Freon™ 134a
Refrigerant (R-134a)

Thermodynamic Properties (SI Units)

Product Information

New tables of the thermodynamic properties of HFC-134a have been developed and are presented here. These tables are based on experimental data from the database at the National Institute of Standards and Technology (NIST). Equations have been developed, based on the Modified Benedict-Webb-Rubin (MBWR) equation of state, which represent the data with accuracy and consistency throughout the entire range of temperature, pressure, and density.

Physical Properties

Chemical Formula	CH_2FCF_3
Molecular Weight	102.03
Boiling Point at One Atmosphere	–26.06 °C (–14.9 °F)
Critical Temperature	101.08 °C (213.9 °F) 374.23 K (673.6 °R)
Critical Pressure	4060.3 kPa (abs) (588.9 psia)
Critical Density	515.3 kg/m³ (32.17 lb/ft³)
Critical Volume	0.00194 m³/kg (0.031 ft³/lb)

Units and Factors

t = Temperature in °C

T = Temperature in K = °C + 273.15

P = Pressure in kiloPascals absolute [kPa (abs)]

v_f = Volume of saturated liquid in m³/kg

v_g = Volume of saturated vapor in m³/kg

V = Volume of superheated vapor in m³/kg

d_f = $1/v_f$ = Density of saturated liquid in kg/m³

d_g = $1/v_g$ = Density of saturated vapor in kg/m³

h_f = Enthalpy of saturated liquid in kJ/kg

h_{fg} = Enthalpy of vaporization in kJ/kg

h_g = Enthalpy of saturated vapor in kJ/kg

H = Enthalpy of superheated vapor in kJ/kg

s_f = Entropy of saturated liquid in kJ/(kg) (K)

s_g = Entropy of saturated vapor in kJ/(kg) (K)

S = Entropy of superheated vapor in kJ/(kg) (K)

C_p = Heat capacity at constant pressure in kJ/(kg) (°C)

C_v = Heat capacity at constant volume in kJ/(kg) (°C)

v_s = Velocity of sound in m/sec

The gas constant, R = 8.314 J/(mole) (K) for HFC-134a, R = 0.0815 kJ/kg·K

One atmosphere = 101.325 kPa

Reference point for enthalpy and entropy:
  h_f = 200 kJ/kg at 0 °C
  s_f = 1 kJ/kg·K at 0 °C

Chemours™

Equations

The MBWR equation of state was used to calculate the tables of thermodynamic properties. It was chosen as the preferred equation of state because it provided the most accurate fit of the thermodynamic data over the entire range of temperatures and pressures presented in these tables. The data fit and calculation of constants for HFC-134a were performed for Chemours at the NIST under the supervision of Dr. Mark O. McLinden.

The constants were calculated in SI units. For conversion of thermodynamic properties to Engineering (ENG) units, properties must be calculated in SI units and converted to ENG units. Conversion factors are provided for each property derived from the MBWR equation of state.

Equation of State (MBWR)

$$\frac{P}{100} = \sum_{n=1}^{9} a_n/V^n + \exp(-V_c^2/V^2) \sum_{n=10}^{15} a_n/V^{2n-17}$$

where the temperature dependence of the coefficients is given by:

$a_1 = RT$

$a_2 = b_1 T + b_2 T^{0.5} + b_3 + b_4/T + b_5/T^2$

$a_3 = b_6 T + b_7 + b_8/T + b_9/T^2$

$a_4 = b_{10} T + b_{11} + b_{12}/T$

$a_5 = b_{13}$

$a_6 = b_{14}/T + b_{15}/T^2$

$a_7 = b_{16}/T$

$a_8 = b_{17}/T + b_{18}/T^2$

$a_9 = b_{19}/T^2$

$a_{10} = b_{20}/T^2 + b_{21}/T^3$

$a_{11} = b_{22}/T^2 + b_{23}/T^4$

$a_{12} = b_{24}/T^2 + b_{25}/T^3$

$a_{13} = b_{26}/T^2 + b_{27}/T^4$

$a_{14} = b_{28}/T^2 + b_{29}/T^3$

$a_{15} = b_{30}/T^2 + b_{31}/T^3 + b_{32}/T^4$

where T is in K = °C + 273.15, V is in liters/mole (= m³/kg x MW), V_c = 0.199334 liters/mole, P is in kPa, and R = 0.08314471 bar (absolute) x liters/mole x K.

MBWR Coefficients for HFC-134a

b_1	= −6.545	523	5227	E−02
b_2	= 5.889	375	1817	E+00
b_3	= −1.376	178	8409	E+02
b_4	= 2.269	316	8845	E+04
b_5	= −2.926	261	3296	E+06
b_6	= −1.192	377	6190	E−04
b_7	= −2.721	419	4543	E+00
b_8	= 1.629	525	3680	E+03
b_9	= 7.294	220	3182	E+05
b_{10}	= −1.172	451	9115	E−04
b_{11}	= 8.686	451	0013	E−01
b_{12}	= −3.066	016	8246	E+02
b_{13}	= −2.566	404	7742	E−02
b_{14}	= −2.438	183	5971	E+00
b_{15}	= −3.160	316	3961	E+02
b_{16}	= 3.432	165	1521	E−01
b_{17}	= −1.015	436	8796	E−02
b_{18}	= 1.173	423	3787	E+00
b_{19}	= −2.730	176	6113	E−02
b_{20}	= −6.633	850	2898	E+05
b_{21}	= −6.475	479	9101	E+07
b_{22}	= −3.729	521	9382	E+04
b_{23}	= 1.261	473	5899	E+09
b_{24}	= −6.474	220	0070	E+02
b_{25}	= 1.236	245	0399	E+05
b_{26}	= −1.569	919	6293	E+00
b_{27}	= −5.184	893	2204	E+05
b_{28}	= −8.139	632	1392	E−02
b_{29}	= 3.032	516	8842	E+01
b_{30}	= 1.339	904	2297	E−04
b_{31}	= −1.585	619	2849	E−01
b_{32}	= 9.067	958	3743	E+00

Ideal Gas Heat Capacity Equation (At Constant Pressure)

C_p^o (J/mole · K) = cp1 + cp2 T + cp3 T²

cp1 = 1.94006 E+01   cp3 = −1.29665 E−04

cp2 = 2.58531 E−01   R = 8.314471 J/mole·K

MW = 102.03

Properties calculated in SI units from the equation and constants listed above can be converted to ENG units using the conversion factors shown below. Please note that in converting enthalpy and entropy from SI to ENG units, a change in reference states must be included (from H = 200 and S = 1 at 0 °C for SI units to H = 0 and S = 0 at –40 °C for ENG units). In the conversion equation below, H (ref) and S (ref) are the saturated liquid enthalpy and entropy at –40 °C. For HFC-134a, H (ref) = 148.4 kJ/kg and S (ref) = 0.7967 kJ/kg·K.

P (psia)	= P (kPa)· 0.14504
T (°F)	= (T [°C]·1.8) + 32
D (lb/ft³)	= D (kg/m³)·0.062428
V (ft³/lb)	= V (m³/kg)·16.018
H (Btu/lb)	= (H [kJ/kg] – H (ref)·0.43021)
S (Btu/lb·°R)	= (S [kJ/kg·K] – S (ref))·0.23901
C_p (Btu/lb·°F)	= C_p (kJ/kg·K)·0.23901
C_v (Btu/lb·°F)	= C_v (kJ/kg·K)·0.23901
v_s (ft/sec)	= v_s (m/sec)·3.2808

Martin-Hou Equation of State (Fit from MBWR Data)

As previously stated, the thermodynamic properties presented in these tables are based on the MBWR equation of state. Coefficients for the Martin-Hou equation of state are presented below for the convenience of those who may have existing computer programs based on this equation of state. While not as accurate as the data from the MBWR equation of state, particularly in the superheated region, data calculated using these Martin-Hou coefficients should be sufficient for most engineering calculations.

$$P = RT/(V-b) + \sum_{i=2}^{5}(A_i + B_iT + C_i\exp[-kT/T_c])/(V-b)^i$$

For SI Units

T and T_c are in K = °C + 273.15 , V is in m³/kg, and P is in kPa

R = 0.0815 kJ/kg·K

b, A_i, B_i, C_i, and k are constants:

A_2 = -8.909485 E–02	A_4 = 1.778071 E–05
B_2 = 4.408654 E–05	B_4 = -4.016976 E–08
C_2 = -2.074834 E+00	C_4 = -2.977911 E–04
A_3 = -1.016882 E–03	A_5 = -7.481440 E–08
B_3 = 2.574527 E–06	B_5 = 1.670285 E–10
C_3 = 2.142829 E–02	C_5 = 1.255922 E–06
b = 3.755677 E–04	k = 4.599967

For ENG Units

T and T_c are in °R = °F + 459.67, V is in ft³/lb, and P is in psia.

R = 0.1052 (psia)(ft³)/lb·°R

b, A_i, B_i, C_i, and k are constants:

A_2 = -3.315708 E+00	A_4 = 1.697907 E–01
B_2 = 9.115011 E–04	B_4 = -2.131040 E–04
C_2 = 7.721597 E+01	C_4 = -2.843653 E+00
A_3 = -6.061984 E–01	A_5 = -1.144381 E–02
B_3 = 8.526469 E–04	B_5 = 1.419396 E–05
C_3 = 1.277414 E+01	C_5 = 1.921091 E–01
b = 6.016014 E–03	k = 4.599967 E+00

Ideal Gas Heat Capacity (At Constant Volume)

$$C_v^o = a + bT + cT^2 + dT^3 + f/T^2$$

For SI Units

C_v^o = kJ/kg·K

T is in K = °C + 273.15

a, b, c, d, and f are constants:

a = 3.154856 E+00	d = -3.754497 E–08
b = -1.656054 E–02	f = -3.023189 E+04
c = 4.353378 E–05	

For ENG Units

C_v^o = Btu/lb·°R

T is in °R = °F + 459.67

a, b, c, d, and f are constants:

a = 7.540287 E–01	d = -1.538660 E–09
b = -2.198925 E–03	f = -2.341093 E+04
c = 3.211365 E–06	

Vapor Pressure

$$\log_{10} P_{sat} \, A + B/T + C \log_{10} T + DT + E \, ([F-T]/T) \log_{10} (F-T)$$

For SI Units

T is in K = °C + 273.15 and P is in kPa

A, B, C, D, E, and F are constants:

A = 4.069889 E+01	D = 7.616005 E–03
B = -2.362540 E+03	E = 2.342564 E–01
C = -1.306883 E+01	F = 3.761111 E+02

For ENG Units

T is in °R = °F + 459.67 and P is in psia

A, B, C, D, E, and F are constants:

A = 4.325629 E+01   D = 4.231114 E–03

B = –4.293056 E+03   E = 2.342564 E–01

C = –1.306883 E+01   F = 6.770000 E+02

Density of the Saturated Liquid

$$d_f = A_f + B_f(1-T_r)^{(1/3)} + C_f(1-T_r)^{(2/3)} + D_f(1-T_r) + E_f(1-T_r)^{(4/3)}$$

For SI Units

$T_r = T/T_c$, both in K = °C + 273.15 and d_f is in kg/m^3

A_f, B_f, C_f, D_f, and E_f are constants:

A_f = 5.281464 E+02 D_f = –9.491172 E+02

B_f = 7.551834 E+02 E_f = 5.935660 E+02

C_f = 1.028676 E+03

For ENG Units

$T_r = T/T_c$, both in °R = °F + 459.67 and d_f is in lb/ft^3

A_f, B_f, C_f, D_f, and E_f are constants:

