

# SPORLAN

## PRESSURE-TEMPERATURE CHART

at Altitude – 5,000 feet above Sea Level

PSIG	TEMPERATURE °F					
	LIGHT GREEN	LIGHT BLUE	CORAL	ROSE	TEAL	WHITE
	REFRIGERANT - (SPORLAN CODE)					
	22 (V)	134a (J)	401A (X)	410A (Z)	507 (P)	717 (A)
5*	-56	-30	-32	-74	-67	-42
4*	-55	-29	-31	-73	-65	-41
3*	-53	-27	-29	-71	-64	-39
2*	-52	-25	-27	-70	-62	-37
1*	-50	-24	-26	-68	-60	-36
0	-48	-22	-24	-67	-59	-35
1	-46	-19	-21	-64	-56	-32
2	-43	-16	-18	-62	-53	-29
3	-40	-14	-16	-59	-51	-27
4	-38	-11	-13	-57	-48	-24
5	-35	-9	-11	-55	-46	-22
6	-33	-6	-8	-53	-44	-20
7	-31	-4	-6	-51	-42	-18
8	-29	-2	-4	-49	-40	-16
9	-27	0	-2	-47	-38	-14
10	-25	2	0	-45	-36	-13
11	-23	4	2	-44	-34	-11
12	-21	6	4	-42	-32	-9
13	-19	8	6	-40	-31	-8
14	-18	9	7	-39	-29	-6
15	-16	11	9	-37	-28	-5
16	-15	13	11	-36	-26	-3
17	-13	14	12	-34	-24	-2
18	-12	16	14	-33	-23	0
19	-10	17	15	-32	-22	1
20	-9	19	17	-30	-20	2
21	-7	20	18	-29	-19	4
22	-6	22	20	-28	-17	5
23	-5	23	21	-27	-16	6
24	-3	24	23	-25	-15	7
25	-2	26	24	-24	-14	9
26	-1	27	25	-23	-12	10
27	1	28	26	-22	-11	11
28	2	29	28	-21	-10	12
29	3	31	29	-20	-9	13
30	4	32	30	-19	-8	14
31	5	33	31	-18	-7	15
32	6	34	32	-17	-6	16
33	7	35	34	-16	-4	17
34	9	36	35	-15	-3	18
35	10	37	36	-14	-2	19
36	11	38	37	-13	-1	20
37	12	39	38	-12	0	21
38	13	40	39	-11	1	22
39	14	41	40	-10	2	23
40	15	43	41	-9	3	24
42	17	44	43	-7	4	25
44	19	46	45	-6	6	27
46	20	48	47	-4	8	29
48	22	50	49	-2	10	30
50	24	52	50	-1	12	32
52	26	54	52	1	13	33
54	27	55	53	2	15	35
56	29	57	54	4	16	36
58	30	59	55	5	18	38
60	32	60	56	7	19	39
62	34	62	57	8	21	41
64	35	63	58	9	22	42
66	36	65	59	11	24	43
68	38	66	60	12	25	45
70	39	67	61	13	27	46
72	41	69	62	15	28	47
74	42	70	63	16	29	48
76	43	72	64	17	31	49
78	45	73	65	18	32	51
80	46	74	66	19	33	52
85	49	77	68	22	36	55
90	52	80	71	25	39	57
95	55	83	74	28	42	60
100	58	86	77	30	45	62
105	60	89	80	33	47	65
110	63	92	82	35	50	67
115	66	94	85	37	52	69
120	68	97	88	39	55	71
125	71	99	90	42	57	74
130	73	102	93	44	59	76
135	75	104	95	46	61	78
140	77	106	97	48	64	80
145	80	108	100	50	66	82
150	82	111	102	52	68	83
155	84	113	104	54	70	85
160	86	115	106	55	72	87
165	88	117	108	57	74	89
170	90	119	110	59	76	90
175	92	121	112	61	77	92
180	93	122	114	62	79	94
185	95	124	116	64	81	95
190	97	126	118	66	83	97
195	99	128	120	67	84	99
200	101	130	122	69	86	100
205	102	131	124	70	88	102
210	104	133	125	72	89	103
220	107	136	129	75	93	106
230	110	140	132	78	96	109
240	113	143	135	80	99	111
250	116	146	139	83	102	114
260	119	149	142	86	104	117
275	124	153	146	89	108	120
290	128	157	150	93	112	124
305	131	161	154	96	116	127
320	135	164	158	100	120	130
335	139	168	162	103	123	134
350	142	172	166	106	127	137
365	146	175	169	109	130	140
380	149	178	173	112	133	143
400	153	183	178	116	137	146
420	158	187	182	120	141	150
440	162	191	186	123	145	153
460	165	194	190	127	148	157
480	169	198	194	130	152	160
500	173	202	198	133	155	163

\* 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

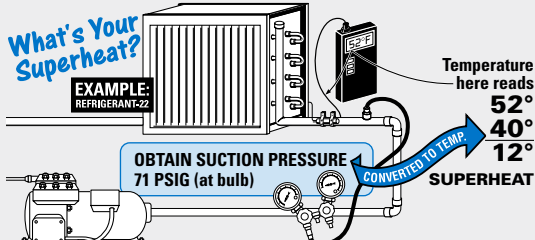
#### POSSIBLE CAUSES

1. Oversized valve
2. TEV seat leak
3. Low superheat adjustment
4. Bulb installation
  - a. Poor installation
  - 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



