













Airgas Pressure/Temperature Chart






Full Line of Refrigerants Available



Low Pressure Refrigerants				
Temperature				
°F	°C	R-11	R-113	R-123
-20	-28.9	27.0	29.1	27.8
-15	-26.1	26.5	28.9	27.4
-10	-23.3	26.0	28.7	26.9
-5	-20.6	25.4	28.5	26.4
0	-17.8	24.7	28.2	25.9
5	-15.0	23.9	27.9	25.2
10	-12.2	23.1	27.6	24.5
15	-9.4	22.1	27.2	23.8
20	-6.7	21.1	26.8	22.8
25	-3.9	19.9	26.3	21.8
30	-1.1	18.6	25.8	20.7
35	1.7	17.2	25.2	19.5
40	4.4	15.6	24.5	18.1
45	7.2	13.9	23.7	16.6
50	10.0	12.0	22.9	14.9
55	12.8	10.0	22.0	13.0
60	15.6	7.8	21.0	11.2
65	18.3	5.4	19.9	8.9
70	21.1	2.8	18.7	6.5
75	23.9	0.0	17.3	4.1
80	26.7	1.5	15.9	1.2
85	29.4	3.2	14.3	0.9
90	32.2	4.9	12.5	2.5
95	35.0	6.8	10.6	4.3
100	37.8	8.8	8.6	6.1
105	40.6	10.9	6.4	8.1
110	43.3	13.2	4.0	10.3
115	46.1	15.6	1.4	12.6
120	48.9	18.4	0.7	15.1
125	51.7	21.2	2.1	17.8
130	54.4	24.0	3.7	20.6
135	57.2	27.1	5.4	23.6
140	60.0	30.4	7.2	26.8
145	62.8	33.9	9.2	30.2
150	65.6	37.7	11.2	33.9

Very High Pressure Refrigerants				
Temperature				
°F	°C	R-13	R-23	R-503
-160	-106.7	23.6	24.3	21.1
-155	-103.9	22.2	22.9	19.2
-150	-101.1	20.8	21.3	16.9
-145	-98.3	19.0	19.4	14.2
-140	-95.6	16.8	17.1	11.1
-135	-92.8	14.3	14.4	7.6
-130	-90.0	11.4	11.4	3.5
-125	-87.2	8.2	7.8	0.6
-120	-84.4	4.5	4.0	3.1
-115	-81.7	0.3	0.3	6.0
-110	-78.9	2.1	2.9	9.3
-105	-76.1	4.7	5.8	12.9
-100	-73.3	7.5	9.0	16.9
-95	-71.6	10.7	12.7	21.4
-90	-67.8	14.2	16.7	26.3
-85	-65.0	18.1	21.3	31.8
-80	-62.2	22.3	26.3	37.7
-75	-59.4	26.9	31.8	44.2
-70	-56.7	32.0	37.9	51.3
-65	-53.9	37.5	44.6	59.0
-60	-51.1	43.5	52.0	67.4
-55	-48.3	50.0	60.0	76.4
-50	-45.6	57.0	68.7	86.1
-45	-42.8	64.6	78.1	96.6
-40	-40.0	72.7	88.3	107.9

