



# R-11 and R-12

# Technical Guidelines

Physical Properties of Refrigerants	R-11	R-12
Environmental Classification	CFC	CFC
Molecular Weight	137.4	120.9
Boiling Point (1 atm, °F)	74.7	-21.6
Critical Pressure (psia)	639.3	600
Critical Temperature (°F)	388	233.5
Critical Density, (lb./ft <sup>3</sup> )	34.6	35.3
Liquid Density (70 °F, lb./ft <sup>3</sup> )	92.73	82.96
Vapor Density (bp, lb./ft <sup>3</sup> )	0.365	0.393
Heat of Vaporization (bp, BTU/lb.)	77.9	71.2
Specific Heat Liquid (70 °F, BTU/lb. °F)	0.2093	0.2324
Specific Heat Vapor (1 atm, 70 °F, BTU/lb. °F)	0.1444 (sat)	0.1455
Ozone Depletion Potential (CFC 11 = 1.0)	1.0	1.0
Global Warming Potential (CO <sub>2</sub> = 1.0)	4750	10910
ASHRAE Standard 34 Safety Rating	A1	A1

Available in the following sizes

R-11  
100 LB DRUM  
200 LB. DRUM

R-12  
30 LB. CYLINDER  
145 LB. CYLINDER

### Pressure-Temp Chart

R-11 psig	Temp (°F)	R-12 psig
	<b>-40</b>	11.0"
	<b>-35</b>	8.4"
	<b>-30</b>	5.5"
	<b>-25</b>	2.3"
27.0"	<b>-20</b>	0.6
26.5"	<b>-15</b>	2.4
26.0"	<b>-10</b>	4.5
25.4"	<b>-5</b>	6.7
24.7"	<b>0</b>	9.2
23.9"	<b>5</b>	11.8
23.1"	<b>10</b>	14.6
22.1"	<b>15</b>	17.7
21.1"	<b>20</b>	21.0
19.9'	<b>25</b>	24.6
18.6'	<b>30</b>	28.5
17.2"	<b>35</b>	32.6
15.6"	<b>40</b>	37.0
13.9"	<b>45</b>	41.7
12.0"	<b>50</b>	46.7
10.0"	<b>55</b>	52.0
7.8"	<b>60</b>	57.7
5.4"	<b>65</b>	63.8
2.8"	<b>70</b>	70.2
0.0	<b>75</b>	77.0
1.5	<b>80</b>	84.2
3.2	<b>85</b>	91.8
4.9	<b>90</b>	99.8
6.8	<b>95</b>	108
8.8	<b>100</b>	117
10.9	<b>105</b>	127
13.2	<b>110</b>	136
15.6	<b>115</b>	147
18.2	<b>120</b>	158
21.0	<b>125</b>	169
24.0	<b>130</b>	181
27.1	<b>135</b>	194
30.4	<b>140</b>	207
34.0	<b>145</b>	220
37.7	<b>150</b>	234

## R-11

Application: Large low pressure centrifugal chillers

Lubricant

Recommendation: Compatible with mineral oil

Retrofitting:

- R-123 is being successfully used to retrofit R-11 chillers
- Retrofit jobs are usually done in cooperation with equipment manufacturers

## R-12

Application: Large centrifugal chillers, open drive A/C, process cooling, high-medium-low temperature refrigeration (large and small systems)

Lubricant

Recommendation: Compatible with mineral oil

Retrofitting to:

R-134a	page 90, 91
R-401A, R-401B	page 90, 92
R-409A	page 90, 92
R-414B	page 90, 92
R-416A	page 90, 93



THERMODYNAMIC PROPERTIES OF R-12

Temp [°F]	Pressure Liquid [psia]	Density Liquid [lb/ft <sup>3</sup> ]	Density Vapor [lb/ft <sup>3</sup> ]	Enthalpy Liquid [Btu/lb]	Enthalpy Vapor [Btu/lb]	Entropy Liquid [Btu/R-lb]	Entropy Vapor [Btu/R-lb]
-60	5.4	96.63	0.1537	-4.145	70.99	-0.01010	0.1779
-55	6.2	96.14	0.1756	-3.115	71.56	-0.00754	0.1770
-50	7.1	95.66	0.1999	-2.081	72.13	-0.00501	0.1761
-45	8.1	95.17	0.2268	-1.043	72.70	-0.00249	0.1753
-40	9.3	94.68	0.2565	0.000	73.27	0.00000	0.1746
-35	10.6	94.18	0.289	1.047	73.84	0.00247	0.1739
-30	12.0	93.68	0.3247	2.098	74.41	0.00493	0.1732
-25	13.5	93.18	0.3637	3.154	74.98	0.00736	0.1726
-20	15.2	92.67	0.4063	4.214	75.55	0.00978	0.1720
-15	17.1	92.16	0.4525	5.280	76.11	0.01218	0.1715
-10	19.2	91.65	0.5028	6.350	76.68	0.01457	0.1710
-5	21.4	91.13	0.5573	7.425	77.24	0.01693	0.1705
0	23.8	90.61	0.6162	8.505	77.80	0.01929	0.1700
5	26.4	90.08	0.6798	9.591	78.35	0.02162	0.1696
10	29.3	89.55	0.7483	10.68	78.90	0.02395	0.1692
15	32.4	89.02	0.8221	11.78	79.45	0.02625	0.1688
20	35.7	88.48	0.9013	12.88	80.00	0.02855	0.1685
25	39.3	87.93	0.9864	13.99	80.54	0.03083	0.1681
30	43.1	87.38	1.078	15.10	81.07	0.03310	0.1678
35	47.2	86.82	1.175	16.22	81.61	0.03536	0.1675
40	51.6	86.25	1.279	17.35	82.13	0.03761	0.1673
45	56.3	85.68	1.391	18.48	82.65	0.03984	0.1670
50	61.3	85.10	1.510	19.62	83.17	0.04207	0.1668
55	66.6	84.52	1.637	20.77	83.68	0.04428	0.1665
60	72.3	83.92	1.772	21.92	84.18	0.04649	0.1663
65	78.4	83.32	1.915	23.08	84.67	0.04869	0.1661
70	84.8	82.71	2.068	24.25	85.16	0.05088	0.1659
75	91.5	82.09	2.231	25.43	85.64	0.05306	0.1657
80	98.7	81.47	2.404	26.61	86.11	0.05524	0.1655
85	106.3	80.83	2.588	27.80	86.58	0.05740	0.1653
90	114.3	80.18	2.783	29.01	87.03	0.05957	0.1651
95	122.7	79.52	2.991	30.22	87.47	0.06173	0.1649
100	131.6	78.85	3.211	31.44	87.90	0.06388	0.1648
105	141.0	78.16	3.445	32.67	88.32	0.06603	0.1646
110	150.8	77.46	3.694	33.91	88.73	0.06818	0.1644
115	161.1	76.75	3.958	35.16	89.12	0.07032	0.1642
120	172.0	76.02	4.238	36.43	89.50	0.07247	0.1640
125	183.3	75.28	4.537	37.70	89.87	0.07461	0.1638
130	195.2	74.51	4.855	38.99	90.22	0.07676	0.1636
135	207.7	73.73	5.193	40.30	90.55	0.07890	0.1634
140	220.7	72.93	5.554	41.61	90.86	0.08106	0.1632
145	234.4	72.10	5.939	42.95	91.15	0.08321	0.1629
150	248.6	71.24	6.351	44.30	91.42	0.08538	0.1627
155	263.5	70.36	6.792	45.67	91.66	0.08755	0.1624
160	279.0	69.45	7.265	47.06	91.87	0.08973	0.1621