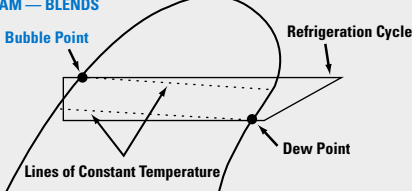
# SPORLAN

## PRESSURE-TEMPERATURE CHART at Altitude – 5,000 feet above Sea Level

PSIG	TEMPERATURE °F					
	BLUE	LIME GREEN	MEDIUM BROWN	LIME GREEN	ORANGE	REDDISH PURPLE
	REFRIGERANT - (SPORLAN CODE)					
	438A (V)	407A (V)	407C (N)	422D (V)	404A (S)	408A (S)
5*	-48	-52	-48	-51	-64	-62
4*	-46	-50	-47	-50	-63	-61
3*	-44	-49	-45	-48	-61	-59
2*	-43	-47	-44	-47	-60	-57
1*	-41	-46	-42	-45	-58	-56
0	-40	-44	-41	-44	-57	-54
1	-37	-41	-38	-41	-54	-51
2	-34	-39	-35	-38	-51	-49
3	-32	-36	-33	-36	-49	-46
4	-29	-34	-30	-33	-46	-44
5	-27	-32	-28	-31	-44	-41
6	-25	-29	-26	-29	-42	-39
7	-23	-27	-24	-27	-40	-37
8	-21	-25	-22	-25	-38	-35
9	-19	-24	-20	-23	-36	-33
10	-17	-22	-18	-21	-34	-31
11	-15	-20	-16	-19	-32	-29
12	-13	-18	-15	-18	-30	-27
13	-12	-17	-13	-16	-28	-26
14	-10	-15	-11	-14	-27	-24
15	-9	-13	-10	-13	-25	-22
16	-7	-12	-8	-11	-24	-21
17	-6	-11	-7	-10	-22	-19
18	-4	-9	-5	-8	-21	-18
19	-3	-8	-4	-7	-19	-16
20	-1	-6	-3	-5	-18	-15
21	0	-5	-1	-4	-17	-13
22	1	-4	0	-3	-15	-12
23	3	-2	1	-1	-14	-11
24	4	-1	3	0	-13	-9
25	5	0	4	1	-11	-8
26	6	1	5	2	-10	-7
27	8	2	6	3	-9	-6
28	9	3	7	5	-8	-5
29	10	5	8	6	-7	-3
30	11	6	10	7	-5	-2
31	12	7	11	8	-4	-1
32	13	8	12	9	-3	0
33	14	9	13	10	-2	1
34	15	10	14	11	-1	2
35	16	11	15	12	0	3
36	17	12	16	13	1	4
37	18	13	17	14	2	5
38	19	14	18	15	3	6
39	20	15	19	16	4	7
40	21	16	20	17	5	8
42	23	18	21	19	7	10
44	25	19	23	21	9	12
46	27	21	25	23	10	14
48	28	23	27	24	12	16
50	30	24	28	26	14	17
52	32	26	30	28	15	19
54	33	27	32	29	17	21
56	35	29	33	31	19	22
58	36	30	35	32	20	24
60	38	32	36	34	22	25
62	39	33	37	35	23	27
64	41	35	39	37	25	28
66	42	36	40	38	26	30
68	43	37	42	39	27	31
70	45	39	43	41	29	33
72	46	40	44	42	30	34
74	47	41	46	43	31	35
76	49	43	47	45	33	37
78	50	44	48	46	34	38
80	51	45	49	47	35	39
85	55	49	53	51	39	43
90	60	54	58	56	44	48
95	65	59	63	61	49	53
100	70	64	68	66	54	58
105	75	69	73	71	59	63
110	80	74	78	76	64	68
115	85	79	83	81	69	73
120	90	84	88	86	74	78
125	95	89	93	91	79	83
130	100	94	98	96	84	88
135	105	99	103	101	89	93
140	110	104	108	106	94	98
145	115	109	113	111	99	103
150	120	114	118	116	104	108
155	125	119	123	121	109	113
160	130	124	128	126	114	118
165	135	129	133	131	119	123
170	140	134	138	136	124	128
175	145	139	143	141	129	133
180	150	144	148	146	134	138
185	155	149	153	151	139	143
190	160	154	158	156	144	148
195	165	159	163	161	149	153
200	170	164	168	166	154	158
205	175	169	173	171	159	163
210	180	174	178	176	164	168
220	190	184	188	186	174	178
230	200	194	198	196	184	188
240	210	204	208	206	194	198
250	220	214	218	216	204	208
260	230	224	228	226	214	218
270	240	234	238	236	224	228
280	250	244	248	246	234	238
290	260	254	258	256	244	248
305	270	264	268	266	254	258
320	280	274	278	276	264	268
335	290	284	288	286	274	278
350	300	294	298	296	284	288
365	310	304	308	306	294	298
380	320	314	318	316	304	308
400	330	324	328	326	314	318
420	340	334	338	336	324	328
440	350	344	348	346	334	338
460	360	354	358	356	344	348
480	370	364	368	366	354	358
500	380	374	378	376	364	368

\* 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 at Altitude - 5,000 Feet above Sea Level

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	43	68	20	36	54	85	57	89
Floral Cooler										
Produce Cooler										
Smoked Meat Cooler	32 to 35	15	40	64	18	33	52	80	55	84
Meat Reach Thru										
Service Deli										
Seafood	26 to 29	15	34	56	14	28	45	71	47	74
Multi-Deck Fresh Meat										
Frozen Glass Door										
Frozen Walk-In	-10 to 0	10	12	26	-	-	17	35	19	38
Frozen Ice Cream										
Frozen Food - Open Type										
	-30 to -20	10	2	13	-	-	6	19	7	20

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				
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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