SPORLAN

PRESSURE-TEMPERATURE CHART at Sea Level

PSIG	TEMPERATURE °F									
	REFRIGERANT - (Sporlan Code)									
	22 (V)	134a (J)	404A (S)		407A (V)		407C (N)		407F (N)	
			Bubble Point	Dew Point	Bubble Point	Dew Point	Bubble Point	Dew Point	Bubble Point	Dew Point
5*	-48	-22	-58	-57	-56	-44	-53	-41	-58	-46
4*	-47	-20	-57	-55	-54	-43	-52	-39	-56	-45
3*	-45	-19	-55	-54	-53	-41	-50	-38	-55	-43
2*	-44	-18	-54	-52	-52	-40	-49	-36	-53	-42
1*	-43	-16	-52	-51	-50	-39	-48	-35	-52	-41
0	-41	-15	-51	-50	-49	-37	-47	-34	-51	-39
1	-39	-12	-49	-47	-47	-35	-44	-31	-48	-37
2	-36	-10	-46	-45	-44	-33	-42	-29	-46	-35
3	-34	-7	-44	-43	-42	-31	-39	-27	-44	-33
4	-32	-5	-42	-41	-40	-28	-37	-25	-42	-30
5	-30	-3	-40	-39	-38	-26	-35	-23	-40	-28
6	-28	-1	-38	-37	-36	-25	-33	-21	-38	-27
7	-26	1	-36	-35	-34	-23	-31	-19	-36	-25
8	-24	3	-34	-33	-32	-21	-29	-17	-34	-23
9	-22	5	-32	-31	-30	-19	-28	-15	-32	-21
10	-20	7	-31	-29	-29	-17	-26	-14	-31	-20
11	-19	8	-29	-28	-27	-16	-24	-12	-29	-18
12	-17	10	-27	-26	-25	-14	-23	-11	-27	-16
13	-15	12	-26	-24	-24	-13	-21	-9	-26	-15
14	-14	13	-24	-23	-22	-11	-20	-7	-24	-13
15	-12	15	-23	-21	-21	-10	-18	-6	-23	-12
16	-11	16	-21	-20	-19	-8	-17	-5	-22	-11
17	-9	18	-20	-19	-18	-7	-15	-3	-20	-9
18	-8	19	-18	-17	-17	-6	-14	-2	-19	-8
19	-7	21	-17	-16	-15	-4	-13	-1	-17	-7
20	-5	22	-16	-15	-14	-3	-11	1	-16	-5
21	-4	24	-14	-13	-13	-2	-10	2	-15	-4
22	-3	25	-13	-12	-11	-1	-9	3	-14	-3
23	-1	26	-12	-11	-10	1	-7	4	-12	-2
24	0	27	-11	-10	-9	2	-6	6	-11	0
25	1	29	-9	-8	-8	3	-5	7	-10	1
26	2	30	-8	-7	-7	4	-4	8	-9	2
27	4	31	-7	-6	-6	5	-3	9	-8	3
28	5	32	-6	-5	-4	6	-2	10	-7	4
29	6	33	-5	-4	-3	7	-1	11	-6	5
30	7	35	-4	-3	-2	8	1	12	-5	6
31	8	36	-3	-2	-1	9	2	13	-4	7
32	9	37	-2	-1	0	10	3	14	-3	8
33	10	38	-1	0	1	11	4	15	-1	9
34	11	39	0	1	2	12	5	16	-1	10
35	12	40	1	2	3	13	6	17	0	11
36	13	41	2	3	4	14	7	18	1	12
37	14	42	3	4	5	15	8	19	2	13
38	15	43	4	5	6	16	9	20	3	14
39	16	44	5	6	7	17	10	21	4	15
40	17	45	6	7	7	18	10	22	5	16
42	19	47	8	9	9	20	12	24	7	17
44	21	49	10	11	11	21	14	25	9	19
46	23	51	11	13	13	23	16	27	10	21
48	24	52	13	14	14	25	17	29	12	22
50	26	54	15	16	16	26	19	30	14	24
52	28	56	16	17	18	28	21	32	15	25
54	29	57	18	19	19	29	22	33	17	27
56	31	59	20	21	21	31	24	35	18	28
58	32	60	21	22	22	32	25	36	20	30
60	34	62	23	24	24	34	27	38	21	31
62	35	64	24	25	25	35	28	39	23	33
64	37	65	25	26	26	36	29	41	24	34
66	38	66	27	28	28	38	31	42	25	35
68	40	68	28	29	29	39	32	43	27	37
70	41	69	30	30	30	40	34	45	28	38
72	42	71	31	32	32	42	35	46	29	39
74	44	72	32	33	33	43	36	47	30	40
76	45	73	33	34	34	44	37	48	32	42
78	46	75	35	36	35	45	39	50	33	43
80	47	76	36	37	37	47	40	51	34	44
85	51	79	39	40	40	49	43	54	37	47
90	54	82	42	43	42	52	46	56	40	50
95	56	85	45	45	45	55	48	59	43	52
100	59	88	47	48	48	57	51	62	45	55
105	62	90	50	51	50	60	54	64	48	57
110	64	93	52	53	53	62	56	67	50	60
115	67	96	55	56	55	65	59	69	53	62
120	69	98	57	58	58	67	61	71	55	64
125	72	100	60	60	60	69	63	73	57	66
130	74	103	62	63	62	71	65	76	59	69
135	76	105	64	65	64	73	68	78	61	71
140	78	107	66	67	66	75	70	80	63	73
145	81	109	68	69	68	77	72	82	66	75
150	83	112	70	71	70	79	74	84	68	77
155	85	114	72	73	72	81	76	86	69	78
160	87	116	74	75	74	83	78	88	71	80
165	89	118	76	77	76	85	80	89	73	82
170	91	120	78	79	78	87	82	91	75	84
175	92	121	80	81	80	89	83	93	77	86
180	94	123	82	82	82	90	85	95	79	87
185	96	125	83	84	83	92	87	96	80	89
190	98	127	85	86	85	94	89	98	82	91
195	100	129	87	88	87	95	90	100	84	92
200	101	130	89	89	88	97	92	101	85	94
205	103	132	90	91	90	98	94	103	87	95
210	105	134	92	92	92	100	95	104	88	97
220	108	137	95	96	95	103	98	107	92	100
230	111	140	98	99	98	106	101	110	95	103
240	114	143	101	102	101	109	104	113	97	105
250	117	146	104	104	104	111	107	116	100	108
260	120	149	107	107	106	114	110	119	103	111
275	124	153	111	111	110	118	114	122	107	115
290	128	157	115	115	114	121	118	126	111	118
305	132	161	118	119	118	125	122	130	114	122
320	136	165	122	122	121	128	125	133	118	125
335	139	169	125	126	125	132	129	136	121	128
350	143	172	129	129	128	135	132	140	125	132
365	146	176	132	132	132	138	135	143	128	135
380	150	179	135	136	135	141	139	146	131	138
400	154	183	139	140	139	145	143	150	135	141
420	158	187	143	144	143	149	147	153	139	145
440	162	191	147	147	147	152	150	157	143	149
460	166	195	151	151	150	155	154	160	146	152
480	169	198	154	154	154	159	158	164	150	155
500	173	202	157	158	157	162	161	167	153	158