High Pressure Refrigerants								
Temperature								
°F	°C	R-12	R-22	R-114	R-134a	R-404A	R-409A	
						Liquid Pressure		Vapor Pressure
-50	-45.6	15.4	6.1	12.8	-	0.2	-	-
-45	-42.8	13.3	2.7	10.3	-	2.6	-	-
-40	-40.0	11.0	0.6	7.6	14.8	4.3	-	-
-35	-37.2	8.4	2.6	4.8	12.5	6.8	-	-
-30	-34.4	5.5	4.9	24.6	9.9	9.5	0.2	9.9
-25	-31.7	2.3	7.4	23.8	6.9	12.5	1.8	7.0
-20	-28.9	0.6	10.2	22.9	3.7	15.7	3.9	3.8
-15	-26.1	2.4	13.2	21.8	0.6	19.3	6.2	0.3
-10	-23.3	4.5	16.5	20.6	1.9	23.2	8.7	1.7
-5	-20.6	6.7	20.1	19.3	4.0	27.5	11.4	3.8
0	-17.8	9.2	24.0	17.8	6.5	32.1	14.4	6.1
5	-15.0	11.8	28.2	16.2	9.1	37.0	17.6	8.6
10	-12.2	14.6	32.8	14.4	11.9	42.4	21.1	11.4
15	-9.4	17.7	37.7	12.4	15.0	48.2	24.9	14.4
20	-6.7	21.0	43.1	10.2	18.4	54.5	29.0	17.6
25	-3.9	24.6	48.8	7.8	22.1	61.2	33.4	21.2
30	-1.1	28.4	54.9	5.2	26.1	68.4	38.1	25.0
35	1.7	32.6	61.5	2.3	30.4	76.1	43.2	29.2
40	4.4	37.0	68.5	0.4	35.0	84.4	48.6	33.6
45	7.2	41.7	76.0	2.0	40.1	93.2	54.4	38.5
50	10.0	46.7	84.0	3.8	45.5	103.0	60.6	43.6
55	12.8	52.0	92.6	5.8	51.3	113.0	67.2	49.2
60	15.6	57.7	101.6	7.9	57.5	123.0	74.2	55.2
65	18.3	63.8	111.2	10.1	64.1	135.0	81.7	61.5
70	21.1	70.2	121.4	12.6	71.2	147.0	89.6	68.4
75	23.9	77.0	132.2	15.2	78.8	159.0	98.0	75.6
80	26.7	84.2	143.6	18.0	86.8	173.0	107.0	83.4
85	29.4	91.8	155.7	20.9	95.4	187.0	116.0	91.6
90	32.2	99.8	168.4	24.1	104.0	202.0	126.0	100.0
95	35.0	108.3	181.8	27.5	114.0	218.0	137.0	110.0
100	37.8	117.2	195.9	31.1	124.0	234.0	148.0	120.0
105	40.6	126.6	210.7	35.0	135.0	252.0	159.0	130.0
110	43.3	136.4	226.3	39.1	147.0	270.0	172.0	141.0
115	46.1	146.8	242.7	43.4	159.0	289.0	184.0	153.0
120	48.9	157.7	259.9	48.0	171.0	310.0	198.0	165.0
125	51.7	168.6	277.9	52.8	185.0	331.0	212.0	178.0
130	54.4	181.0	296.8	58.0	199.0	353.0	227.0	192.0
135	57.2	193.5	316.5	63.4	214.0	377.0	242.0	207.0
140	60.0	206.6	337.2	69.0	229.0	401.0	258.0	222.0
145	62.8	220.3	358.8	75.0	246.0	429.0	-	-
150	65.6	234.6	381.4	81.3	263.0	456.0	-	-

