DuPont Refrigerants

R22 Replacements

PRESSURE-TEMPERATURE GUIDE

Key: **Green (in of Hg) = Vacuum**
Black (psig) = Saturated Vapor (calculate superheat)
Bold (psig) = Saturated Liquid (calculate subcooling)

For 5,000 ft. Elevations: psig + 2.5

	Freon®	ISCEON®			Suva®		
°F	22 (R22)	M099™ (R438A)	M059 (R417A)	M029 (R422D)	407A (R407A)	407C (R407C)	410A (R410A)
-50	6.1	11.4	13.2	9.2	9.0	11.0	4.9
-48	4.8	10.3	12.2	7.9	7.7	9.8	5.9
-46	3.4	9.1	11.1	6.6	6.4	8.6	7.1
-44	1.9	7.8	10.0	5.3	5.0	7.3	8.2
-42	0.4	6.5	8.8	3.8	3.5	6.0	9.4
-40	0.6	5.2	7.6	2.3	2.0	4.6	10.7
-38	1.4	3.8	6.3	0.8	0.4	3.2	12.0
-36	2.2	2.3	4.9	0.4	0.6	1.6	13.3
-34	3.1	0.8	3.5	1.2	1.5	0.1	14.7
-32	4.0	0.4	2.1	2.1	2.3	0.8	16.2
-30	4.9	1.2	0.5	3.0	3.3	1.6	17.7
-28	5.9	2.1	0.5	3.9	4.2	2.5	19.3
-26	6.9	3.0	1.3	4.9	5.2	3.5	20.9
-24	8.0	3.9	2.2	5.9	6.3	4.4	22.6
-22	9.1	4.9	3.1	7.0	7.4	5.4	24.4
-20	10.2	5.9	4.0	8.1	8.5	6.5	26.2
-18	11.4	7.0	5.0	9.2	9.7	7.6	28.1
-16	12.6	8.1	6.0	10.4	10.9	8.7	30.0
-14	13.9	9.2	7.0	11.7	12.2	9.9	32.0
-12	15.2	10.4	8.1	12.9	13.5	11.1	34.1
-10	16.5	11.6	9.2	14.3	14.9	12.3	36.3
-8	17.9	12.9	10.4	15.6	16.3	13.7	38.5
-6	19.4	14.2	11.6	17.1	17.8	15.0	40.8
-4	20.9	15.6	12.8	18.5	19.3	16.4	43.2
-2	22.4	17.0	14.1	20.1	20.9	17.9	45.7
0	24.0	18.5	15.5	21.7	22.5	19.4	48.2
2	25.7	20.0	16.9	23.3	24.2	21.0	50.8
4	27.4	21.6	18.3	25.0	26.0	22.6	53.5
6	29.2	23.2	19.8	26.7	27.8	24.3	56.3
8	31.0	24.9	21.3	28.5	29.7	26.1	59.2
10	32.8	26.6	22.9	30.4	31.6	27.9	62.2
12	34.8	28.4	24.6	32.3	33.6	29.8	65.2
14	36.8	30.3	26.3	34.3	35.7	31.7	68.4
16	38.8	32.2	28.1	36.4	37.8	33.7	71.6
18	40.9	34.2	29.9	38.5	40.0	35.7	74.9
20	43.1	36.2	31.7	40.7	42.3	37.9	78.4
22	45.3	38.3	33.7	42.9	44.7	40.1	81.9
24	47.6	40.5	35.7	45.2	47.1	42.3	85.5
26	50.0	42.8	37.7	47.6	49.6	44.7	89.2
28	52.4	45.1	39.9	50.1	52.2	47.1	93.1
30	55.0	47.5	42.0	52.6	54.8	49.6	97.0
32	57.5	49.9	44.3	55.2	57.6	52.1	101.1
34	60.2	52.5	46.6	57.9	60.4	54.8	105.2
36	62.9	55.1	49.0	60.6	63.3	57.5	109.5
38	65.7	57.7	51.5	63.5	66.3	60.3	113.9
40	68.6	60.5	54.0	66.4	69.4	63.2	118.4
42	71.5	63.3	56.6	69.4	72.5	66.1	123.0
44	74.5	66.3	59.3	72.5	75.8	69.2	127.7
46	77.6	69.3	62.0	75.6	79.1	72.3	132.6
48	80.8	72.3	64.8	78.9	82.6	75.5	137.5
50	84.1	75.5	67.8	82.2	86.1	78.8	142.6
52	87.4	**94.6**	**81.1**	**96.1**	**108.2**	**101.7**	**148.4**
54	90.8	**98.3**	**84.4**	**99.8**	**112.3**	**105.6**	**153.8**
56	94.4	**102.1**	**87.7**	**103.6**	**116.5**	**109.6**	**159.3**
58	98.0	**105.9**	**91.1**	**107.4**	**120.8**	**113.7**	**164.9**
60	101.6	**109.8**	**94.6**	**111.4**	**125.2**	**117.9**	**170.7**
62	105.4	**113.9**	**98.2**	**115.4**	**129.7**	**122.3**	**176.6**
64	109.3	**118.0**	**101.9**	**119.6**	**134.3**	**126.7**	**182.7**
66	113.2	**122.2**	**105.6**	**123.8**	**139.0**	**131.2**	**188.9**
68	117.3	**126.6**	**109.5**	**128.1**	**143.9**	**135.8**	**195.3**