* Inches mercury below one atmosphere

MAKE A SYSTEMATIC ANALYSIS

Based on the complaint and measurements taken

Changing Parts Might Be The First Reaction
BUT...
1. May not be necessary and...
2. Does not always solve the problem

SUPERHEAT AND SUCTION PRESSURE

symptoms can provide the real cause

POSSIBLE CAUSES

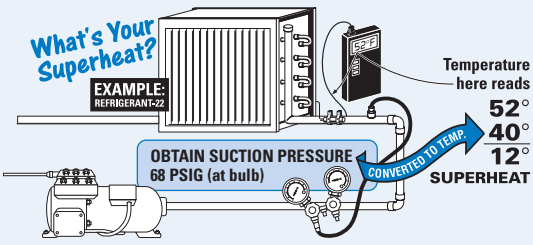
1. Oversized valve
2. TEV seat leak
3. Low superheat adjustment
4. Bulb installation
   a. Poor thermal contact
   b. Warm location
5. Wrong thermostatic charge
6. Bad compressor – low capacity
7. Moisture, dirt, wax
8. Incorrectly located external equalizer

POSSIBLE CAUSES

1. Moisture, dirt, wax
2. Undersized valve
3. High superheat adjustment
4. Gas charge condensation
5. Dead thermostatic element charge
6. Wrong thermostatic charge
7. Evaporator pressure drop — no external equalizer
8. External equalizer location
9. Restricted or capped external equalizer
10. Low refrigerant charge
11. Liquid line vapor
    a. Vertical lift
    b. High friction loss
    c. Long or small line
    d. Plugged drier or strainer
12. Low pressure drop across valve
    a. Same as #11 above
    b. Undersized distributor nozzle or circuits
    c. Low condensing temperature

POSSIBLE CAUSES

1. Low load
   a. Not enough air
   b. Dirty air filters
   c. Air too cold
   d. Coil icing
2. Poor air distribution
3. Poor refrigerant distribution
4. Improper compressor-evaporator balance
5. Evaporator oil logged
6. Flow from one TEV affecting another's bulb