High Pressure Refrigerants							
Temperature							
°F	°C	R-410A	R-416A		R-500	R-502	R-507
		Liquid Pressure		Vapor Pressure			
-50	-45.6	5.9	-	-	12.8	0.2	1.1
-45	-42.8	8.7	-	-	10.4	1.9	3.3
-40	-40.0	11.6	-	-	7.6	4.1	5.5
-35	-37.2	14.9	-	-	4.6	6.5	8.2
-30	-34.4	18.5	12.1	13.4	1.2	9.2	11.1
-25	-31.7	22.5	9.6	11.0	1.2	12.1	14.3
-20	-28.9	26.9	6.7	8.3	3.2	15.3	17.8
-15	-26.1	31.7	3.5	5.3	5.4	18.8	21.7
-10	-23.3	36.8	0.0	2.0	7.8	22.6	25.8
-5	-20.6	42.5	1.9	0.8	10.4	26.7	30.3
0	-17.8	48.6	4.0	2.8	13.3	31.1	35.2
5	-15.0	56.2	6.3	5.0	16.4	35.9	40.5
10	-12.2	62.3	8.9	7.4	19.7	41.0	46.1
15	-9.4	70.0	11.6	10.0	23.4	46.5	52.2
20	-6.7	78.3	14.6	12.8	27.3	52.5	58.8
25	-3.9	87.3	17.8	15.9	31.5	58.8	65.8
30	-1.1	96.8	21.4	19.3	36.0	65.6	73.3
35	1.7	107.0	25.2	22.9	40.9	72.8	81.3
40	4.4	118.0	29.3	26.8	46.1	80.5	89.8
45	7.2	130.0	33.7	31.1	51.6	88.7	98.9
50	10.0	142.0	38.4	35.6	57.6	97.4	109.0
55	12.8	155.0	43.5	40.5	63.9	106.6	119.0
60	15.6	170.0	49.0	45.7	70.6	116.4	130.0
65	18.3	185.0	54.8	51.3	77.8	126.7	141.0
70	21.1	201.0	61.1	57.3	85.4	137.6	154.0
75	23.9	217.0	67.7	63.7	93.5	149.1	167.0
80	26.7	235.0	74.8	70.6	102.0	161.2	180.0
85	29.4	254.0	82.3	77.8	111.0	174.0	195.0
90	32.2	274.0	90.3	85.5	120.6	187.4	210.0
95	35.0	295.0	98.8	93.7	130.6	201.4	226.0
100	37.8	317.0	108.0	102.0	141.2	216.2	244.0
105	40.6	340.0	117.0	112.0	152.4	231.7	260.1
110	43.3	365.0	127.0	121.0	164.1	247.9	278.8
115	46.1	391.0	138.0	132.0	176.5	264.9	298.5
120	48.9	418.0	149.0	143.0	189.4	282.7	319.2
125	51.7	446.0	161.0	154.0	203.0	300.4	340.9
130	54.4	476.0	173.0	166.0	217.2	320.8	363.7
135	57.2	507.0	186.0	179.0	232.1	341.2	387.7
140	60.0	539.0	200.0	192.0	247.7	362.6	412.9
145	62.8	573.0	214.0	206.0	264.1	385.0	439.5
150	65.6	608.0	229.0	221.0	281.1	408.4	467.4

Vapor Pressure in PSIG In Vacuum (inches in Hg)

Boiling Points					
Low Pressure					
	R-11	Trichlorofluoromethane	CCl3F	BP	74.5°F
	R-113	Trichlorotrifluoroethane	CCl2FCClF2	BP	117.6°F
	R-123	Dichlorotrifluoroethane	CHCl2CF3	BP	82.2°F
High-Pressure					
	R-12	Dichlorodifluoromethane	CCl2F2	BP	-21.6°F
	R-22	Chlorodifluoromethane	CHClF2	BP	-41.5°F
	R-114	Dichlorotetrafluoroethane	CCl2F2	BP	38.6°F
	R-134a	Tetrafluoroethane	CF3CH2F	BP	-15.1°F
	R-404A	Azeotrope	R-125/143a/134a	BP	-52.1°F
	R-409A	Azeotrope	R-22/124/142b	BP	-31.8°F
	R-410A	Azeotrope	R-32/125	BP	-61.0°F
	R-416A	Azeotrope	R-134a/124/600	BP	-10.0°F
	R-500	Azeotrope	R-12/152a	BP	-28.3°F
	R-502	Azeotrope	R-22/115	BP	-49.8°F
	R-507	Azeotrope	R-125/143a	BP	-52.8°F
Very High-Pressure					
	R-13	Chlorotrifluoromethane	CClF3	BP	-114.6°F
	R-23	Trifluoromethane	CHF3	BP	-115.6°F
	R-503	Azeotrope	R-23/13	BP	-126.1°F

System Evacuation

Before adding refrigerant charge, evacuate to proper vacuum level to remove non-condensable gases and to evaporate and remove moisture in the system. This chart shows the vacuum level and the temperature at which water will vaporize.