A_f = 3.297110 E+01 D_f = –5.925145 E+01

B_f = 4.714456 E+01 E_f = 3.705512 E+01

C_f = 6.421816 E+01

Table 1. Freon™ 134a Saturation Properties—Temperature Table

Temp [°C]	Pressure	Volume [m³/kg]		Density [kg/m³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg)(K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid $1/v_f$	Vapor $1/v_g$	Liquid h_f	Latent h_{fg}	Vapor h_g	Liquid s_f	Vapor s_g	
−100	0.57	0.0006	25.0000	1580.5	0.040	77.3	259.9	337.2	0.4448	1.9460	−100
−99	0.63	0.0006	22.7273	1577.8	0.044	78.4	259.4	337.8	0.4514	1.9407	−99
−98	0.70	0.0006	20.4082	1575.0	0.049	79.6	258.8	338.4	0.4581	1.9356	−98
−97	0.77	0.0006	18.5185	1572.3	0.054	80.7	258.2	339.0	0.4646	1.9306	−97
−96	0.86	0.0006	16.9492	1569.5	0.059	81.9	257.7	339.6	0.4711	1.9257	−96
−95	0.95	0.0006	15.3846	1566.8	0.065	83.0	257.1	340.1	0.4776	1.9209	−95
−94	1.04	0.0006	13.8889	1564.1	0.072	84.2	256.6	340.7	0.4841	1.9161	−94
−93	1.15	0.0006	12.6582	1561.3	0.079	85.3	256.0	341.3	0.4905	1.9115	−93
−92	1.27	0.0006	11.6279	1558.6	0.086	86.5	255.4	341.9	0.4968	1.9070	−92
−91	1.40	0.0006	10.6383	1555.8	0.094	87.6	254.9	342.5	0.5032	1.9025	−91
−90	1.53	0.0006	9.7087	1553.1	0.103	88.8	254.3	343.1	0.5095	1.8982	−90
−89	1.68	0.0006	8.9286	1550.4	0.112	89.9	253.8	343.7	0.5158	1.8939	−89
−88	1.84	0.0006	8.1967	1547.6	0.122	91.1	253.2	344.3	0.5220	1.8898	−88
−87	2.02	0.0006	7.5188	1544.9	0.133	92.3	252.7	344.9	0.5282	1.8857	−87
−86	2.20	0.0006	6.8966	1542.1	0.145	93.4	252.1	345.5	0.5344	1.8817	−86
−85	2.41	0.0006	6.3291	1539.4	0.158	94.6	251.6	346.2	0.5406	1.8778	−85
−84	2.63	0.0007	5.8480	1536.7	0.171	95.7	251.0	346.8	0.5467	1.8739	−84
−83	2.86	0.0007	5.4054	1533.9	0.185	96.9	250.5	347.4	0.5528	1.8702	−83
−82	3.11	0.0007	4.9751	1531.2	0.201	98.0	249.9	348.0	0.5589	1.8665	−82
−81	3.39	0.0007	4.6083	1528.5	0.217	99.2	249.4	348.6	0.5650	1.8629	−81
−80	3.68	0.0007	4.2553	1525.7	0.235	100.4	248.8	349.2	0.5710	1.8594	−80
−79	3.99	0.0007	3.9526	1523.0	0.253	101.5	248.3	349.8	0.5770	1.8559	−79
−78	4.33	0.0007	3.6630	1520.2	0.273	102.7	247.7	350.4	0.5830	1.8525	−78
−77	4.69	0.0007	3.3898	1517.5	0.295	103.9	247.2	351.1	0.5890	1.8492	−77
−76	5.07	0.0007	3.1546	1514.8	0.317	105.0	246.6	351.7	0.5949	1.846	−76
−75	5.48	0.0007	2.9326	1512.0	0.341	106.2	246.1	352.3	0.6009	1.8428	−75
−74	5.92	0.0007	2.7248	1509.3	0.367	107.4	245.5	352.9	0.6068	1.8397	−74
−73	6.39	0.0007	2.5381	1506.5	0.394	108.6	245.0	353.5	0.6126	1.8366	−73
−72	6.89	0.0007	2.3641	1503.8	0.423	109.7	244.4	354.2	0.6185	1.8336	−72
−71	7.42	0.0007	2.2075	1501.0	0.453	110.9	243.9	354.8	0.6243	1.8307	−71
−70	7.98	0.0007	2.0576	1498.3	0.486	112.1	243.3	355.4	0.6302	1.8279	−70
−69	8.58	0.0007	1.9231	1495.5	0.520	113.3	242.8	356.0	0.6360	1.8251	−69
−68	9.22	0.0007	1.7986	1492.8	0.556	114.5	242.2	356.6	0.6417	1.8223	−68
−67	9.89	0.0007	1.6835	1490.0	0.594	115.6	241.6	357.3	0.6475	1.8196	−67
−66	10.61	0.0007	1.5773	1487.3	0.634	116.8	241.1	357.9	0.6532	1.817	−66
−65	11.37	0.0007	1.4771	1484.5	0.677	118.0	240.5	358.5	0.6590	1.8144	−65
−64	12.18	0.0007	1.3850	1481.8	0.722	119.2	239.9	359.2	0.6647	1.8119	−64
−63	13.03	0.0007	1.3004	1479.0	0.769	120.4	239.4	359.8	0.6704	1.8095	−63
−62	13.93	0.0007	1.2210	1476.3	0.819	121.6	238.8	360.4	0.6760	1.8071	−62
−61	14.88	0.0007	1.1481	1473.5	0.871	122.8	238.2	361.0	0.6817	1.8047	−61
−60	15.89	0.0007	1.0799	1470.7	0.926	124.0	237.7	361.7	0.6873	1.8024	−60
−59	16.95	0.0007	1.0163	1468.0	0.984	125.2	237.1	362.3	0.6929	1.8001	−59
−58	18.07	0.0007	0.9579	1465.2	1.044	126.4	236.5	362.9	0.6985	1.7979	−58
−57	19.25	0.0007	0.9025	1462.4	1.108	127.6	236.0	363.6	0.7041	1.7958	−57
−56	20.49	0.0007	0.8511	1459.6	1.175	128.8	235.4	364.2	0.7097	1.7937	−56
−55	21.80	0.0007	0.8032	1456.9	1.245	130.0	234.8	364.8	0.7152	1.7916	−55
−54	23.17	0.0007	0.7587	1454.1	1.318	131.2	234.2	365.4	0.7208	1.7896	−54
−53	24.62	0.0007	0.7168	1451.3	1.395	132.4	233.6	366.1	0.7263	1.7876	−53
−52	26.14	0.0007	0.6775	1448.5	1.476	133.7	233.1	366.7	0.7318	1.7857	−52
−51	27.73	0.0007	0.6410	1445.7	1.560	134.9	232.5	367.3	0.7373	1.7838	−51
−50	29.41	0.0007	0.6068	1442.9	1.648	136.1	231.9	368.0	0.7428	1.7819	−50
−49	31.16	0.0007	0.5747	1440.1	1.740	137.3	231.3	368.6	0.7482	1.7801	−49
−48	33.00	0.0007	0.5447	1437.3	1.836	138.5	230.7	369.2	0.7537	1.7783	−48
−47	34.93	0.0007	0.5165	1434.5	1.936	139.8	230.1	369.9	0.7591	1.7766	−47
−46	36.95	0.0007	0.4902	1431.6	2.040	141.0	229.5	370.5	0.7645	1.7749	−46
−45	39.06	0.0007	0.4653	1428.8	2.149	142.2	228.9	371.1	0.7699	1.7732	−45
−44	41.27	0.0007	0.4419	1426.0	2.263	143.5	228.3	371.8	0.7753	1.7716	−44
−43	43.58	0.0007	0.4198	1423.2	2.382	144.7	227.7	372.4	0.7806	1.77	−43
−42	45.99	0.0007	0.3992	1420.3	2.505	145.9	227.1	373.0	0.7860	1.7685	−42
−41	48.51	0.0007	0.3798	1417.5	2.633	147.2	226.5	373.7	0.7913	1.767	−41
−40	51.14	0.0007	0.3614	1414.6	2.767	148.4	225.9	374.3	0.7967	1.7655	−40

Table 1. Freon™ 134a Saturation Properties—Temperature Table (continued)