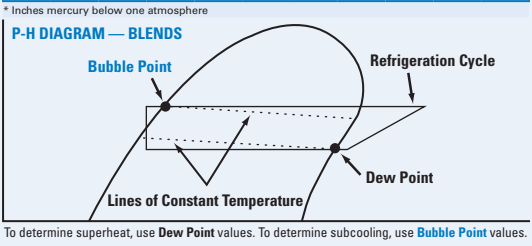
SPORLAN

PRESSURE-TEMPERATURE CHART at Sea Level

PSIG	TEMPERATURE °F — REFRIGERANT - (Sporlan Code)									
	410A (Z)		438A (V)		448A (D)		449A (D)		507 (P)	513A (J)
	Bubble Point	Dew Point	Bubble Point	Dew Point	Bubble Point	Dew Point	Bubble Point	Dew Point		
5*	-67	-67	-51	-40	-58	-46	-57	-47	-59	-28
4*	-66	-65	-50	-38	-56	-45	-56	-45	-57	-27
3*	-64	-64	-48	-37	-55	-44	-54	-44	-56	-25
2*	-63	-63	-47	-36	-54	-42	-53	-43	-55	-24
1*	-62	-62	-45	-34	-52	-41	-52	-41	-53	-23
0	-61	-60	-44	-33	-51	-40	-50	-40	-52	-21
1	-58	-58	-42	-31	-49	-37	-48	-38	-50	-19
2	-56	-56	-39	-28	-46	-35	-45	-35	-47	-16
3	-54	-54	-37	-26	-44	-33	-43	-33	-45	-14
4	-52	-52	-35	-24	-42	-31	-41	-31	-43	-11
5	-50	-50	-33	-22	-40	-29	-39	-29	-41	-9
6	-48	-48	-31	-20	-38	-27	-37	-27	-39	-7
7	-46	-46	-29	-18	-36	-25	-35	-25	-37	-5
8	-45	-44	-27	-16	-34	-23	-33	-23	-35	-3
9	-43	-43	-25	-14	-32	-21	-32	-21	-33	-1
10	-41	-41	-23	-13	-31	-20	-30	-20	-32	1
11	-40	-39	-22	-11	-29	-18	-28	-18	-30	3
12	-38	-38	-20	-9	-27	-17	-27	-17	-28	4
13	-37	-36	-18	-8	-26	-15	-25	-15	-27	6
14	-35	-35	-17	-6	-24	-13	-24	-13	-25	8
15	-34	-34	-15	-5	-23	-12	-22	-12	-24	9
16	-32	-32	-14	-3	-21	-11	-21	-11	-22	11
17	-31	-31	-13	-2	-20	-9	-19	-9	-21	12
18	-30	-30	-11	-1	-19	-8	-18	-8	-19	14
19	-29	-28	-10	1	-17	-7	-16	-7	-18	15
20	-27	-27	-8	2	-16	-5	-15	-5	-17	17
21	-26	-26	-7	3	-15	-4	-14	-4	-16	18
22	-25	-25	-6	5	-13	-3	-13	-3	-14	19
23	-24	-24	-5	6	-12	-2	-11	-1	-13	21
24	-23	-22	-3	7	-11	0	-10	0	-12	22
25	-21	-21	-2	8	-10	1	-9	1	-11	23
26	-20	-20	-1	9	-9	2	-8	2	-9	24
27	-19	-19	0	10	-8	3	-7	3	-8	26
28	-18	-18	1	12	-6	4	-6	4	-7	27
29	-17	-17	2	13	-5	5	-5	5	-6	28
30	-16	-16	4	14	-4	6	-3	6	-5	29
31	-15	-15	5	15	-3	7	-2	7	-4	30
32	-14	-14	6	16	-2	8	-1	8	-3	32
33	-13	-13	7	17	-1	9	0	9	-2	33
34	-12	-12	8	18	0	10	1	10	-1	34
35	-11	-11	9	19	1	11	2	11	0	35
36	-10	-10	10	20	2	12	3	12	1	36
37	-10	-9	11	21	3	13	4	13	2	37
38	-9	-8	12	22	4	14	5	14	3	38
39	-8	-8	13	23	5	15	5	15	4	39
40	-7	-7	14	24	6	16	6	16	5	40
42	-5	-5	15	25	7	18	8	18	7	42
44	-4	-3	17	27	9	20	10	20	9	44
46	-2	-2	19	29	11	21	12	21	10	46
48	0	0	21	30	12	23	13	23	12	47
50	1	1	22	32	14	24	15	25	14	49