Pressure Vacuum Equivalents					
Absolute pressure above a zero base		Vacuum below one atmosphere		Fraction of one atmosphere	Vaporization temperature of H2O in °F
Microns	PSIA	mm Hg	Inches Hg		
0	0.000	760.00	29.921	-	-
50	0.001	759.95	29.920	1/15000	-50
100	0.002	759.90	29.920	1/7600	-40
150	0.003	759.85	29.920	1/5100	-33
200	0.004	759.80	29.910	1/3800	-28
300	0.006	759.70	29.910	1/2500	-21
500	0.009	759.50	29.900	1/1500	-12
1,000	0.019	759.00	29.880	1/760	1
2,000	0.039	758.00	29.840	1/380	15
4,000	0.078	756.00	29.760	1/190	29
6,000	0.117	754.00	29.690	1/127	39
10,000	0.193	750.00	29.530	1/76	52
15,000	0.290	745.00	29.330	1/50	63
20,000	0.387	740.00	29.130	1/38	72
30,000	0.580	730.00	28.740	1/25	84
50,000	0.967	710.00	27.950	1/15	101
100,000	1.930	660.00	25.980	2/15	125
200,000	3.870	560.00	22.050	1/4	152
500,000	9.670	260.00	10.240	2/3	192
760,000	14.696	0.00	0.000	1 atmos	212

Liquid Density of Refrigerants							
		Temperature (°F)			Temperature (°F)		
		-80	-40.0	0.0	40.0	80.0	120
R-11	#/cu. ft.	104.2	101.3	98.3	95.1	91.9	88.5
	#/gal.	13.9	13.5	13.1	12.7	12.3	11.8
R-12	#/cu. ft.	98.4	94.7	90.7	86.3	81.5	75.9
	#/gal.	13.2	12.7	12.1	11.5	10.9	10.2
R-13	#/cu. ft.	90.2	84.1	77.0	67.7	48.9	-
	#/gal.	12.1	11.2	10.3	9.1	6.5	-
R-22	#/cu. ft.	91.0	88.0	83.8	79.3	74.1	68.1
	#/gal.	12.3	11.8	11.2	10.6	9.9	9.1
R-113	#/cu. ft.	-	-	103.6	100.6	97.5	94.1
	#/gal.	-	-	13.9	13.5	13.0	12.6
R-114	#/cu. ft.	105.5	102.1	98.5	94.7	90.6	86.1
	#/gal.	14.1	13.7	13.2	12.7	12.1	11.5
R-123	#/cu. ft.	-	-	97.9	94.6	91.1	87.5
	#/gal.	-	-	13.1	12.6	12.2	11.7
R-134a	#/cu. ft.	92.4	88.5	84.4	79.9	75.0	69.2
	#/gal.	12.4	11.8	11.3	10.7	10.0	9.3
R-404A	#/cu. ft.	-	80.4	75.9	70.8	64.8	56.7
	#/gal.	-	10.7	10.1	9.5	8.7	7.6
R-409A	#/cu. ft.	-	87.9	83.9	79.6	74.9	69.4
	#/gal.	-	11.7	11.2	10.6	10.0	9.3
R-410A	#/cu. ft.	-	82.0	77.3	72.0	65.7	57.4
	#/gal.	-	11.0	10.3	9.6	8.8	7.7
R-416A	#/cu. ft.	-	89.0	85.0	80.7	75.9	70.4
	#/gal.	-	11.9	11.4	10.8	10.1	9.4
R-500	#/cu. ft.	87.9	84.3	80.5	76.3	71.8	66.6
	#/gal.	11.8	11.3	10.8	10.2	9.6	8.9
R-502	#/cu. ft.	95.8	91.4	86.7	81.5	75.5	68.0
	#/gal.	12.8	12.2	11.6	10.9	10.1	9.1
R-503	#/cu. ft.	86.4	80.3	72.3	61.1	-	-
	#/gal.	11.6	10.7	9.7	8.2	-	-
R-507	#/cu. ft.	-	80.9	76.3	71.2	65.0	56.7
	#/gal.	-	10.8	10.2	9.5	8.7	7.6

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