Temp [°C]	Pressure	Volume [m³/kg]		Density [kg/m³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg)(K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid 1/v_f	Vapor 1/v_g	Liquid h_f	Latent h_fg	Vapor h_g	Liquid s_f	Vapor s_g	
−39	53.88	0.0007	0.3441	1411.8	2.906	149.6	225.3	374.9	0.8020	1.7641	−39
−38	56.74	0.0007	0.3279	1408.9	3.050	150.9	224.7	375.5	0.8073	1.7627	−38
−37	59.72	0.0007	0.3125	1406.0	3.200	152.1	224.0	376.2	0.8126	1.7613	−37
−36	62.83	0.0007	0.2980	1403.1	3.356	153.4	223.4	376.8	0.8178	1.7599	−36
−35	66.07	0.0007	0.2843	1400.2	3.518	154.6	222.8	377.4	0.8231	1.7586	−35
−34	69.43	0.0007	0.2713	1397.4	3.686	155.9	222.2	378.1	0.8283	1.7573	−34
−33	72.93	0.0007	0.2590	1394.5	3.861	157.1	221.5	378.7	0.8336	1.7561	−33
−32	76.58	0.0007	0.2474	1391.5	4.042	158.4	220.9	379.3	0.8388	1.7548	−32
−31	80.36	0.0007	0.2365	1388.6	4.229	159.7	220.3	379.9	0.8440	1.7536	−31
−30	84.29	0.0007	0.2260	1385.7	4.424	160.9	219.6	380.6	0.8492	1.7525	−30
−29	88.37	0.0007	0.2162	1382.8	4.625	162.2	219.0	381.2	0.8544	1.7513	−29
−28	92.61	0.0007	0.2069	1379.8	4.833	163.5	218.3	381.8	0.8595	1.7502	−28
−27	97.02	0.0007	0.1981	1376.9	5.049	164.7	217.7	382.4	0.8647	1.7491	−27
−26	101.58	0.0007	0.1896	1373.9	5.273	166.0	217.1	383.1	0.8698	1.7481	−26
−25	106.32	0.0007	0.1817	1371.0	5.504	167.3	216.4	383.7	0.8750	1.747	−25
−24	111.22	0.0007	0.1741	1368.0	5.743	168.6	215.7	384.3	0.8801	1.746	−24
−23	116.31	0.0007	0.1669	1365.0	5.991	169.8	215.1	384.9	0.8852	1.745	−23
−22	121.57	0.0007	0.1601	1362.0	6.247	171.1	214.4	385.5	0.8903	1.744	−22
−21	127.02	0.0007	0.1536	1359.0	6.511	172.4	213.7	386.2	0.8954	1.7431	−21
−20	132.67	0.0007	0.1474	1356.0	6.784	173.7	213.1	386.8	0.9005	1.7422	−20
−19	138.50	0.0007	0.1415	1353.0	7.066	175.0	212.4	387.4	0.9055	1.7413	−19
−18	144.54	0.0007	0.1359	1349.9	7.357	176.3	211.7	388.0	0.9106	1.7404	−18
−17	150.78	0.0007	0.1306	1346.9	7.658	177.6	211.0	388.6	0.9157	1.7395	−17
−16	157.23	0.0007	0.1255	1343.8	7.968	178.9	210.4	389.2	0.9207	1.7387	−16
−15	163.90	0.0007	0.1207	1340.8	8.288	180.2	209.7	389.8	0.9257	1.7379	−15
−14	170.78	0.0007	0.1160	1337.7	8.618	181.5	209.0	390.4	0.9307	1.7371	−14
−13	177.89	0.0007	0.1116	1334.6	8.958	182.8	208.3	391.1	0.9357	1.7363	−13
−12	185.22	0.0008	0.1074	1331.5	9.309	184.1	207.6	391.7	0.9407	1.7356	−12
−11	192.79	0.0008	0.1034	1328.4	9.671	185.4	206.9	392.3	0.9457	1.7348	−11
−10	200.60	0.0008	0.0996	1325.3	10.044	186.7	206.2	392.9	0.9507	1.7341	−10
−9	208.65	0.0008	0.0959	1322.1	10.428	188.0	205.4	393.5	0.9557	1.7334	−9
−8	216.95	0.0008	0.0924	1319.0	10.823	189.3	204.7	394.1	0.9606	1.7327	−8
−7	225.50	0.0008	0.0890	1315.8	11.231	190.7	204.0	394.7	0.9656	1.7321	−7
−6	234.32	0.0008	0.0858	1312.6	11.650	192.0	203.3	395.3	0.9705	1.7314	−6
−5	243.39	0.0008	0.0828	1309.4	12.082	193.3	202.5	395.9	0.9755	1.7308	−5
−4	252.74	0.0008	0.0798	1306.2	12.526	194.6	201.8	396.4	0.9804	1.7302	−4
−3	262.36	0.0008	0.0770	1303.0	12.983	196.0	201.1	397.0	0.9853	1.7295	−3
−2	272.26	0.0008	0.0743	1299.8	13.454	197.3	200.3	397.6	0.9902	1.729	−2
−1	282.45	0.0008	0.0718	1296.5	13.937	198.7	199.6	398.2	0.9951	1.7284	−1
0	292.93	0.0008	0.0693	1293.3	14.435	200.0	198.8	398.8	1.0000	1.7278	0
1	303.70	0.0008	0.0669	1290.0	14.946	201.3	198.0	399.4	1.0049	1.7273	1
2	314.77	0.0008	0.0646	1286.7	15.472	202.7	197.3	400.0	1.0098	1.7267	2
3	326.16	0.0008	0.0624	1283.4	16.013	204.0	196.5	400.5	1.0146	1.7262	3
4	337.85	0.0008	0.0604	1280.1	16.569	205.4	195.7	401.1	1.0195	1.7257	4
5	349.87	0.0008	0.0583	1276.7	17.140	206.8	194.9	401.7	1.0244	1.7252	5
6	362.21	0.0008	0.0564	1273.4	17.726	208.1	194.2	402.3	1.0292	1.7247	6
7	374.88	0.0008	0.0546	1270.0	18.329	209.5	193.4	402.8	1.0340	1.7242	7
8	387.88	0.0008	0.0528	1266.6	18.948	210.8	192.6	403.4	1.0389	1.7238	8
9	401.23	0.0008	0.0511	1263.2	19.583	212.2	191.8	404.0	1.0437	1.7233	9
10	414.92	0.0008	0.0494	1259.8	20.236	213.6	190.9	404.5	1.0485	1.7229	10
11	428.97	0.0008	0.0478	1256.3	20.906	215.0	190.1	405.1	1.0533	1.7224	11
12	443.37	0.0008	0.0463	1252.9	21.594	216.4	189.3	405.6	1.0582	1.722	12
13	458.11	0.0008	0.0448	1249.4	22.301	217.7	188.5	406.2	1.0630	1.7216	13
14	473.25	0.0008	0.0434	1245.9	23.026	219.1	187.6	406.8	1.0678	1.7212	14
15	488.78	0.0008	0.0421	1242.3	23.770	220.5	186.8	407.3	1.0726	1.7208	15
16	504.68	0.0008	0.0408	1238.8	24.533	221.9	185.9	407.8	1.0773	1.7204	16
17	520.98	0.0008	0.0395	1235.2	25.317	223.3	185.1	408.4	1.0821	1.72	17
18	537.67	0.0008	0.0383	1231.6	26.121	224.7	184.2	408.9	1.0869	1.7196	18
19	554.76	0.0008	0.0371	1228.0	26.945	226.1	183.3	409.5	1.0917	1.7192	19
20	572.25	0.0008	0.0360	1224.4	27.791	227.5	182.5	410.0	1.0964	1.7189	20
21	590.16	0.0008	0.0349	1220.7	28.659	228.9	181.6	410.5	1.1012	1.7185	21

Table 1. Freon™ 134a Saturation Properties—Temperature Table (continued)

Temp [°C]	Pressure	Volume [m³/kg]		Density [kg/m³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg)(K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid $1/v_f$	Vapor $1/v_g$	Liquid h_f	Latent h_{fg}	Vapor h_g	Liquid s_f	Vapor s_g	
22	608.49	0.0008	0.0338	1217.0	29.549	230.4	180.7	411.0	1.1060	1.7182	22
23	627.25	0.0008	0.0328	1213.3	30.462	231.8	179.8	411.6	1.1107	1.7178	23
24	646.44	0.0008	0.0318	1209.6	31.399	233.2	178.9	412.1	1.1155	1.7175	24
25	666.06	0.0008	0.0309	1205.9	32.359	234.6	178.0	412.6	1.1202	1.7171	25
26	686.13	0.0008	0.0300	1202.1	33.344	236.1	177.0	413.1	1.1250	1.7168	26
27	706.66	0.0008	0.0291	1198.3	34.354	237.5	176.1	413.6	1.1297	1.7165	27
28	727.64	0.0008	0.0283	1194.4	35.389	238.9	175.2	414.1	1.1345	1.7161	28
29	749.04	0.0008	0.0274	1190.6	36.451	240.4	174.2	414.6	1.1392	1.7158	29
30	771.02	0.0008	0.0266	1186.7	37.540	241.8	173.3	415.1	1.1439	1.7155	30
31	793.43	0.0008	0.0259	1182.8	38.657	243.3	172.3	415.6	1.1487	1.7151	31
32	816.28	0.0008	0.0251	1178.8	39.802	244.8	171.3	416.1	1.1534	1.7148	32
33	839.66	0.0009	0.0244	1174.9	40.975	246.2	170.3	416.6	1.1581	1.7145	33
34	863.53	0.0009	0.0237	1170.8	42.179	247.7	169.3	417.0	1.1628	1.7142	34
35	887.91	0.0009	0.0230	1166.8	43.413	249.2	168.3	417.5	1.1676	1.7138	35
36	912.80	0.0009	0.0224	1162.7	44.679	250.6	167.3	418.0	1.1723	1.7135	36
37	938.20	0.0009	0.0218	1158.6	45.977	252.1	166.3	418.4	1.1770	1.7132	37
38	964.14	0.0009	0.0211	1154.5	47.308	253.6	165.3	418.9	1.1817	1.7129	38
39	990.60	0.0009	0.0205	1150.3	48.672	255.1	164.2	419.3	1.1864	1.7125	39
40	1017.61	0.0009	0.0200	1146.1	50.072	256.6	163.2	419.8	1.1912	1.7122	40
41	1045.16	0.0009	0.0194	1141.9	51.508	258.1	162.1	420.2	1.1959	1.7119	41
42	1073.26	0.0009	0.0189	1137.6	52.980	259.6	161.0	420.6	1.2006	1.7115	42
43	1101.93	0.0009	0.0184	1133.3	54.490	261.1	159.9	421.1	1.2053	1.7112	43
44	1131.16	0.0009	0.0178	1128.9	56.040	262.7	158.8	421.5	1.2101	1.7108	44
45	1161.01	0.0009	0.0174	1124.5	57.630	264.2	157.7	421.9	1.2148	1.7105	45
46	1191.41	0.0009	0.0169	1120.0	59.261	265.7	156.6	422.3	1.2195	1.7101	46
47	1222.41	0.0009	0.0164	1115.6	60.934	267.3	155.4	422.7	1.2242	1.7097	47
48	1253.95	0.0009	0.0160	1111.0	62.652	268.8	154.3	423.1	1.2290	1.7093	48
49	1286.17	0.0009	0.0155	1106.4	64.415	270.4	153.1	423.5	1.2337	1.709	49
50	1319.00	0.0009	0.0151	1101.8	66.225	271.9	151.9	423.8	1.2384	1.7086	50
51	1352.44	0.0009	0.0147	1097.1	68.084	273.5	150.7	424.2	1.2432	1.7082	51
52	1386.52	0.0009	0.0143	1092.4	69.992	275.1	149.5	424.6	1.2479	1.7077	52
53	1421.23	0.0009	0.0139	1087.6	71.952	276.6	148.3	424.9	1.2527	1.7073	53
54	1456.58	0.0009	0.0135	1082.8	73.966	278.2	147.0	425.3	1.2574	1.7069	54
55	1492.59	0.0009	0.0132	1077.9	76.035	279.8	145.8	425.6	1.2622	1.7064	55
56	1529.26	0.0009	0.0128	1072.9	78.162	281.4	144.5	425.9	1.2670	1.7059	56
57	1566.61	0.0009	0.0124	1067.9	80.348	283.0	143.2	426.2	1.2717	1.7055	57
58	1604.63	0.0009	0.0121	1062.8	82.596	284.6	141.9	426.5	1.2765	1.705	58
59	1643.35	0.0009	0.0118	1057.7	84.908	286.3	140.5	426.8	1.2813	1.7044	59
60	1682.76	0.0010	0.0115	1052.5	87.287	287.9	139.2	427.1	1.2861	1.7039	60
61	1722.88	0.0010	0.0111	1047.2	89.735	289.5	137.8	427.4	1.2909	1.7033	61
62	1763.72	0.0010	0.0108	1041.8	92.255	291.2	136.4	427.6	1.2957	1.7028	62
63	1805.28	0.0010	0.0105	1036.4	94.851	292.9	135.0	427.9	1.3006	1.7021	63
64	1847.47	0.0010	0.0103	1030.9	97.526	294.5	133.6	428.1	1.3054	1.7015	64
65	1890.54	0.0010	0.0100	1025.3	100.283	296.2	132.1	428.3	1.3102	1.7009	65
66	1934.36	0.0010	0.0097	1019.6	103.125	297.9	130.6	428.5	1.3151	1.7002	66
67	1978.94	0.0010	0.0094	1013.8	106.058	299.6	129.1	428.7	1.3200	1.6995	67
68	2024.28	0.0010	0.0092	1008.0	109.085	301.3	127.5	428.8	1.3249	1.6987	68
69	2070.42	0.0010	0.0089	1002.0	112.212	303.0	126.0	429.0	1.3298	1.6979	69
70	2117.34	0.0010	0.0087	995.9	115.442	304.8	124.4	429.1	1.3347	1.6971	70
71	2165.08	0.0010	0.0084	989.7	118.783	306.5	122.7	429.2	1.3397	1.6963	71
72	2213.63	0.0010	0.0082	983.4	122.239	308.3	121.1	429.3	1.3446	1.6954	72
73	2263.01	0.0010	0.0079	977.0	125.818	310.1	119.4	429.4	1.3496	1.6945	73
74	2313.23	0.0010	0.0077	970.4	129.527	311.8	117.6	429.5	1.3547	1.6935	74
75	2364.31	0.0010	0.0075	963.7	133.373	313.7	115.8	429.5	1.3597	1.6924	75
76	2416.25	0.0010	0.0073	956.9	137.366	315.5	114.0	429.5	1.3648	1.6913	76
77	2469.08	0.0011	0.0071	949.9	141.514	317.3	112.2	429.5	1.3699	1.6902	77
78	2522.79	0.0011	0.0069	942.7	145.830	319.2	110.3	429.4	1.3750	1.689	78
79	2577.42	0.0011	0.0067	935.4	150.324	321.0	108.3	429.3	1.3801	1.6877	79
80	2632.97	0.0011	0.0065	927.8	155.010	322.9	106.3	429.2	1.3854	1.6863	80
81	2689.46	0.0011	0.0063	920.1	159.904	324.9	104.2	429.1	1.3906	1.6849	81
82	2746.90	0.0011	0.0061	912.1	165.022	326.8	102.1	428.9	1.3959	1.6834	82

