	TT_RCOND_IN, 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_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

Table 3. Compressor design data, Circuit 8

COMPRESSOR DATA, Medium Temperature, Circuit 8, Rack B			
Compressor Model Number	Capacity (Btu/h)	Total Heat of Rejection * (Btu/h)	Type
Rack "B"			
3DPHR12ML	88,700	118,800	RECIP
4DJ3R28ML	196,400	264,700	RECIP
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4DJ3R28ML	196,400	264,700	RECIP
4DJ3R28ML	196,400	264,700	RECIP
4DJ3R28ML	196,400	264,700	RECIP
CAPACITY:	1,070,700		

Table 4. Case descriptions and design parameters, Circuit 8

Case Descriptions, Medium Temperature Glycol Systems, Rack B									Design parameters		
SYS	SYSTEM DESCRIPTION	Line UP	L	W	H	Q ty	Model Number	Bt u/ft	Suct Temp	Type	Total Btuh
G-1A	PASTRY 1 (DOME)	6			1-6FT	1	Hill PDNUM	320	+20	O C	1,920
G-1B	PASTRY 1 (FRONT)	6			1-6FT	1	Hill PDNUM	1075	+20	O C	6,450
G-2	SERVICE PASTRY	6			1	1	Barker BMD	650	+20	O C	3,900
G-3A	SANDWHICH PREP TABLE (TOP)	7			1-7FT	1	Barker SB/CWC	300	+20	O C	2,100
G-3B	SANDWHICH PREP TABLE (UNDER)	7			1-7FT	1	Barker SB	370	+20	O C	2,590
G-4A	WOK (TOP)	6			1-6FT	1	Barker SB/CWC	300	+20	O C	1,800
G-4B	WOK (UNDER)	6			1-6FT	1	Barker SB	370	+20	O C	2,220
G-5A	SAUTE STATION (TOP)	5			1-5FT	1	Barker SB/CWC	350	+20	O C	1,750
G-5B	SAUTE STATION (UNDER)	5			1-5FT	1	Barker SB	450	+20	O C	2,250
G-6A	SANDWHICH PREP TABLE (TOP)	7			1-7FT	1	Barker SB/CWC	300	+20	O C	2,100
G-6B	SANDWHICH PREP TABLE (UNDER)	7			1-7FT	1	Barker SB	370	+20	O C	2,590
G-7	DELI COOLER		25'-6"	14'-11"	10'	2	Bohn ADTG-1000		+20	O C	27,000
G-8A	SALAD (TOP)	9		1		1	Barker SB/CW	300	+20	O C	2,700
G-8B	SALAD (RRS)	8		1		1	Barker SB (LOWER)	370	+20	O C	2,960
G-9A	SALAD (TOP)	9		1		1	Barker SB/CW	300	+20	O C	2,700
G-9B	SALAD (RRS)	8		1		1	Barker SB (LOWER)	370	+20	O C	2,960
G-10	GRAB-N-GO	16		2		2	Hill ON4UM	1043	+20	O C	16,688
G-11	CHARCUTERIE	4			1-4FT	1	Barker SMD-4R	650	+20	O C	2,600
G-12	SERVICE DELI	12	1			1	Barker SSD	450	+20	O C	5,400
G-13A	DELI WORK TOP FRIG 1	7			1-7FT	1	Barker SB	670	+20	O C	4,690
G-13B	DELI WORK TOP FRIG 2	7			1-7FT	1	Barker SB	670	+20	O C	4,690
G-14	GRAB-N-GO	28	1	2	1-90° w	4	Hill O5DMH	1435	+20	O C	45,640
G-15A	OLIVE BAR (TOP)	10	1			1	Barker SB/CWC	300	+20	O C	3,000
G-15B	OLIVE BAR (UNDER)	10	1			1	Barker SB	370	+20	O C	3,700
G-16	WINE	16		2		2	Barker QC	1500	+20	O C	24,000
G-17	SD CHEESE	12	1		1-90° w	2	Barker DLPC	650	+20	O C	10,400

TOTAL LOAD = 951,1
02