

SPORLAN

PRESSURE-TEMPERATURE CHART

at Sea Level

PSIG	TEMPERATURE °F					
	LIGHT GREEN	LIGHT BLUE	ROSE	TEAL	WHITE	NAVY BLUE
	REFRIGERANT - (SPORLAN CODE)					
	22 (V)	134a (J)	410A (Z)	507 (P)	717 (A)	438A (V)
5*	-48	-22	-67	-59	-35	-40
4*	-47	-21	-66	-58	-33	-38
3*	-46	-19	-64	-56	-32	-37
2*	-44	-18	-63	-55	-30	-36
1*	-43	-16	-62	-53	-29	-34
0	-41	-15	-61	-52	-28	-33
1	-39	-12	-58	-50	-26	-31
2	-36	-10	-56	-47	-23	-28
3	-34	-7	-54	-45	-21	-26
4	-32	-5	-52	-43	-19	-24
5	-30	-3	-50	-41	-17	-22
6	-28	-1	-48	-39	-15	-20
7	-26	1	-46	-37	-13	-18
8	-24	3	-45	-35	-12	-16
9	-22	5	-43	-33	-10	-14
10	-20	7	-41	-32	-8	-13
11	-19	8	-40	-30	-7	-11
12	-17	10	-38	-28	-5	-9
13	-15	12	-37	-27	-4	-8
14	-14	13	-35	-25	-2	-6
15	-12	15	-34	-24	-1	-5
16	-11	16	-32	-22	0	-3
17	-9	18	-31	-21	2	-2
18	-8	19	-30	-19	3	-1
19	-7	21	-29	-18	4	1
20	-5	22	-27	-17	6	2
21	-4	24	-26	-16	7	3
22	-3	25	-25	-14	8	5
23	-1	26	-24	-13	9	6
24	0	27	-23	-12	10	7
25	1	29	-21	-11	11	8
26	2	30	-20	-9	12	9
27	4	31	-19	-8	14	10
28	5	32	-18	-7	15	12
29	6	33	-17	-6	16	13
30	7	35	-16	-5	17	14
31	8	36	-15	-4	18	15
32	9	37	-14	-3	19	16
33	10	38	-13	-2	20	17
34	11	39	-12	-1	20	18
35	12	40	-11	0	21	19
36	13	41	-10	1	22	20
37	14	42	-10	2	23	21
38	15	43	-9	3	24	22
39	16	44	-8	4	25	23
40	17	45	-7	5	26	24
42	19	47	-5	7	28	25
44	21	49	-4	9	29	27
46	23	51	-2	10	31	29
48	24	52	0	12	32	30
50	26	54	1	14	34	32
52	28	56	3	15	35	34
54	29	57	4	17	37	35
56	31	59	6	18	38	37
58	32	60	7	20	40	38
60	34	62	8	21	41	40
62	35	64	10	23	42	41
64	37	65	11	24	44	42
66	38	66	12	26	45	44
68	40	68	14	27	46	45
70	41	69	15	28	47	46
72	42	71	16	30	49	48
74	44	72	17	31	50	49
76	45	73	18	32	51	50
78	46	75	20	33	52	52
80	48	76	21	35	53	53
85	51	79	24	38	56	56
90	54	82	26	40	59	59
95	56	85	29	43	61	61
100	59	88	31	46	63	64
105	62	90	34	48	66	66
110	64	93	36	51	68	69
115	67	96	38	53	70	71
120	69	98	41	56	73	75
125	72	100	43	58	75	77
130	74	103	45	60	77	80
135	76	105	47	63	79	82
140	78	107	49	65	81	84
145	81	109	51	67	82	86
150	83	112	53	69	84	88
155	85	114	54	71	86	90
160	87	116	56	73	88	91
165	89	118	58	75	90	93
170	91	120	60	77	91	95
175	93	122	61	78	93	97
180	94	123	63	80	95	99
185	96	125	65	82	96	101
190	98	127	66	84	98	103
195	100	129	68	85	99	105
200	101	130	69	87	101	107
205	103	132	71	89	102	109
210	105	134	72	90	104	111
220	108	137	75	93	107	115
230	111	140	78	96	109	119
240	114	143	81	99	112	123
250	117	146	84	102	115	127
260	120	149	86	105	117	131
275	124	153	90	109	121	135
290	128	157	94	113	124	139
305	132	161	97	117	128	143
320	136	165	100	120	131	147
335	139	169	104	124	134	151
350	143	172	107	127	137	155
365	146	176	110	130	140	159
380	150	179	113	133	143	163
400	154	183	117	138	147	167
420	158	187	120	141	150	171
440	162	191	124	145	154	175
460	166	195	127	149	157	179
480	170	198	130	152	160	183
500	173	202	134	156	163	187