Table 1. Freon™ 134a Saturation Properties—Temperature Table (continued)

Temp [°C]	Pressure	Volume [m³/kg]		Density [kg/m³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg)(K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid $1/v_f$	Vapor $1/v_g$	Liquid h_f	Latent h_{fg}	Vapor h_g	Liquid s_f	Vapor s_g	
83	2805.31	0.0011	0.0059	903.9	170.383	328.8	99.9	428.7	1.4012	1.6818	83
84	2864.70	0.0011	0.0057	895.5	176.010	330.7	97.7	428.4	1.4066	1.68	84
85	2925.11	0.0011	0.0055	886.7	181.929	332.8	95.3	428.1	1.4121	1.6782	85
86	2986.54	0.0011	0.0053	877.6	188.169	334.8	92.9	427.7	1.4176	1.6762	86
87	3049.01	0.0012	0.0051	868.2	194.766	336.9	90.4	427.3	1.4232	1.6741	87
88	3112.55	0.0012	0.0050	858.4	201.761	339.0	87.7	426.8	1.4289	1.6719	88
89	3177.10	0.0012	0.0048	848.1	209.206	341.2	85.0	426.2	1.4347	1.6694	89
90	3242.87	0.0012	0.0046	837.3	217.162	343.4	82.1	425.5	1.4406	1.6668	90
91	3309.78	0.0012	0.0044	826.0	225.706	345.7	79.1	424.8	1.4466	1.6639	91
92	3377.85	0.0012	0.0043	814.0	234.936	348.0	75.9	423.9	1.4528	1.6607	92
93	3447.13	0.0012	0.0041	801.1	244.978	350.4	72.5	422.9	1.4592	1.6572	93
94	3517.65	0.0013	0.0039	787.4	256.005	353.0	68.9	421.8	1.4658	1.6533	94
95	3589.44	0.0013	0.0037	772.3	268.255	355.6	64.9	420.5	1.4727	1.6489	95
96	3662.57	0.0013	0.0035	755.8	282.079	358.4	60.5	418.9	1.4799	1.6439	96
97	3737.09	0.0014	0.0034	737.1	298.029	361.3	55.7	417.0	1.4877	1.6381	97
98	3813.08	0.0014	0.0032	715.4	317.065	364.6	50.0	414.6	1.4963	1.6311	98
99	3890.64	0.0015	0.0029	688.6	341.133	368.4	43.2	411.5	1.5061	1.6221	99
100	3969.94	0.0015	0.0027	651.4	375.503	373.2	33.8	407.0	1.5187	1.6092	100
101	4051.35	0.0018	0.0022	566.4	457.594	383.0	13.0	396.0	1.5447	1.5794	101

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 10.00 kPa (abs)							Pressure = 20.00 kPa (abs)						Temp [°C]
	V	H	S	Cp	Cp/Cv	V_s		V	H	S	Cp	Cp/Cv	V_s	
−66.85	0.00067	115.8	0.6484	1.1863	1.5234	938.7	SAT LIQ	0.00068	128.3	0.7075	1.2068	1.5130	887.7	−56.39
−66.85	1.66667	357.4	1.8192	0.6695	1.1477	137.7	SAT VAP	0.87032	363.9	1.7945	0.6968	1.1466	140.3	−56.39
−65	1.68067	358.6	1.8252	0.6727	1.1465	138.3		—	—	—	—	—	—	−65
−60	1.72414	362.0	1.8413	0.6816	1.1434	139.9		—	—	—	—	—	—	−60
−55	1.76678	365.4	1.8572	0.6906	1.1405	141.4		0.87642	364.9	1.7989	0.6990	1.1456	140.7	−55
−50	1.80832	368.9	1.8730	0.6996	1.1378	142.9		0.89767	368.4	1.8149	0.7071	1.1423	142.3	−50
−45	1.84843	372.4	1.8886	0.7087	1.1352	144.4		0.91912	372.0	1.8306	0.7154	1.1392	143.9	−45
−40	1.89036	376.0	1.9040	0.7178	1.1328	145.9		0.93985	375.6	1.8462	0.7238	1.1364	145.4	−40
−35	1.93050	379.6	1.9193	0.7269	1.1304	147.4		0.96061	379.2	1.8617	0.7323	1.1337	146.9	−35
−30	1.97239	383.3	1.9345	0.7360	1.1283	148.9		0.98232	382.9	1.8770	0.7409	1.1311	148.4	−30
−25	2.01207	387.0	1.9496	0.7451	1.1262	150.3		1.00301	386.6	1.8921	0.7495	1.1288	149.8	−25
−20	2.05339	390.7	1.9646	0.7541	1.1242	151.7		1.02354	390.4	1.9072	0.7582	1.1265	151.3	−20
−15	2.09644	394.5	1.9794	0.7632	1.1223	153.1		1.04493	394.2	1.9221	0.7669	1.1244	152.7	−15
−10	2.13675	398.3	1.9941	0.7722	1.1204	154.5		1.06496	398.1	1.9369	0.7756	1.1224	154.1	−10
−5	2.17865	402.2	2.0087	0.7813	1.1187	155.9		1.08578	402.0	1.9516	0.7843	1.1205	155.5	−5
0	2.21729	406.2	2.0233	0.7902	1.1170	157.2		1.10619	405.9	1.9661	0.7930	1.1186	156.9	0
5	2.26244	410.1	2.0377	0.7992	1.1154	158.6		1.12740	409.9	1.9806	0.8017	1.1169	158.3	5
10	2.30415	414.1	2.0520	0.8081	1.1139	159.9		1.14811	413.9	1.9950	0.8104	1.1152	159.6	10
15	2.34192	418.2	2.0662	0.8169	1.1124	161.2		1.16822	418.0	2.0092	0.8191	1.1136	161.0	15
20	2.38095	422.3	2.0803	0.8257	1.1109	162.6		1.18906	422.1	2.0234	0.8277	1.1121	162.3	20
25	2.42718	426.5	2.0944	0.8345	1.1095	163.9		1.20919	426.3	2.0375	0.8363	1.1106	163.6	25
30	2.46305	430.7	2.1083	0.8432	1.1082	165.1		1.23001	430.5	2.0514	0.8449	1.1092	164.9	30
35	2.50627	434.9	2.1222	0.8518	1.1069	166.4		1.25156	434.7	2.0653	0.8534	1.1078	166.2	35
40	2.54453	439.2	2.1360	0.8605	1.1056	167.7		1.27226	439.0	2.0791	0.8619	1.1065	167.5	40
45	2.59067	443.5	2.1497	0.8690	1.1044	168.9		1.29199	443.3	2.0929	0.8704	1.1052	168.7	45
50	2.63158	447.9	2.1633	0.8775	1.1033	170.2		1.31234	447.7	2.1065	0.8788	1.1040	170.0	50
55	2.67380	452.3	2.1768	0.8860	1.1021	171.4		1.33333	452.1	2.1200	0.8871	1.1028	171.2	55
60	2.71003	456.7	2.1903	0.8943	1.1010	172.7		1.35318	456.6	2.1335	0.8954	1.1017	172.5	60
65	2.75482	461.2	2.2037	0.9027	1.1000	173.9		1.37363	461.1	2.1469	0.9037	1.1006	173.7	65
70	2.79330	465.8	2.2170	0.9110	1.0989	175.1		1.39470	465.6	2.1603	0.9119	1.0995	174.9	70
75	2.83286	470.3	2.2302	0.9192	1.0979	176.3		1.41443	470.2	2.1735	0.9201	1.0984	176.1	75
80	2.87356	474.9	2.2434	0.9273	1.0969	177.5		1.43678	474.8	2.1867	0.9282	1.0974	177.3	80
85	2.91545	479.6	2.2565	0.9354	1.0960	178.7		1.45560	479.5	2.1998	0.9362	1.0965	178.5	85

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 30.00 kPa (abs)							Pressure = 40.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−49.66	0.00069	136.5	0.7446	1.2205	1.5084	855.4	SAT LIQ	0.00070	142.8	0.7722	1.2311	1.5059	831.3	−44.57
−49.66	0.59559	368.2	1.7813	0.7154	1.1468	141.8	SAT VAP	0.45496	371.4	1.7725	0.7301	1.1475	142.8	−44.57
−45	0.60901	371.5	1.7961	0.7224	1.1434	143.3		—	—	—	—	—	—	−45
−40	0.62344	375.2	1.8118	0.7300	1.1401	144.8		0.46490	374.8	1.7871	0.7364	1.1440	144.3	−40
−35	0.63735	378.8	1.8274	0.7379	1.1370	146.4		0.47574	378.5	1.8028	0.7437	1.1404	145.9	−35
−30	0.65189	382.6	1.8428	0.7459	1.1341	147.9		0.48662	382.2	1.8183	0.7511	1.1372	147.4	−30
−25	0.66578	386.3	1.8581	0.7541	1.1315	149.4		0.49727	386.0	1.8336	0.7587	1.1342	148.9	−25
−20	0.67981	390.1	1.8732	0.7623	1.1289	150.9		0.50787	389.8	1.8489	0.7665	1.1314	150.4	−20
−15	0.69396	393.9	1.8882	0.7707	1.1266	152.3		0.51867	393.6	1.8639	0.7745	1.1288	151.9	−15
−10	0.70771	397.8	1.9031	0.7790	1.1244	153.8		0.52910	397.5	1.8789	0.7825	1.1264	153.4	−10
−5	0.72202	401.7	1.9178	0.7874	1.1223	155.2		0.53967	401.5	1.8937	0.7906	1.1241	154.8	−5
0	0.73584	405.7	1.9324	0.7959	1.1203	156.6		0.55036	405.4	1.9083	0.7988	1.1219	156.2	0
5	0.74963	409.7	1.9470	0.8043	1.1184	158.0		0.56085	409.4	1.9229	0.8070	1.1199	157.7	5
10	0.76336	413.7	1.9614	0.8128	1.1166	159.3		0.57110	413.5	1.9374	0.8152	1.1180	159.0	10
15	0.77760	417.8	1.9757	0.8213	1.1149	160.7		0.58173	417.6	1.9517	0.8235	1.1161	160.4	15
20	0.79114	421.9	1.9899	0.8297	1.1132	162.0		0.59207	421.7	1.9659	0.8318	1.1144	161.8	20
25	0.80515	426.1	2.0040	0.8382	1.1117	163.4		0.60241	425.9	1.9801	0.8401	1.1128	163.1	25
30	0.81900	430.3	2.0180	0.8466	1.1102	164.7		0.61312	430.1	1.9941	0.8484	1.1112	164.4	30
35	0.83264	434.6	2.0319	0.8550	1.1087	166.0		0.62344	434.4	2.0081	0.8566	1.1097	165.7	35
40	0.84602	438.9	2.0457	0.8634	1.1073	167.3		0.63371	438.7	2.0219	0.8649	1.1082	167.0	40
45	0.85985	443.2	2.0595	0.8717	1.1060	168.5		0.64392	443.0	2.0357	0.8731	1.1068	168.3	45
50	0.87413	447.6	2.0731	0.8800	1.1047	169.8		0.65445	447.4	2.0494	0.8813	1.1055	169.6	50
55	0.88731	452.0	2.0867	0.8883	1.1035	171.1		0.66489	451.9	2.0630	0.8895	1.1042	170.9	55
60	0.90171	456.5	2.1002	0.8965	1.1023	172.3		0.67522	456.3	2.0765	0.8977	1.1030	172.1	60
65	0.91491	461.0	2.1136	0.9047	1.1012	173.5		0.68540	460.8	2.0899	0.9058	1.1018	173.4	65
70	0.92851	465.5	2.1270	0.9129	1.1001	174.8		0.69589	465.4	2.1033	0.9138	1.1006	174.6	70
75	0.94251	470.1	2.1402	0.9210	1.0990	176.0		0.70621	470.0	2.1165	0.9219	1.0995	175.8	75
80	0.95602	474.7	2.1534	0.9290	1.0979	177.2		0.71633	474.6	2.1297	0.9299	1.0985	177.0	80
85	0.96993	479.4	2.1665	0.9370	1.0969	178.4		0.72674	479.3	2.1429	0.9378	1.0974	178.2	85
90	0.98328	484.1	2.1796	0.9449	1.0960	179.6		0.73692	484.0	2.1559	0.9457	1.0964	179.4	90
95	0.99701	488.8	2.1925	0.9528	1.0950	180.7		0.74738	488.7	2.1689	0.9535	1.0954	180.6	95
100	1.01112	493.6	2.2054	0.9607	1.0941	181.9		0.75758	493.5	2.1818	0.9613	1.0945	181.8	100
105	1.02459	498.4	2.2183	0.9685	1.0932	183.1		0.76805	498.3	2.1947	0.9691	1.0936	183.0	105
110	—	—	—	—	—	—		0.77821	503.2	2.2074	0.9768	1.0927	184.1	110

