

Evaporator Temperature and Glide

Technical Bulletin

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

Bulletin#: 07 rev 1.0

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".



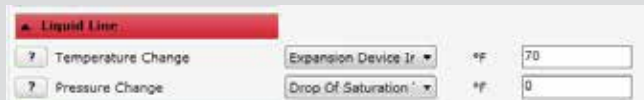
Step 2:
Select the second icon "BASIC CYCLE".



Step 3:
Select your refrigerant.



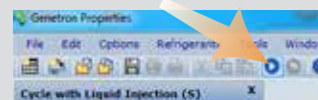
Step 4:
Change liquid line selection to "Expansion Valve Device Inlet".
Enter your liquid temperature.



Step 5:
Change evaporator parameter to "Evaporator Pressure". Enter evaporator pressure.



Step 6:
Click the "Run" icon.



Step 7:
Read the evaporator temperature.

Performance Parameters

Refrigerant	R448A	EER	Btu/w.h	5.447
GWP	1273	Heating COP	-	2.127
Mass Flow	lb/s 0.04873	Subcooling Exp. Dev. In	°F	60.76
Cooling Capacity	Btu/h 11984.6	Superheat Evap. Out	°F	9
Heating Capacity	Btu/h 15968.3	Condensation Temp.	°F	134.33
Power	kW 2.199	Evaporation Temp.	°F	-23.77
Cooling COP	- 1.597			

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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