BUBBLE POINT

DEW POINT

* 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. 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

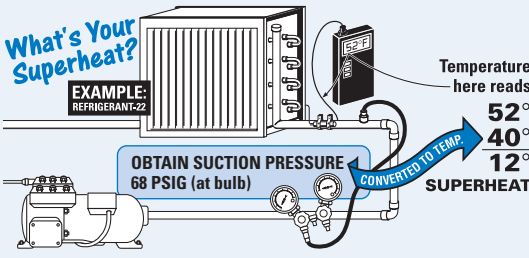
POSSIBLE CAUSES

1. 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. 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



What's Your Superheat?

EXAMPLE: REFRIGERANT-22

SPORLAN

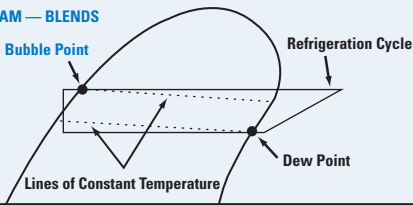
PRESSURE-TEMPERATURE CHART

at Sea Level

PSIG	TEMPERATURE °F					
	CORAL	ORANGE	LIME GREEN	MEDIUM BROWN	LIGHT GREEN	LIME GREEN
	REFRIGERANT - (SPORLAN CODE)					
	401A (X)	404A (S)	407A (V)	407C (N)	407F (V)	422D (V)
5*	-24	-57	-44	-41	-46	-44
4*	-23	-55	-43	-39	-45	-42
3*	-21	-54	-41	-38	-43	-41
2*	-20	-52	-40	-36	-42	-40
1*	-18	-51	-39	-35	-41	-38
0	-17	-50	-37	-34	-39	-37
1	-14	-47	-35	-31	-37	-35
2	-12	-45	-33	-29	-35	-32
3	-9	-43	-31	-27	-33	-30
4	-7	-41	-28	-25	-30	-28
5	-5	-39	-26	-23	-28	-26
6	-3	-37	-25	-21	-27	-24
7	-1	-35	-23	-19	-25	-22
8	1	-33	-21	-17	-23	-20
9	3	-31	-19	-15	-21	-18
10	5	-29	-17	-14	-20	-17
11	7	-28	-16	-12	-18	-15
12	8	-26	-14	-11	-16	-13
13	10	-24	-13	-9	-15	-12
14	12	-23	-11	-7	-13	-10
15	13	-21	-10	-6	-12	-9
16	15	-20	-8	-5	-11	-7
17	16	-19	-7	-3	-9	-6
18	18	-17	-6	-2	-8	-5
19	19	-16	-4	-1	-7	-3
20	21	-15	-3	1	-5	-2
21	22	-13	-2	2	-4	-1
22	23	-12	-1	3	-3	0
23	25	-11	1	4	-2	2
24	26	-10	2	6	0	3
25	27	-8	3	7	1	4
26	28	-7	4	8	2	5
27	30	-6	5	9	3	6
28	31	-5	6	10	4	7
29	32	-4	7	11	5	9
30	33	-3	8	12	6	10
31	34	-2	9	13	7	11
32	35	-1	10	14	8	12
33	36	0	11	15	9	13
34	37	1	12	16	10	14
35	38	2	13	17	11	15
36	39	3	14	18	12	16
37	41	4	15	19	13	17
38	42	5	16	20	14	18
39	43	6	17	21	15	18
40	44	7	18	22	16	19
42	45	9	20	24	17	21
44	47	11	21	25	19	23
46	49	13	23	27	21	25
48	51	14	25	29	22	26
50	53	16	26	30	24	28
52	54	17	28	32	25	30
54	56	19	29	33	27	31
56	58	21	31	35	28	33
58	59	22	32	36	30	34
60	61	22	34	38	31	36
62	62	25	35	39	33	37
64	64	26	36	41	34	38
66	65	28	38	42	35	40
68	67	29	39	43	37	41
70	68	30	40	45	38	42
72	69	32	42	46	39	44
74	71	33	43	47	40	45
76	63	34	44	48	42	46
78	65	36	45	50	43	47
80	66	37	47	51	44	49
85	69	40	49	54	47	52
90	72	43	52	56	50	54
95	75	45	55	59	52	57
100	78	48	57	62	55	60
105	81	51	60	64	57	62
110	84	53	62	67	60	65
115	86	56	65	69	62	67
120	89	58	67	71	64	70
125	91	60	69	73	66	72
130	94	63	71	75	69	75
135	96	65	74	78	71	77
140	98	67	76	80	73	79
145	101	69	78	82	75	81
150	103	71	80	83	77	83
155	105	72	82	85	79	85
160	107	74	83	87	80	87
165	109	76	85	89	82	89
170	111	78	87	90	84	91
175	113	80	88	92	85	93
180	115	82	90	94	87	94
185	117	83	92	95	88	95
190	119	85	95	98	92	98
195	121	87	98	101	95	100
200	123	89	101	104	97	103
205	124	90	104	107	100	106
210	126	92	106	110	103	109
220	130	95	110	114	107	112
230	133	98	114	118	111	114
240	136	101	118	122	114	119
250	139	104	121	125	118	122
260	142	107	125	129	121	126
275	147	111	128	132	125	130
290	151	115	132	135	128	134
305	155	118	135	139	131	137
320	159	122	139	143	135	140
335	163	125	143	147	139	144
350	166	129	147	151	143	148
365	170	132	150	154	146	152
380	174	135	154	158	150	156
400	178	139	157	161	153	159
420	182	143				163
440	187	147				166
460	191	151				
480	195	154				
500	198	157				