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 50.00 kPa (abs)							Pressure = 60.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−40.43	0.00071	147.9	0.7944	1.2399	1.5046	811.8	SAT LIQ	0.00071	152.2	0.8130	1.2476	1.5040	795.3	−36.91
−40.43	0.36914	374.0	1.7661	0.7424	1.1483	143.6	SAT VAP	0.31114	376.2	1.7611	0.7533	1.1493	144.2	−36.91
−40	0.36982	374.3	1.7675	0.7430	1.1480	143.7		—	—	—	—	—	—	−40
−35	0.37864	378.1	1.7833	0.7495	1.1440	145.3		0.31397	377.7	1.7672	0.7555	1.1477	144.8	−35
−30	0.38745	381.8	1.7990	0.7564	1.1404	146.9		0.32134	381.5	1.7830	0.7618	1.1436	146.4	−30
−25	0.39604	385.6	1.8144	0.7635	1.1370	148.5		0.32873	385.3	1.7986	0.7683	1.1400	148.0	−25
−20	0.40469	389.5	1.8297	0.7708	1.1340	150.0		0.33591	389.2	1.8140	0.7752	1.1366	149.6	−20
−15	0.41339	393.3	1.8449	0.7784	1.1311	151.5		0.34317	393.0	1.8292	0.7823	1.1334	151.1	−15
−10	0.42194	397.3	1.8599	0.7860	1.1284	153.0		0.35039	397.0	1.8443	0.7896	1.1306	152.6	−10
−5	0.43048	401.2	1.8748	0.7938	1.1260	154.5		0.35753	400.9	1.8592	0.7971	1.1279	154.1	−5
0	0.43898	405.2	1.8895	0.8017	1.1236	155.9		0.36470	404.9	1.8740	0.8047	1.1254	155.6	0
5	0.44743	409.2	1.9041	0.8097	1.1215	157.3		0.37189	409.0	1.8887	0.8124	1.1230	157.0	5
10	0.45579	413.3	1.9186	0.8177	1.1194	158.7		0.37893	413.1	1.9032	0.8202	1.1208	158.4	10
15	0.46425	417.4	1.9330	0.8257	1.1175	160.1		0.38595	417.2	1.9176	0.8280	1.1188	159.8	15
20	0.47259	421.5	1.9473	0.8338	1.1156	161.5		0.39308	421.3	1.9319	0.8359	1.1168	161.2	20
25	0.48100	425.7	1.9614	0.8420	1.1139	162.8		0.40000	425.5	1.9461	0.8439	1.1150	162.6	25
30	0.48948	430.0	1.9755	0.8501	1.1122	164.2		0.40700	429.8	1.9602	0.8519	1.1132	163.9	30
35	0.49776	434.2	1.9895	0.8582	1.1106	165.5		0.41408	434.1	1.9742	0.8599	1.1116	165.3	35
40	0.50607	438.5	2.0034	0.8664	1.1091	166.8		0.42105	438.4	1.9881	0.8679	1.1100	166.6	40
45	0.51440	442.9	2.0172	0.8745	1.1076	168.1		0.42808	442.7	2.0020	0.8759	1.1085	167.9	45
50	0.52274	447.3	2.0309	0.8826	1.1062	169.4		0.43497	447.1	2.0157	0.8839	1.1070	169.2	50
55	0.53107	451.7	2.0445	0.8907	1.1049	170.7		0.44189	451.6	2.0293	0.8919	1.1056	170.5	55
60	0.53937	456.2	2.0580	0.8988	1.1036	171.9		0.44883	456.1	2.0429	0.8999	1.1043	171.8	60
65	0.54765	460.7	2.0715	0.9068	1.1024	173.2		0.45579	460.6	2.0563	0.9079	1.1030	173.0	65
70	0.55586	465.3	2.0848	0.9148	1.1012	174.4		0.46275	465.1	2.0697	0.9158	1.1018	174.3	70
75	0.56402	469.9	2.0981	0.9228	1.1001	175.7		0.46970	469.7	2.0830	0.9237	1.1006	175.5	75
80	0.57241	474.5	2.1113	0.9307	1.0990	176.9		0.47642	474.4	2.0962	0.9316	1.0995	176.7	80
85	0.58072	479.2	2.1245	0.9386	1.0979	178.1		0.48356	479.1	2.1094	0.9394	1.0984	177.9	85
90	0.58893	483.9	2.1375	0.9464	1.0969	179.3		0.49020	483.8	2.1225	0.9472	1.0973	179.1	90
95	0.59737	488.6	2.1505	0.9543	1.0959	180.5		0.49727	488.5	2.1355	0.9550	1.0963	180.3	95
100	0.60533	493.4	2.1635	0.9620	1.0949	181.7		0.50403	493.3	2.1484	0.9627	1.0953	181.5	100
105	0.61387	498.3	2.1763	0.9697	1.0940	182.8		0.51099	498.2	2.1613	0.9703	1.0944	182.7	105
110	0.62189	503.1	2.1891	0.9774	1.0931	184.0		0.51787	503.0	2.1741	0.9780	1.0934	183.9	110
115	—	—	—	—	—	—		0.52466	507.9	2.1868	0.9855	1.0925	185.0	115

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 70.00 kPa (abs)							Pressure = 80.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−33.83	0.00072	156.1	0.8292	1.2544	1.5038	781.0	SAT LIQ	0.00072	159.5	0.8435	1.2606	1.5038	768.3	−31.09
−33.83	0.26918	378.2	1.7571	0.7630	1.1504	144.6	SAT VAP	0.23747	379.9	1.7538	0.7718	1.1515	145.0	−31.09
−30	0.27412	381.1	1.7693	0.7673	1.1470	145.9		0.23872	380.7	1.7572	0.7729	1.1505	145.4	−30
−25	0.28050	385.0	1.7850	0.7733	1.1430	147.6		0.24438	384.6	1.7730	0.7783	1.1460	147.1	−25
−20	0.28678	388.8	1.8004	0.7797	1.1392	149.1		0.24994	388.5	1.7886	0.7842	1.1420	148.7	−20
−15	0.29308	392.7	1.8158	0.7863	1.1359	150.7		0.25549	392.4	1.8040	0.7904	1.1383	150.3	−15
−10	0.29931	396.7	1.8309	0.7932	1.1327	152.2		0.26103	396.4	1.8192	0.7969	1.1349	151.9	−10
−5	0.30553	400.7	1.8459	0.8004	1.1298	153.8		0.26645	400.4	1.8343	0.8037	1.1318	153.4	−5
0	0.31172	404.7	1.8608	0.8077	1.1271	155.2		0.27196	404.5	1.8492	0.8107	1.1290	154.9	0
5	0.31786	408.8	1.8755	0.8151	1.1246	156.7		0.27732	408.5	1.8640	0.8179	1.1263	156.4	5
10	0.32394	412.9	1.8901	0.8227	1.1223	158.1		0.28273	412.6	1.8786	0.8252	1.1238	157.8	10
15	0.33003	417.0	1.9045	0.8303	1.1201	159.6		0.28810	416.8	1.8931	0.8326	1.1215	159.3	15
20	0.33613	421.2	1.9189	0.8380	1.1180	161.0		0.29343	421.0	1.9075	0.8402	1.1193	160.7	20
25	0.34211	425.4	1.9331	0.8458	1.1161	162.3		0.29878	425.2	1.9218	0.8478	1.1172	162.1	25
30	0.34819	429.6	1.9473	0.8537	1.1143	163.7		0.30404	429.4	1.9359	0.8555	1.1153	163.5	30
35	0.35423	433.9	1.9613	0.8615	1.1125	165.0		0.30941	433.7	1.9500	0.8632	1.1135	164.8	35
40	0.36023	438.2	1.9752	0.8694	1.1109	166.4		0.31466	438.1	1.9640	0.8709	1.1118	166.2	40
45	0.36630	442.6	1.9890	0.8773	1.1093	167.7		0.32000	442.4	1.9778	0.8787	1.1101	167.5	45
50	0.37230	447.0	2.0028	0.8852	1.1078	169.0		0.32520	446.9	1.9916	0.8865	1.1085	168.8	50
55	0.37821	451.4	2.0164	0.8931	1.1063	170.3		0.33047	451.3	2.0053	0.8944	1.1071	170.1	55
60	0.38417	455.9	2.0300	0.9010	1.1050	171.6		0.33568	455.8	2.0188	0.9022	1.1056	171.4	60
65	0.39017	460.5	2.0435	0.9089	1.1036	172.8		0.34095	460.3	2.0323	0.9100	1.1043	172.7	65
70	0.39620	465.0	2.0569	0.9168	1.1024	174.1		0.34614	464.9	2.0457	0.9178	1.1030	173.9	70
75	0.40209	469.6	2.0702	0.9246	1.1012	175.3		0.35137	469.5	2.0591	0.9255	1.1017	175.2	75
80	0.40800	474.3	2.0834	0.9324	1.1000	176.6		0.35663	474.2	2.0723	0.9333	1.1005	176.4	80
85	0.41391	478.9	2.0966	0.9402	1.0989	177.8		0.36179	478.8	2.0855	0.9410	1.0994	177.6	85
90	0.41982	483.7	2.1097	0.9480	1.0978	179.0		0.36697	483.6	2.0986	0.9487	1.0982	178.9	90
95	0.42589	488.4	2.1227	0.9557	1.0967	180.2		0.37216	488.3	2.1116	0.9564	1.0972	180.1	95
100	0.43178	493.2	2.1357	0.9633	1.0957	181.4		0.37736	493.1	2.1246	0.9640	1.0961	181.3	100
105	0.43764	498.1	2.1485	0.9710	1.0948	182.6		0.38256	498.0	2.1375	0.9716	1.0951	182.5	105
110	0.44346	502.9	2.1613	0.9786	1.0938	183.8		0.38775	502.8	2.1503	0.9792	1.0942	183.6	110
115	0.44944	507.8	2.1741	0.9861	1.0929	184.9		0.39293	507.8	2.1630	0.9867	1.0932	184.8	115
120	0.45537	512.8	2.1867	0.9936	1.0920	186.1		0.39809	512.7	2.1757	0.9941	1.0923	186.0	120