70	121.4	**131.0**	**113.4**	**132.6**	**148.8**	**140.5**	**201.8**
72	125.7	**135.5**	**117.5**	**137.1**	**153.9**	**145.4**	**208.4**
74	130.0	**140.2**	**121.6**	**141.7**	**159.1**	**150.3**	**215.2**
76	134.5	**144.9**	**125.8**	**146.5**	**164.4**	**155.4**	**222.2**
78	139.0	**149.8**	**130.1**	**151.3**	**169.8**	**160.5**	**229.3**
80	143.6	**154.7**	**134.5**	**156.3**	**175.3**	**165.8**	**236.5**
82	148.4	**159.8**	**139.1**	**161.4**	**181.0**	**171.2**	**244.0**
84	153.2	**165.0**	**143.7**	**166.5**	**186.7**	**176.8**	**251.6**
86	158.2	**170.3**	**148.4**	**171.8**	**192.6**	**182.4**	**259.3**
88	163.2	**175.7**	**153.2**	**177.2**	**198.7**	**188.2**	**267.3**
90	168.4	**181.2**	**158.2**	**182.8**	**204.8**	**194.1**	**275.4**
92	173.7	**186.8**	**163.2**	**188.4**	**211.1**	**200.1**	**283.6**
94	179.1	**192.6**	**168.4**	**194.2**	**217.6**	**206.3**	**292.1**
96	184.6	**198.5**	**173.6**	**200.0**	**224.1**	**212.5**	**300.7**
98	190.2	**204.5**	**179.0**	**206.0**	**230.8**	**219.0**	**309.5**
100	195.9	**210.6**	**184.5**	**212.2**	**237.6**	**225.5**	**318.5**
102	201.8	**216.8**	**190.1**	**218.4**	**244.6**	**232.2**	**327.7**
104	207.7	**223.2**	**195.8**	**224.8**	**251.7**	**239.0**	**337.1**
106	213.8	**229.7**	**201.6**	**231.3**	**259.0**	**245.9**	**346.7**
108	220.0	**236.4**	**207.6**	**237.9**	**266.4**	**253.0**	**356.5**
110	226.4	**243.1**	**213.7**	**244.7**	**273.9**	**260.3**	**366.4**
112	232.8	**250.1**	**219.9**	**251.6**	**281.6**	**267.6**	**376.6**
114	239.4	**257.1**	**226.2**	**258.7**	**289.5**	**275.1**	**387.0**
116	246.1	**264.3**	**232.6**	**265.9**	**297.5**	**282.8**	**397.6**
118	253.0	**271.6**	**239.2**	**273.2**	**305.6**	**290.6**	**408.4**
120	260.0	**279.1**	**245.9**	**280.7**	**314.0**	**298.6**	**419.4**
122	267.1	**286.7**	**252.8**	**288.3**	**322.4**	**306.7**	**430.7**
124	274.3	**294.4**	**259.7**	**296.0**	**331.1**	**315.0**	**442.1**
126	281.7	**302.3**	**266.8**	**303.9**	**339.9**	**323.4**	**453.8**
128	289.2	**310.3**	**274.1**	**312.0**	**348.8**	**332.0**	**465.8**
130	296.9	**318.5**	**281.5**	**320.2**	**357.9**	**340.7**	**477.9**
132	304.7	**326.9**	**289.0**	**328.6**	**367.2**	**349.7**	**490.3**
134	312.6	**335.4**	**296.7**	**337.1**	**376.7**	**358.7**	**503.0**
136	320.7	**344.1**	**304.5**	**345.8**	**386.3**	**368.0**	**515.9**
138	329.0	**352.9**	**312.5**	**354.7**	**396.2**	**377.4**	**529.1**
140	337.4	**361.9**	**320.6**	**363.7**	**406.2**	**387.0**	**542.5**
142	345.9	**371.0**	**328.9**	**372.9**	**416.3**	**396.7**	**556.2**
144	354.6	**380.3**	**337.3**	**382.3**	**426.7**	**406.6**	**570.2**
146	363.5	**389.8**	**345.9**	**391.8**	**437.2**	**416.7**	**584.5**
148	372.5	**399.4**	**354.6**	**401.5**	**448.0**	**427.0**	**599.0**
150	381.7	**409.2**	**363.5**	**411.4**	**458.9**	**437.5**	**613.9**