52	3	3	24	34	16	26	17	26	15	51
54	4	4	25	35	17	28	18	28	17	52
56	6	6	27	37	19	29	20	29	18	54
58	7	7	29	38	20	30	21	31	20	56
60	8	9	30	40	22	32	23	32	21	57
62	10	10	32	41	23	33	24	33	23	59
64	11	11	33	42	24	35	25	35	24	60
66	12	13	34	44	26	36	27	36	26	62
68	14	14	36	45	27	37	28	38	27	63
70	15	15	37	46	28	39	29	39	28	65
72	16	16	38	48	30	40	31	40	30	66
74	17	17	40	49	31	41	32	41	31	67
76	18	19	41	50	32	42	33	43	32	69
78	20	20	42	52	34	44	34	44	33	70
80	21	21	43	53	35	45	36	45	35	71
85	24	24	46	56	38	48	39	48	38	75
90	26	26	49	59	41	51	41	51	40	78
95	29	29	52	61	43	53	44	53	43	81
100	31	31	55	64	46	56	47	56	46	84
105	34	34	58	66	49	58	49	59	48	86
110	36	36	60	69	51	61	52	61	51	89
115	38	39	63	71	53	63	54	63	53	92
120	41	41	65	74	56	65	57	66	56	94
125	43	43	67	76	58	68	59	68	58	97
130	45	45	70	78	60	70	61	70	60	99
135	47	47	72	80	62	72	63	72	63	101
140	49	49	74	82	65	74	66	74	65	104
145	51	51	76	84	67	76	68	76	67	106
150	53	53	78	86	69	78	70	78	69	108
155	54	55	80	88	71	80	72	80	71	110
160	56	56	82	90	73	82	74	82	73	112
165	58	58	84	92	74	84	75	84	75	114
170	60	60	86	94	76	85	77	86	77	116
175	61	62	88	96	78	87	79	88	78	118
180	63	63	90	98	80	89	81	89	80	120
185	65	65	91	99	82	91	83	91	82	122
190	66	67	93	101	83	92	84	93	84	124
195	68	68	95	103	85	94	86	94	85	126
200	69	70	97	104	87	96	88	96	87	127
205	71	71	98	106	88	97	89	98	89	129
210	72	73	100	107	90	99	91	99	90	131
220	75	76	103	110	93	102	94	102	93	134
230	78	78	106	113	96	105	97	105	96	137
240	81	81	109	116	99	107	100	108	99	141
250	84	84	112	119	102	110	103	111	102	144
260	86	86	115	122	105	113	106	113	105	147
275	90	90	119	126	109	117	110	117	109	151
290	94	94	123	130	112	120	114	121	113	155
305	97	97	127	133	116	124	117	124	117	159
320	100	101	130	137	120	127	121	128	120	163
335	104	104	134	140	123	131	124	131	124	166
350	107	107	137	143	127	134	128	135	127	170
365	110	110	141	146	130	137	131	138	130	174
380	113	113	144	149	133	140	134	141	133	177
400	116	117	148	153	137	144	138	145	137	181
420	120	120	152	157	141	148	142	148	141	185
440	124	124	156	161	145	151	146	152	145	189
460	127	127	160	164	149	155	150	155	149	193
480	130	131	163	168	152	158	153	159	152	197
500	134	134	167	171	156	161	157	162	156	200