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 90.00 kPa (abs)							Pressure = 100.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−28.61	0.00072	162.7	0.8564	1.2662	1.5041	756.7	SAT LIQ	0.00073	165.6	0.8681	1.2715	1.5046	746.2	−26.34
−28.61	0.21254	381.4	1.7509	0.7800	1.1527	145.4	SAT VAP	0.19246	382.8	1.7484	0.7876	1.1539	145.7	−26.34
−25	0.21622	384.3	1.7624	0.7835	1.1492	146.6		0.19372	383.9	1.7527	0.7888	1.1525	146.1	−25
−20	0.22129	388.2	1.7780	0.7888	1.1448	148.3		0.19829	387.9	1.7685	0.7935	1.1477	147.8	−20
−15	0.22624	392.1	1.7935	0.7946	1.1408	149.9		0.20284	391.8	1.7840	0.7988	1.1434	149.5	−15
−10	0.23121	396.1	1.8088	0.8007	1.1372	151.5		0.20734	395.8	1.7994	0.8045	1.1395	151.1	−10
−5	0.23613	400.2	1.8240	0.8071	1.1339	153.0		0.21182	399.9	1.8146	0.8106	1.1359	152.7	−5
0	0.24102	404.2	1.8389	0.8138	1.1308	154.5		0.21626	404.0	1.8297	0.8169	1.1327	154.2	0
5	0.24588	408.3	1.8538	0.8207	1.1279	156.0		0.22065	408.1	1.8445	0.8235	1.1296	155.7	5
10	0.25069	412.4	1.8684	0.8278	1.1253	157.5		0.22502	412.2	1.8593	0.8304	1.1269	157.2	10
15	0.25549	416.6	1.8830	0.8350	1.1229	159.0		0.22941	416.4	1.8739	0.8373	1.1243	158.7	15
20	0.26028	420.8	1.8974	0.8423	1.1206	160.4		0.23370	420.6	1.8883	0.8445	1.1218	160.1	20
25	0.26504	425.0	1.9117	0.8498	1.1184	161.8		0.23804	424.8	1.9027	0.8517	1.1196	161.6	25
30	0.26976	429.3	1.9259	0.8573	1.1164	163.2		0.24231	429.1	1.9169	0.8591	1.1175	163.0	30
35	0.27450	433.6	1.9400	0.8649	1.1145	164.6		0.24661	433.4	1.9310	0.8665	1.1155	164.3	35
40	0.27925	437.9	1.9540	0.8725	1.1127	165.9		0.25088	437.7	1.9450	0.8741	1.1136	165.7	40
45	0.28393	442.3	1.9679	0.8802	1.1110	167.3		0.25517	442.1	1.9589	0.8816	1.1118	167.1	45
50	0.28860	446.7	1.9816	0.8879	1.1093	168.6		0.25940	446.6	1.9727	0.8892	1.1101	168.4	50
55	0.29334	451.2	1.9953	0.8956	1.1078	169.9		0.26364	451.0	1.9864	0.8968	1.1085	169.7	55
60	0.29797	455.7	2.0089	0.9033	1.1063	171.2		0.26788	455.5	2.0001	0.9045	1.1070	171.0	60
65	0.30266	460.2	2.0225	0.9110	1.1049	172.5		0.27203	460.1	2.0136	0.9121	1.1055	172.3	65
70	0.30731	464.8	2.0359	0.9188	1.1036	173.8		0.27624	464.7	2.0270	0.9198	1.1042	173.6	70
75	0.31201	469.4	2.0492	0.9265	1.1023	175.0		0.28043	469.3	2.0404	0.9274	1.1028	174.9	75
80	0.31666	474.0	2.0625	0.9342	1.1010	176.3		0.28466	473.9	2.0537	0.9350	1.1016	176.1	80
85	0.32123	478.7	2.0757	0.9418	1.0999	177.5		0.28885	478.6	2.0669	0.9427	1.1004	177.4	85
90	0.32595	483.5	2.0888	0.9495	1.0987	178.7		0.29300	483.4	2.0800	0.9503	1.0992	178.6	90
95	0.33058	488.2	2.1018	0.9571	1.0976	179.9		0.29718	488.1	2.0930	0.9578	1.0981	179.8	95
100	0.33523	493.0	2.1148	0.9647	1.0966	181.1		0.30139	492.9	2.1060	0.9654	1.0970	181.0	100
105	0.33979	497.9	2.1277	0.9722	1.0955	182.3		0.30553	497.8	2.1189	0.9729	1.0959	182.2	105
110	0.34447	502.8	2.1405	0.9798	1.0946	183.5		0.30969	502.7	2.1318	0.9804	1.0949	183.4	110
115	0.34904	507.7	2.1533	0.9872	1.0936	184.7		0.31387	507.6	2.1445	0.9878	1.0940	184.6	115
120	0.35361	512.6	2.1659	0.9947	1.0927	185.9		0.31797	512.5	2.1572	0.9952	1.0930	185.8	120
125	0.35817	517.6	2.1786	1.0021	1.0918	187.0		0.32216	517.5	2.1698	1.0026	1.0921	186.9	125

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 101.325 kPa (abs)							Pressure = 110.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−26.06	0.00073	165.9	0.8696	1.2722	1.5046	744.9	SAT LIQ	0.00073	168.2	0.8788	1.2765	1.5051	736.6	−24.25
−26.06	0.19011	383.0	1.7481	0.7886	1.1540	145.7	SAT VAP	0.17593	384.1	1.7462	0.7948	1.1551	145.9	−24.25
−25	0.19106	383.9	1.7515	0.7895	1.1530	146.1		—	—	—	—	—	—	−25
−20	0.19562	387.8	1.7673	0.7942	1.1481	147.7		0.17953	387.5	1.7597	0.7984	1.1507	147.4	−20
−15	0.20012	391.8	1.7829	0.7994	1.1438	149.4		0.18369	391.5	1.7754	0.8031	1.1461	149.0	−15
−10	0.20454	395.8	1.7982	0.8050	1.1398	151.0		0.18783	395.6	1.7908	0.8084	1.1419	150.7	−10
−5	0.20894	399.9	1.8135	0.8110	1.1362	152.6		0.19194	399.6	1.8061	0.8141	1.1381	152.3	−5
0	0.21336	403.9	1.8285	0.8173	1.1329	154.2		0.19600	403.7	1.8212	0.8201	1.1346	153.9	0
5	0.21768	408.0	1.8434	0.8239	1.1299	155.7		0.20004	407.8	1.8361	0.8264	1.1314	155.4	5
10	0.22202	412.2	1.8581	0.8307	1.1271	157.2		0.20404	412.0	1.8509	0.8330	1.1284	156.9	10
15	0.22630	416.3	1.8727	0.8377	1.1244	158.6		0.20803	416.2	1.8656	0.8397	1.1257	158.4	15
20	0.23057	420.5	1.8872	0.8448	1.1220	160.1		0.21200	420.4	1.8801	0.8467	1.1231	159.9	20
25	0.23485	424.8	1.9015	0.8520	1.1197	161.5		0.21598	424.6	1.8945	0.8538	1.1208	161.3	25
30	0.23906	429.1	1.9158	0.8594	1.1176	162.9		0.21988	428.9	1.9087	0.8610	1.1186	162.7	30
35	0.24331	433.4	1.9299	0.8668	1.1156	164.3		0.22376	433.2	1.9228	0.8683	1.1165	164.1	35
40	0.24759	437.7	1.9439	0.8743	1.1137	165.7		0.22769	437.6	1.9369	0.8756	1.1145	165.5	40
45	0.25176	442.1	1.9578	0.8818	1.1119	167.0		0.23154	442.0	1.9508	0.8831	1.1127	166.9	45
50	0.25595	446.5	1.9716	0.8894	1.1102	168.4		0.23546	446.4	1.9646	0.8905	1.1109	168.2	50
55	0.26015	451.0	1.9853	0.8970	1.1086	169.7		0.23929	450.9	1.9784	0.8981	1.1093	169.5	55
60	0.26427	455.5	1.9989	0.9046	1.1071	171.0		0.24313	455.4	1.9920	0.9056	1.1077	170.8	60
65	0.26846	460.1	2.0125	0.9123	1.1056	172.3		0.24697	459.9	2.0055	0.9132	1.1062	172.1	65
70	0.27263	464.6	2.0259	0.9199	1.1042	173.6		0.25088	464.5	2.0190	0.9208	1.1048	173.4	70
75	0.27678	469.3	2.0393	0.9275	1.1029	174.8		0.25465	469.2	2.0324	0.9283	1.1034	174.7	75
80	0.28090	473.9	2.0526	0.9352	1.1016	176.1		0.25853	473.8	2.0457	0.9359	1.1021	176.0	80
85	0.28506	478.6	2.0658	0.9428	1.1004	177.3		0.26233	478.5	2.0589	0.9435	1.1009	177.2	85
90	0.28918	483.3	2.0789	0.9504	1.0992	178.6		0.26610	483.2	2.0720	0.9510	1.0997	178.4	90
95	0.29326	488.1	2.0919	0.9579	1.0981	179.8		0.26998	488.0	2.0851	0.9586	1.0985	179.7	95
100	0.29735	492.9	2.1049	0.9655	1.0970	181.0		0.27375	492.8	2.0981	0.9661	1.0974	180.9	100
105	0.30157	497.8	2.1178	0.9730	1.0960	182.2		0.27755	497.7	2.1110	0.9735	1.0963	182.1	105
110	0.30562	502.6	2.1306	0.9804	1.0950	183.4		0.28129	502.6	2.1238	0.9810	1.0953	183.3	110
115	0.30969	507.6	2.1434	0.9879	1.0940	184.6		0.28514	507.5	2.1366	0.9884	1.0943	184.5	115
120	0.31377	512.5	2.1561	0.9953	1.0931	185.7		0.28893	512.5	2.1493	0.9958	1.0934	185.6	120
125	0.31797	517.5	2.1687	1.0026	1.0922	186.9		0.29265	517.5	2.1619	1.0031	1.0924	186.8	125
130	—	—	—	—	—	—		0.29647	522.5	2.1745	1.0104	1.0915	188.0	130