Approx Pressure Control Settings - Refrigeration

Application	Temp Range (°F)	Evap ΔT (°F)	Refrigerant							
			R-22		ISCEON® MO99™		ISCEON® MO29		R-404A	
			Out	In	Out	In	Out	In	Out	In
Beverage Cooler	35 to 38	15	41	66	38	63	42	69	53	82
Floral Cooler										
Produce Cooler										
Smoked Meat Cooler	32 to 35	15	38	62	35	59	39	64	49	77
Meat Reach Thru										
Service Deli										
Seafood										
Multi-Deck Fresh Meat	26 to 29	15	32	54	29	51	33	56	42	68
Frozen Glass Door	-10 to 0	10	9	24	7	21	9	23	15	33
Frozen Glass Walk-In										
Frozen Ice Cream	-30 to -20	10	0	10	4 in Hg	8	0	10	4	16
Frozen Food - Open Type										

DuPont Refrigerants

R12 and R502 Replacements

PRESSURE-TEMPERATURE GUIDE

Key: **Green (in of Hg) = Vacuum**
Black (psig) = Saturated Vapor (calculate superheat)
Bold (psig) = Saturated Liquid (calculate subcooling)

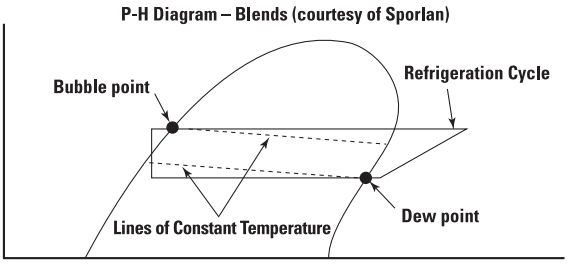
For 5,000 ft. Elevations: psig + 2.5

	Freon®	ISCEON®	Suva®				ISCEON®	Freon®
°F	12 (R12)	M049 *Plus*™ (R437A)	134a (R134a)	507 (R507A)	404A (R404A)	HP80 (R402A)	M079 (R422A)	502 (R502)
-50	15.4	17.0	18.7	0.9	0.1	1.1	2.2	0.7
-48	14.6	16.2	18.0	1.7	0.7	1.9	0.6	0.4
-46	13.8	15.3	17.3	2.6	1.6	2.8	0.5	1.2
-44	12.9	14.4	16.5	3.5	2.4	3.7	1.4	2.1
-42	12.0	13.5	15.7	4.4	3.4	4.7	2.2	2.9
-40	11.0	12.5	14.8	5.4	4.3	5.7	3.1	3.8
-38	10.0	11.5	13.9	6.4	5.3	6.8	4.1	4.8
-36	8.9	10.4	13.0	7.5	6.3	7.8	5.1	5.7
-34	7.8	9.3	12.0	8.6	7.4	9.0	6.1	6.7
-32	6.7	8.1	10.9	9.8	8.5	10.1	7.2	7.8
-30	5.5	6.9	9.8	11.0	9.6	11.4	8.3	8.9
-28	4.3	5.6	8.7	12.2	10.8	12.6	9.5	10.0
-26	3.0	4.2	7.5	13.5	12.0	13.9	10.7	11.2
-24	1.7	2.8	6.3	14.8	13.3	15.3	11.9	12.4
-22	0.3	1.4	5.0	16.2	14.6	16.7	13.2	13.6
-20	0.5	0.1	3.7	17.6	16.0	18.2	14.6	14.9
-18	1.3	0.8	2.3	19.1	17.4	19.7	16.0	16.2
-16	2.0	1.6	0.8	20.6	18.9	21.2	17.4	17.6
-14	2.8	2.5	0.4	22.2	20.4	22.9	18.9	19.0
-12	3.6	3.4	1.1	23.8	22.0	24.5	20.5	20.5
-10	4.5	4.3	1.9	25.5	23.6	26.3	22.1	22.1
-8	5.3	5.2	2.8	27.2	25.3	28.0	23.7	23.6
-6	6.2	6.2	3.6	29.0	27.0	29.9	25.4	25.3
-4	7.2	7.2	4.6	30.9	28.8	31.8	27.2	26.9
-2	8.1	8.3	5.5	32.8	30.7	33.8	29.1	28.7
0	9.1	9.4	6.5	34.8	32.6	35.8	30.9	30.4
2	10.1	10.5	7.5	36.8	34.6	37.9	32.9	32.3
4	11.2	11.7	8.5	38.9	36.6	40.1	34.9	34.2
6	12.3	12.9	9.6	41.1	38.7	42.3	37.0	36.1
8	13.4	14.2	10.8	43.4	40.9	44.6	39.1	38.2
