

Evaporator Temperature and Glide

Technical Bulletin

Product: Refrigerant blends with glide (R-400 series)

Bulletin#: 07 rev 0.0

Application: Refrigeration and HVAC



Background

Zeotropic refrigerant blends exhibit a temperature glide (glide) during phase change in the condenser and evaporator. The glide leads to changing temperatures across the heat exchanger. The changing temperature affects the air flowing through the coil. The effect of the changing temperature has typically been calculated by taking the average of the bubble and dew point temperatures.

The use of the average temperature is suitable for the vast majority of applications.

Problem

The precise evaporator temperature will be slightly affected by the temperature of the refrigerant entering the expansion device. This is due to the quality of the refrigerant entering the evaporator. There may be specialty applications where a very precise value for the evaporator temperature is needed.

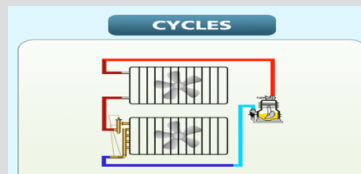
Resolution

Use Honeywell's Genetron® Properties software to determine the precise evaporator temperature.

Download the software from www.honeywell-refrigerants.com/americas/genetron-refrigerants-modeling-software-download.

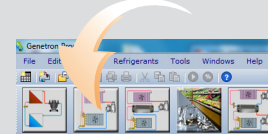
Step 1:

Open the program and Select "CYCLES".



Step 2:

Select the second icon "BASIC CYCLE".



Step 3:

Select your refrigerant.

Input Cycle			
	Parameters	Option	Unit
	Refrigerant	R448A	
	Project Description	Simplified Basic Cycle	
▼ Compressor			

Step 4:

Change liquid line selection to "Expansion Valve Device Inlet". Enter your liquid temperature.

▼ Condenser			
▲ Liquid Line			
?	Temperature Change	Temperature Chang	°C 60
?	Pressure Change	Drop Of Saturation	°C 0

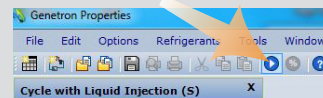
Step 5:

Change evaporator parameter to "Evaporator Pressure". Enter evaporator pressure.

?	Pressure Change	Drop Of Saturation	°C 0
▼ Liquid Injection Line			
▲ Evaporator			

Step 6:

Click the "Run" icon.



Step 7:

Read the evaporator temperature.

Performance Parameters				
Refrigerant	R448A	EER	Btu/W.h	14.21
GWP	1273	Heating COP	-	3.445
Mass Flow	kg/s 0.01587	Subcooling Exp. Dev. In	°C	65
Cooling Capacity	W 3510	Superheat Evap. Out	°C	5
Heating Capacity	W 2903.5	Condensation Temp.	°C	56.85
Power	kW 0.843	Evaporation Temp.	°C	-3.15
Cooling COP	- 4.165			

Tables for R-448A and R-407F evaporator temperatures are given below for convenience.

LIQUID TEMPERATURE ENTERING TXV °F	EVAPORATOR PRESSURE psig							
	5	10	20	30	40	50	60	70
	COIL TEMPERATURE °F - R-448A							
40	-33.3	-24.3	-9.9	1.6	11.3	19.6	27.1	35.8
50	-33.1	-24.1	-9.7	1.8	11.4	19.8	27.2	33.9
60	-35.0	-23.9	-9.5	1.9	11.6	19.9	27.4	34.1
70	-32.8	-23.8	-9.4	2.1	11.7	20.1	27.5	34.2
80	-32.6	-23.6	-9.2	2.3	11.9	20.3	27.7	34.4
90	-32.4	-23.4	-9.0	2.5	12.1	20.5	27.9	34.6
100	-32.2	-23.2	-8.8	2.7	12.3	20.7	28.1	34.8
110	-32.0	-23.0	-8.6	2.9	12.5	20.9	28.3	35.0
120	-31.7	-22.7	-8.3	3.1	12.7	21.1	28.5	35.2
AVERAGE COIL TEMPERATURE °F	-34.3	-25.2	-10.6	1.0	10.8	19.2	26.8	33.6

Table 1: R-448A Evaporator Coil Temperature

LIQUID TEMPERATURE ENTERING TXV °F	EVAPORATOR PRESSURE psig							
	5	10	20	30	40	50	60	70
	COIL TEMPERATURE °F - R-448A							
40	-33.1	-24.2	-10.0	1.4	10.9	19.1	26.5	33.1
50	-32.9	-24.0	-9.8	1.5	11.0	19.3	26.6	33.2
60	-32.8	-23.9	-9.7	1.7	11.2	19.4	26.7	33.4
70	-32.6	-23.7	-9.5	1.8	11.3	19.6	26.9	33.5
80	-32.4	-23.5	-9.3	2.0	11.5	19.7	27.1	33.7
90	-32.2	-23.4	-9.1	2.2	11.7	19.9	27.2	33.9
100	-32.0	-23.2	-9.0	2.4	11.9	20.1	27.4	34.0
110	-31.8	-23.0	-8.7	2.6	12.1	20.3	27.6	34.2
120	-31.6	-22.7	-8.5	2.8	12.3	20.5	27.8	34.4
AVERAGE COIL TEMPERATURE °F	-34.1	-25.1	-10.7	0.8	10.4	18.8	26.2	32.9

Table 2: R-407F Evaporator Coil Temperature

For more information:

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