* Inches mercury below one atmosphere

P-H DIAGRAM — BLENDS



To determine superheat, use **Dew Point** values. To determine subcooling, use **Bubble Point** values.

APPROXIMATE PRESSURE CONTROL SETTINGS

Pressure - Pounds Per Square Inch Gauge

APPLICATION	TEMPERATURE RANGE (°F)	EVAPORATOR TD (°F)	REFRIGERANT 22 Out	22 In	134a Out	134a In	404A Out	404A In	507 Out	507 In
Beverage Cooler Floral Cooler Produce Cooler	35 to 38	15	41	66	17	33	53	82	56	86
Smoked Meat Cooler Meat Reach Thru Service Deli Seafood	32 to 35	15	38	62	15	30	49	77	52	81
Multi-Deck Fresh Meat	26 to 29	15	32	54	11	25	42	68	45	72
Frozen Glass Door	-10 to 0	10	9	24	-	-	15	33	16	35
Frozen Walk-In, Frozen Ice Cream	-30 to -20	10	0	10	-	-	4	16	4	18
Frozen Food - Open Type										

Pressure control settings assume a suction line pressure loss equivalent to 2°F.

CARRYING CAPACITY OF REFRIGERATION LINES

Tons of Refrigeration - 200 Feet Equivalent Pipe Length

TYPE L COPPER TUBE O.D. Inches	REFRIGERANT 22 Liquid Line	22 Suction Line	134a Liquid Line	134a Suction Line	404A / 507 Liquid Line	404A / 507 Suction Line	R407A Liquid Line	R407A Suction Line	R448A / R449A Liquid Line	R448A / R449A Suction Line
	20°F Evap.		20°F Evap.		-20°F Evap.		20°F Evap.		-20°F Evap.	
3/8	0.99	0.09	0.73	0.06	0.71	0.04	1.01	0.07	0.93	0.03
1/2	2.37	0.23	1.77	0.13	1.71	0.10	2.42	0.18	2.23	0.07
5/8	4.48	0.43	3.36	0.25	3.23	0.18	4.57	0.33	4.2	0.13
7/8	11.9	1.13	8.97	0.67	8.58	0.49	12.1	0.88	11.1	0.36
1-1/8	24.3	2.30	18.3	1.36	17.5	0.99	24.6	1.79	22.55	0.73
1-3/8	42.6	4.02	32.2	2.38	30.6	1.74	42.9	3.14	39.35	1.3
1-5/8	67.6	6.37	51.1	3.78	48.4	2.76	67.9	4.97	62.25	2.05
2-1/8	141	13.2	107	7.88	101	5.74	141	10.3	129.5	4.27
2-5/8	250	23.4	190	14.0	179	10.2	249	18.3	228.5	7.57
3-1/8	400	37.5	304	22.4	286	16.3	398	29.2	365	12.15
3-5/8	595	55.7	453	33.3	425	24.2	592	43.4	542	18.05
4-1/8	841	78.7	641	47.0	600	34.2	835	61.2	764	25.5

Refrigerants 22, 134a, 404A, and 507 values are based on 100°F liquid temperature and the stated evaporator temperature. Both suction and liquid line values are based on a pressure drop equivalent to 1°F change in saturation temperature. For additional information on refrigerant line sizing, consult ASHRAE's Refrigeration Handbook or equipment manufacturer.

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