10	14.6	15.5	11.9	45.7	43.1	46.9	41.4	40.2
12	15.8	16.9	13.1	48.0	45.4	49.4	43.6	42.4
14	17.0	18.3	14.4	50.5	47.8	51.9	46.0	44.5
16	18.3	19.7	15.7	53.0	50.2	54.5	48.4	46.8
18	19.6	21.2	17.0	55.6	52.7	57.1	50.9	49.1
20	21.0	22.8	18.4	58.2	55.3	59.8	53.5	51.5
22	22.4	24.4	19.9	61.0	58.0	62.6	56.1	54.0
24	23.8	26.0	21.3	63.8	60.7	65.5	58.8	56.5
26	25.3	27.8	22.9	66.7	63.5	68.5	61.6	59.1
28	26.8	29.5	24.5	69.6	66.4	71.5	64.5	61.7
30	28.4	31.3	26.1	72.7	69.3	74.7	67.5	64.5
32	30.0	33.2	27.8	75.8	72.4	77.9	70.5	67.3
34	31.7	35.1	29.5	79.0	75.5	81.2	73.6	70.1
36	33.4	37.1	31.3	82.3	78.7	84.6	76.8	73.1
38	35.1	39.2	33.1	85.7	82.0	88.1	80.1	76.1
40	36.9	41.3	35.0	89.2	85.4	91.6	83.5	79.2
42	38.7	43.5	37.0	92.7	88.8	95.3	87.0	82.4
44	40.6	45.7	39.0	96.4	92.4	99.0	90.5	85.6
46	42.6	48.0	41.1	100.1	96.0	102.9	94.2	89.0
48	44.6	50.4	43.2	104.0	99.8	106.8	97.9	92.4
50	46.6	52.9	45.4	107.9	103.6	110.9	101.8	95.9
52	48.7	**61.6**	47.7	112.0	**109.2**	**119.6**	**111.3**	99.5
54	50.9	**64.4**	50.0	116.2	**113.3**	**123.9**	**115.4**	103.2
56	53.1	**67.1**	52.4	120.4	**117.4**	**128.3**	**119.7**	107.0
58	55.3	**70.0**	54.9	124.7	**121.7**	**132.8**	**124.0**	110.8
60	57.6	**72.9**	57.4	129.2	**126.0**	**137.4**	**128.4**	114.7
62	60.0	**75.9**	60.0	133.7	**130.5**	**142.1**	**132.9**	118.8
64	62.4	**79.0**	62.7	138.4	**135.0**	**147.0**	**137.5**	122.9
66	64.9	**82.1**	65.4	143.1	**139.7**	**151.9**	**142.3**	127.1
68	67.5	**85.4**	68.2	148.0	**144.4**	**157.0**	**147.1**	131.4
70	70.1	**88.7**	71.1	153.0	**149.3**	**162.1**	**152.1**	135.8
72	72.7	**92.1**	74.1	158.1	**154.3**	**167.4**	**157.2**	140.3
74	75.5	**95.5**	77.1	163.3	**159.4**	**172.8**	**162.3**	144.9
76	78.2	**99.1**	80.2	168.6	**164.6**	**178.3**	**167.6**	149.5
78	81.1	**102.8**	83.4	174.1	**169.9**	**183.9**	**173.0**	154.3
80	84.0	**106.5**	86.7	179.6	**175.4**	**189.7**	**178.6**	159.2
82	87.0	**110.3**	90.0	185.3	**181.0**	**195.5**	**184.2**	164.2
84	90.0	**114.2**	93.5	191.1	**186.7**	**201.5**	**190.0**	169.3
86	93.2	**118.2**	97.0	197.1	**192.5**	**207.7**	**195.9**	174.5
88	96.3	**122.3**	100.6	203.1	**198.4**	**213.9**	**201.9**	179.9
90	99.6	**126.5**	104.3	209.3	**204.5**	**220.3**	**208.1**	185.3
92	102.9	**130.8**	108.1	215.6	**210.7**	**226.8**	**214.4**	190.8
94	106.3	**135.2**	112.0	222.1	**217.0**	**233.4**	**220.8**	196.5