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 120.00 kPa (abs)							Pressure = 130.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−22.29	0.00073	170.7	0.8888	1.2812	1.5058	727.6	SAT LIQ	0.00074	173.1	0.8981	1.2856	1.5065	719.1	−20.47
−22.29	0.16207	385.4	1.7443	0.8016	1.1563	146.1	SAT VAP	0.15026	386.5	1.7426	0.8080	1.1575	146.3	−20.47
−20	0.16385	387.2	1.7516	0.8033	1.1538	146.9		0.15060	386.9	1.7441	0.8083	1.1570	146.4	−20
−15	0.16773	391.2	1.7674	0.8075	1.1488	148.6		0.15423	390.9	1.7600	0.8120	1.1516	148.2	−15
−10	0.17156	395.3	1.7829	0.8124	1.1443	150.3		0.15780	395.0	1.7756	0.8164	1.1468	149.9	−10
−5	0.17535	399.3	1.7983	0.8177	1.1402	151.9		0.16134	399.1	1.7910	0.8213	1.1425	151.5	−5
0	0.17912	403.5	1.8134	0.8233	1.1365	153.5		0.16483	403.2	1.8062	0.8266	1.1385	153.1	0
5	0.18285	407.6	1.8284	0.8294	1.1331	155.1		0.16829	407.3	1.8212	0.8323	1.1349	154.7	5
10	0.18657	411.7	1.8432	0.8356	1.1300	156.6		0.17173	411.5	1.8361	0.8383	1.1316	156.3	10
15	0.19022	415.9	1.8579	0.8422	1.1271	158.1		0.17516	415.7	1.8509	0.8446	1.1286	157.8	15
20	0.19387	420.2	1.8725	0.8489	1.1245	159.6		0.17857	420.0	1.8654	0.8511	1.1258	159.3	20
25	0.19751	424.4	1.8869	0.8558	1.1220	161.0		0.18195	424.2	1.8799	0.8578	1.1232	160.8	25
30	0.20113	428.7	1.9012	0.8628	1.1197	162.5		0.18529	428.5	1.8942	0.8647	1.1208	162.2	30
35	0.20475	433.1	1.9153	0.8700	1.1175	163.9		0.18864	432.9	1.9084	0.8717	1.1185	163.6	35
40	0.20833	437.4	1.9294	0.8772	1.1155	165.3		0.19198	437.3	1.9225	0.8788	1.1164	165.0	40
45	0.21191	441.8	1.9434	0.8845	1.1135	166.6		0.19531	441.7	1.9365	0.8860	1.1144	166.4	45
50	0.21552	446.3	1.9572	0.8919	1.1117	168.0		0.19861	446.1	1.9504	0.8933	1.1125	167.8	50
55	0.21906	450.7	1.9710	0.8993	1.1100	169.3		0.20190	450.6	1.9641	0.9006	1.1108	169.1	55
60	0.22262	455.3	1.9846	0.9068	1.1084	170.7		0.20521	455.1	1.9778	0.9080	1.1091	170.5	60
65	0.22614	459.8	1.9982	0.9143	1.1068	172.0		0.20846	459.7	1.9914	0.9154	1.1075	171.8	65
70	0.22967	464.4	2.0117	0.9218	1.1054	173.3		0.21173	464.3	2.0049	0.9228	1.1060	173.1	70
75	0.23321	469.0	2.0251	0.9293	1.1040	174.5		0.21501	468.9	2.0183	0.9302	1.1045	174.4	75
80	0.23669	473.7	2.0384	0.9368	1.1026	175.8		0.21825	473.6	2.0316	0.9377	1.1032	175.7	80
85	0.24021	478.4	2.0516	0.9443	1.1014	177.1		0.22148	478.3	2.0448	0.9451	1.1019	176.9	85
90	0.24372	483.1	2.0647	0.9518	1.1001	178.3		0.22477	483.0	2.0580	0.9526	1.1006	178.2	90
95	0.24722	487.9	2.0778	0.9593	1.0989	179.5		0.22800	487.8	2.0711	0.9600	1.0994	179.4	95
100	0.25069	492.7	2.0908	0.9667	1.0978	180.8		0.23116	492.6	2.0841	0.9674	1.0982	180.6	100
105	0.25419	497.6	2.1037	0.9742	1.0967	182.0		0.23447	497.5	2.0970	0.9748	1.0971	181.8	105
110	0.25767	502.5	2.1165	0.9816	1.0957	183.2		0.23764	502.4	2.1098	0.9822	1.0961	183.0	110
115	0.26116	507.4	2.1293	0.9890	1.0947	184.4		0.24091	507.3	2.1226	0.9895	1.0950	184.2	115
120	0.26462	512.4	2.1420	0.9963	1.0937	185.5		0.24414	512.3	2.1353	0.9968	1.0940	185.4	120
125	0.26810	517.4	2.1547	1.0036	1.0928	186.7		0.24728	517.3	2.1480	1.0041	1.0931	186.6	125
130	0.27152	522.4	2.1672	1.0109	1.0919	187.9		0.25050	522.3	2.1606	1.0114	1.0922	187.8	130

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 140.00 kPa (abs)							Pressure = 150.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−18.75	0.00074	175.3	0.9068	1.2899	1.5072	711.2	SAT LIQ	0.00074	177.4	0.9150	1.2939	1.5081	703.7	−17.12
−18.75	0.14010	387.5	1.7411	0.8142	1.1587	146.4	SAT VAP	0.13123	388.5	1.7397	0.8201	1.1599	146.5	−17.12
−15	0.14263	390.6	1.7530	0.8166	1.1545	147.7		0.13259	390.3	1.7464	0.8213	1.1574	147.3	−15
−10	0.14599	394.7	1.7687	0.8205	1.1493	149.5		0.13576	394.4	1.7622	0.8247	1.1519	149.1	−10
−5	0.14930	398.8	1.7842	0.8250	1.1447	151.2		0.13889	398.5	1.7778	0.8287	1.1470	150.8	−5
0	0.15258	402.9	1.7995	0.8299	1.1405	152.8		0.14196	402.7	1.7931	0.8333	1.1426	152.4	0
5	0.15584	407.1	1.8146	0.8353	1.1368	154.4		0.14503	406.9	1.8083	0.8384	1.1386	154.1	5
10	0.15906	411.3	1.8295	0.8411	1.1333	156.0		0.14806	411.1	1.8233	0.8438	1.1350	155.7	10
15	0.16226	415.5	1.8443	0.8471	1.1301	157.5		0.15106	415.3	1.8381	0.8496	1.1316	157.2	15
20	0.16543	419.8	1.8589	0.8534	1.1272	159.0		0.15404	419.6	1.8528	0.8557	1.1285	158.7	20
25	0.16858	424.1	1.8734	0.8599	1.1245	160.5		0.15701	423.9	1.8673	0.8620	1.1257	160.2	25
30	0.17173	428.4	1.8877	0.8666	1.1219	162.0		0.15995	428.2	1.8817	0.8685	1.1231	161.7	30
35	0.17486	432.7	1.9020	0.8735	1.1196	163.4		0.16289	432.5	1.8959	0.8752	1.1206	163.2	35
40	0.17794	437.1	1.9161	0.8804	1.1174	164.8		0.16581	436.9	1.9101	0.8820	1.1183	164.6	40
45	0.18106	441.5	1.9301	0.8875	1.1153	166.2		0.16869	441.4	1.9241	0.8890	1.1162	166.0	45
50	0.18413	446.0	1.9440	0.8946	1.1134	167.6		0.17156	445.8	1.9380	0.8960	1.1142	167.4	50
55	0.18720	450.5	1.9578	0.9019	1.1115	168.9		0.17449	450.3	1.9518	0.9032	1.1123	168.7	55
60	0.19026	455.0	1.9715	0.9091	1.1098	170.3		0.17734	454.9	1.9656	0.9103	1.1105	170.1	60
65	0.19331	459.6	1.9851	0.9165	1.1082	171.6		0.18018	459.4	1.9792	0.9176	1.1088	171.4	65
70	0.19635	464.2	1.9986	0.9238	1.1066	172.9		0.18305	464.0	1.9927	0.9249	1.1072	172.8	70
75	0.19936	468.8	2.0120	0.9312	1.1051	174.2		0.18587	468.7	2.0061	0.9322	1.1057	174.1	75
80	0.20243	473.5	2.0253	0.9386	1.1037	175.5		0.18875	473.4	2.0195	0.9395	1.1043	175.3	80
85	0.20547	478.2	2.0386	0.9460	1.1024	176.8		0.19157	478.1	2.0327	0.9468	1.1029	176.6	85
90	0.20851	482.9	2.0517	0.9534	1.1011	178.0		0.19440	482.8	2.0459	0.9541	1.1016	177.9	90
95	0.21146	487.7	2.0648	0.9607	1.0998	179.3		0.19720	487.6	2.0590	0.9615	1.1003	179.1	95
100	0.21450	492.5	2.0778	0.9681	1.0987	180.5		0.20000	492.4	2.0720	0.9688	1.0991	180.4	100
105	0.21753	497.4	2.0908	0.9755	1.0975	181.7		0.20284	497.3	2.0850	0.9761	1.0979	181.6	105
110	0.22051	502.3	2.1036	0.9828	1.0964	182.9		0.20563	502.2	2.0978	0.9834	1.0968	182.8	110
115	0.22351	507.2	2.1164	0.9901	1.0954	184.1		0.20846	507.1	2.1106	0.9907	1.0958	184.0	115
120	0.22650	512.2	2.1291	0.9974	1.0944	185.3		0.21124	512.1	2.1234	0.9979	1.0947	185.2	120
125	0.22946	517.2	2.1418	1.0046	1.0934	186.5		0.21404	517.1	2.1360	1.0052	1.0937	186.4	125
130	0.23245	522.2	2.1544	1.0118	1.0925	187.7		0.21683	522.2	2.1486	1.0123	1.0928	187.6	130
135	0.23546	527.3	2.1669	1.0190	1.0916	188.8		0.21964	527.2	2.1611	1.0195	1.0919	188.7	135