* 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		134a		404A		507	
			Out	In	Out	In	Out	In	Out	In
Beverage Cooler	35 to 38	15	41	66	17	33	53	82	56	86
Floral Cooler										
Produce Cooler										
Smoked Meat Cooler	32 to 35	15	38	62	15	30	49	77	52	81
Meat Reach Thru										
Service Deli										
Seafood										
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										
Frozen Food - Open Type	-30 to -20	10	0	10	-	-	4	16	4	18

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						IRON PIPE SIZE Inches	SCHEDULE	REFRIGERANT 717 (Ammonia)	
	22		134a		404A / 507				Liquid Line	Suction Line
	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line				
	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	3/8	80	10.2	0.41
1/2	2.37	0.23	1.77	0.13	1.71	0.10	1/2	80	20.1	0.81
5/8	4.48	0.43	3.36	0.25	3.23	0.18	3/4	80	45.5	1.85
7/8	11.9	1.13	8.97	0.67	8.58	0.49	1	80	89.4	3.64
1-1/8	24.3	2.30	18.3	1.36	17.5	0.99	1-1/4	80	192	7.84
1-3/8	42.6	4.02	32.2	2.38	30.6	1.74	1-1/2	80	293	12.0
1-5/8	67.6	6.37	51.1	3.78	48.4	2.76	2	40	683	28.0
2-1/8	141	13.2	107	7.88	101	5.74	2-1/2	40	1090	44.7
2-5/8	250	23.4	190	14.0	179	10.2	3	40	1930	79.1
3-1/8	400	37.5	304	22.4	286	16.3	3-1/2	40	2820	116
3-5/8	595	55.7	453	33.3	425	24.2	4	40	3930	162
4-1/8	841	78.7	641	47.0	600	34.2	5	40	7100	292

Refrigerants 22, 134a, 404A, and 507 values are based on 100°F liquid temperature and the stated evaporator temperature. Refrigerant 717 (ammonia) values are based on 86°F liquid temperature and 20°F 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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