96	109.8	**139.7**	115.9	228.7	**223.4**	**240.2**	**227.3**	202.3
98	113.3	**144.3**	120.0	235.4	**230.0**	**247.1**	**234.0**	208.1
100	116.9	**149.0**	124.2	242.3	**236.8**	**254.2**	**240.9**	214.1
102	120.6	**153.7**	128.4	249.3	**243.6**	**261.4**	**247.8**	220.3
104	124.4	**158.6**	132.7	256.5	**250.6**	**268.7**	**254.9**	226.5
106	128.2	**163.6**	137.2	263.8	**257.8**	**276.2**	**262.2**	232.9
108	132.1	**168.7**	141.7	271.2	**265.1**	**283.9**	**269.6**	239.3
110	136.1	**173.9**	146.4	278.8	**272.5**	**291.6**	**277.1**	246.0
112	140.2	**179.3**	151.1	286.6	**280.1**	**299.6**	**284.8**	252.7
114	144.3	**184.7**	156.0	294.5	**287.9**	**307.6**	**292.6**	259.6
116	148.6	**190.2**	160.9	302.6	**295.8**	**315.9**	**300.6**	266.6
118	152.9	**195.9**	166.0	310.8	**303.8**	**324.3**	**308.8**	273.7
120	157.3	**201.7**	171.2	319.2	**312.1**	**332.8**	**317.1**	281.0
122	161.8	**207.6**	176.5	327.8	**320.4**	**341.6**	**325.6**	288.4
124	166.3	**213.6**	181.8	336.5	**329.0**	**350.5**	**334.2**	295.9
126	171.0	**219.7**	187.4	345.4	**337.7**	**359.5**	**343.0**	303.6
128	175.7	**226.0**	193.0	354.5	**346.6**	**368.7**	**352.0**	311.4
130	180.5	**232.4**	198.7	363.8	**355.6**	**378.1**	**361.2**	319.4
132	185.5	**238.9**	204.6	373.2	**364.9**	**387.7**	**370.5**	327.5
134	190.5	**245.5**	210.6	382.9	**374.3**	**397.5**	**380.0**	335.8
136	195.6	**252.3**	216.7	392.7	**383.9**	**407.4**	**389.7**	344.2
138	200.8	**259.2**	222.9	402.7	**393.7**	**417.5**	**399.6**	352.8
140	206.0	**266.2**	229.2	413.0	**403.7**	**427.8**	**409.7**	361.6
142	211.4	**273.4**	235.7	423.4	**413.9**	**438.3**	**420.0**	370.5
144	216.9	**280.7**	242.3	434.1	**424.3**	**449.0**	**430.5**	379.5
146	222.5	**288.1**	249.0	445.0	**434.9**	**459.9**	**441.2**	388.8
148	228.1	**295.7**	255.9	456.1	**445.7**	**471.0**	**452.1**	398.2
150	233.9	**303.5**	262.9	467.4	**456.8**	**482.3**	**463.2**	407.7

Properties calculated using REFPROP Ver 8.0, Std Ref Data Program, NIST 2007.

Modifications were made to REFPROP when interaction parameters were not available.

P-H Diagram – Blends (courtesy of Sporlan)



To determine superheat, use **dew point** values.
To determine subcooling, use **bubble point** values.

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