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 160.00 kPa (abs)							Pressure = 170.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−15.58	0.00074	179.4	0.9228	1.2979	1.5089	696.6	SAT LIQ	0.00075	181.3	0.9302	1.3017	1.5098	689.9	−14.11
−15.58	0.12344	389.5	1.7384	0.8258	1.1612	146.6	SAT VAP	0.11655	390.4	1.7372	0.8313	1.1624	146.7	−14.11
−15	0.12379	390.0	1.7402	0.8261	1.1605	146.9		—	—	—	—	—	—	−15
−10	0.12679	394.1	1.7561	0.8289	1.1546	148.6		0.11889	393.8	1.7503	0.8333	1.1574	148.2	−10
−5	0.12975	398.3	1.7717	0.8325	1.1494	150.4		0.12170	398.0	1.7660	0.8364	1.1518	150.0	−5
0	0.13268	402.4	1.7872	0.8367	1.1447	152.1		0.12447	402.2	1.7815	0.8402	1.1469	151.7	0
5	0.13556	406.6	1.8024	0.8415	1.1405	153.7		0.12721	406.4	1.7968	0.8446	1.1424	153.4	5
10	0.13843	410.8	1.8174	0.8466	1.1367	155.3		0.12994	410.6	1.8119	0.8495	1.1384	155.0	10
15	0.14126	415.1	1.8323	0.8522	1.1332	156.9		0.13263	414.9	1.8268	0.8548	1.1347	156.6	15
20	0.14407	419.4	1.8470	0.8580	1.1299	158.5		0.13528	419.2	1.8415	0.8604	1.1314	158.2	20
25	0.14686	423.7	1.8616	0.8641	1.1270	160.0		0.13793	423.5	1.8561	0.8663	1.1283	159.7	25
30	0.14966	428.0	1.8760	0.8705	1.1242	161.5		0.14055	427.8	1.8706	0.8724	1.1254	161.2	30
35	0.15242	432.4	1.8903	0.8770	1.1217	162.9		0.14316	432.2	1.8849	0.8788	1.1228	162.7	35
40	0.15516	436.8	1.9044	0.8837	1.1193	164.4		0.14577	436.6	1.8991	0.8853	1.1203	164.1	40
45	0.15790	441.2	1.9185	0.8905	1.1171	165.8		0.14835	441.1	1.9132	0.8920	1.1180	165.6	45
50	0.16059	445.7	1.9324	0.8974	1.1150	167.2		0.15092	445.5	1.9272	0.8988	1.1159	167.0	50
55	0.16329	450.2	1.9463	0.9044	1.1131	168.6		0.15347	450.0	1.9410	0.9057	1.1139	168.4	55
60	0.16600	454.7	1.9600	0.9115	1.1112	169.9		0.15603	454.6	1.9548	0.9127	1.1120	169.7	60
65	0.16869	459.3	1.9736	0.9187	1.1095	171.3		0.15858	459.2	1.9684	0.9198	1.1102	171.1	65
70	0.17141	463.9	1.9872	0.9259	1.1079	172.6		0.16108	463.8	1.9820	0.9269	1.1085	172.4	70
75	0.17406	468.6	2.0006	0.9331	1.1063	173.9		0.16364	468.4	1.9954	0.9341	1.1069	173.7	75
80	0.17674	473.2	2.0140	0.9404	1.1048	175.2		0.16617	473.1	2.0088	0.9413	1.1054	175.0	80
85	0.17940	478.0	2.0272	0.9477	1.1034	176.5		0.16863	477.9	2.0221	0.9485	1.1039	176.3	85
90	0.18205	482.7	2.0404	0.9549	1.1020	177.7		0.17117	482.6	2.0353	0.9557	1.1025	177.6	90
95	0.18471	487.5	2.0535	0.9622	1.1008	179.0		0.17367	487.4	2.0484	0.9630	1.1012	178.9	95
100	0.18734	492.3	2.0666	0.9695	1.0995	180.2		0.17618	492.2	2.0614	0.9702	1.1000	180.1	100
105	0.19001	497.2	2.0795	0.9768	1.0983	181.5		0.17867	497.1	2.0744	0.9774	1.0988	181.3	105
110	0.19260	502.1	2.0924	0.9840	1.0972	182.7		0.18113	502.0	2.0873	0.9847	1.0976	182.6	110
115	0.19524	507.0	2.1052	0.9913	1.0961	183.9		0.18362	507.0	2.1001	0.9919	1.0965	183.8	115
120	0.19790	512.0	2.1179	0.9985	1.0951	185.1		0.18612	511.9	2.1128	0.9990	1.0954	185.0	120
125	0.20052	517.0	2.1306	1.0057	1.0941	186.3		0.18857	516.9	2.1255	1.0062	1.0944	186.2	125
130	0.20313	522.1	2.1432	1.0128	1.0931	187.5		0.19106	522.0	2.1381	1.0133	1.0934	187.4	130
135	0.20576	527.2	2.1557	1.0200	1.0922	188.6		0.19354	527.1	2.1506	1.0204	1.0925	188.5	135
140	—	—	—	—	—	—		0.19600	532.2	2.1631	1.0275	1.0915	189.7	140

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 180.00 kPa (abs)							Pressure = 190.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−12.71	0.00075	183.2	0.9372	1.3053	1.5107	683.4	SAT LIQ	0.00075	184.9	0.9439	1.3089	1.5116	677.3	−11.37
−12.71	0.11039	391.2	1.7361	0.8366	1.1637	146.8	SAT VAP	0.10484	392.0	1.7351	0.8418	1.1649	146.9	−11.37
−10	0.11186	393.5	1.7448	0.8377	1.1602	147.8		0.10556	393.2	1.7395	0.8422	1.1631	147.4	−10
−5	0.11453	397.7	1.7606	0.8404	1.1543	149.6		0.10812	397.4	1.7554	0.8444	1.1569	149.2	−5
0	0.11718	401.9	1.7761	0.8438	1.1491	151.3		0.11066	401.6	1.7710	0.8474	1.1514	151.0	0
5	0.11979	406.1	1.7915	0.8478	1.1444	153.0		0.11315	405.9	1.7864	0.8510	1.1464	152.7	5
10	0.12237	410.4	1.8066	0.8524	1.1402	154.7		0.11562	410.1	1.8016	0.8553	1.1420	154.4	10
15	0.12494	414.7	1.8216	0.8574	1.1363	156.3		0.11805	414.4	1.8166	0.8600	1.1380	156.0	15
20	0.12747	419.0	1.8364	0.8628	1.1328	157.9		0.12047	418.7	1.8314	0.8652	1.1343	157.6	20
25	0.12999	423.3	1.8510	0.8685	1.1296	159.4		0.12287	423.1	1.8461	0.8706	1.1309	159.2	25
30	0.13247	427.6	1.8655	0.8744	1.1266	160.9		0.12525	427.5	1.8606	0.8764	1.1278	160.7	30
35	0.13495	432.0	1.8798	0.8806	1.1239	162.4		0.12760	431.9	1.8750	0.8824	1.1250	162.2	35
40	0.13742	436.4	1.8941	0.8870	1.1213	163.9		0.12995	436.3	1.8893	0.8887	1.1223	163.7	40
45	0.13988	440.9	1.9082	0.8936	1.1190	165.3		0.13229	440.7	1.9034	0.8951	1.1199	165.1	45
50	0.14231	445.4	1.9222	0.9003	1.1167	166.8		0.13461	445.2	1.9174	0.9017	1.1176	166.6	50
55	0.14474	449.9	1.9360	0.9071	1.1147	168.2		0.13693	449.8	1.9313	0.9084	1.1155	168.0	55
60	0.14717	454.5	1.9498	0.9140	1.1127	169.5		0.13922	454.3	1.9451	0.9152	1.1134	169.4	60
65	0.14957	459.0	1.9635	0.9209	1.1109	170.9		0.14152	458.9	1.9588	0.9221	1.1115	170.7	65
70	0.15195	463.7	1.9770	0.9280	1.1091	172.2		0.14380	463.5	1.9724	0.9290	1.1098	172.1	70
75	0.15434	468.3	1.9905	0.9351	1.1075	173.6		0.14607	468.2	1.9859	0.9360	1.1081	173.4	75
80	0.15674	473.0	2.0039	0.9422	1.1059	174.9		0.14832	472.9	1.9993	0.9431	1.1065	174.7	80
85	0.15911	477.7	2.0172	0.9494	1.1044	176.2		0.15060	477.6	2.0126	0.9502	1.1050	176.0	85
90	0.16150	482.5	2.0304	0.9565	1.1030	177.5		0.15284	482.4	2.0258	0.9573	1.1035	177.3	90
95	0.16385	487.3	2.0435	0.9637	1.1017	178.7		0.15509	487.2	2.0389	0.9645	1.1021	178.6	95
100	0.16622	492.1	2.0566	0.9709	1.1004	180.0		0.15733	492.0	2.0520	0.9716	1.1008	179.8	100
105	0.16858	497.0	2.0696	0.9781	1.0992	181.2		0.15957	496.9	2.0650	0.9788	1.0996	181.1	105
110	0.17094	501.9	2.0825	0.9853	1.0980	182.4		0.16181	501.8	2.0779	0.9859	1.0984	182.3	110
115	0.17328	506.9	2.0953	0.9924	1.0969	183.7		0.16404	506.8	2.0907	0.9930	1.0972	183.6	115
120	0.17562	511.8	2.1080	0.9996	1.0958	184.9		0.16625	511.8	2.1034	1.0001	1.0961	184.8	120
125	0.17797	516.9	2.1207	1.0067	1.0947	186.1		0.16849	516.8	2.1161	1.0072	1.0951	186.0	125
130	0.18031	521.9	2.1333	1.0138	1.0937	187.3		0.17071	521.8	2.1288	1.0143	1.0940	187.2	130
135	0.18265	527.0	2.1458	1.0209	1.0928	188.4		0.17292	526.9	2.1413	1.0214	1.0931	188.3	135
140	0.18498	532.1	2.1583	1.0279	1.0918	189.6		0.17516	532.0	2.1538	1.0284	1.0921	189.5	140

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 200.00 kPa (abs)							Pressure = 210.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−10.08	0.00075	186.6	0.9503	1.3124	1.5125	671.3	SAT LIQ	0.00076	188.2	0.9565	1.3157	1.5135	665.6	−8.84
−10.08	0.09985	392.8	1.7342	0.8468	1.1661	146.9	SAT VAP	0.09531	393.6	1.7333	0.8517	1.1674	147.0	−8.84
−10	0.09989	392.9	1.7344	0.8468	1.1660	146.9		—	—	—	—	—	—	−10
−5	0.10235	397.1	1.7504	0.8485	1.1595	148.8		0.09713	396.8	1.7456	0.8527	1.1621	148.4	−5
0	0.10478	401.4	1.7661	0.8510	1.1537	150.6		0.09945	401.1	1.7613	0.8548	1.1560	150.2	0
5	0.10717	405.6	1.7815	0.8543	1.1485	152.3		0.10175	405.4	1.7769	0.8577	1.1506	152.0	5
10	0.10953	409.9	1.7968	0.8583	1.1438	154.0		0.10401	409.7	1.7922	0.8613	1.1457	153.7	10
15	0.11186	414.2	1.8118	0.8627	1.1396	155.7		0.10626	414.0	1.8073	0.8654	1.1413	155.4	15
20	0.11417	418.5	1.8267	0.8676	1.1358	157.3		0.10847	418.3	1.8222	0.8700	1.1373	157.0	20
25	0.11647	422.9	1.8414	0.8729	1.1323	158.9		0.11067	422.7	1.8370	0.8751	1.1336	158.6	25
30	0.11874	427.3	1.8560	0.8784	1.1291	160.4		0.11284	427.1	1.8516	0.8805	1.1303	160.2	30
35	0.12099	431.7	1.8704	0.8843	1.1261	162.0		0.11501	431.5	1.8660	0.8862	1.1272	161.7	35
40	0.12324	436.1	1.8847	0.8904	1.1234	163.4		0.11715	435.9	1.8803	0.8921	1.1244	163.2	40
45	0.12547	440.6	1.8989	0.8967	1.1208	164.9		0.11927	440.4	1.8945	0.8982	1.1218	164.7	45
50	0.12767	445.1	1.9129	0.9031	1.1185	166.3		0.12139	444.9	1.9086	0.9046	1.1193	166.1	50
55	0.12989	449.6	1.9268	0.9097	1.1163	167.8		0.12350	449.5	1.9225	0.9110	1.1171	167.6	55
60	0.13207	454.2	1.9406	0.9164	1.1142	169.2		0.12560	454.0	1.9363	0.9176	1.1149	169.0	60
65	0.13425	458.8	1.9543	0.9232	1.1122	170.5		0.12768	458.6	1.9501	0.9244	1.1129	170.4	65
70	0.13643	463.4	1.9679	0.9301	1.1104	171.9		0.12975	463.3	1.9637	0.9312	1.1111	171.7	70
75	0.13860	468.1	1.9814	0.9370	1.1087	173.2		0.13184	468.0	1.9772	0.9380	1.1093	173.1	75
80	0.14075	472.8	1.9948	0.9440	1.1070	174.6		0.13390	472.7	1.9906	0.9450	1.1076	174.4	80
85	0.14290	477.5	2.0082	0.9511	1.1055	175.9		0.13596	477.4	2.0040	0.9519	1.1060	175.7	85
90	0.14505	482.3	2.0214	0.9581	1.1040	177.2		0.13799	482.2	2.0172	0.9589	1.1045	177.0	90
95	0.14719	487.1	2.0345	0.9652	1.1026	178.4		0.14004	487.0	2.0304	0.9660	1.1031	178.3	95
100	0.14932	491.9	2.0476	0.9723	1.1013	179.7		0.14209	491.8	2.0434	0.9730	1.1017	179.6	100
105	0.15145	496.8	2.0606	0.9794	1.1000	181.0		0.14413	496.7	2.0564	0.9801	1.1004	180.8	105
110	0.15359	501.7	2.0735	0.9865	1.0988	182.2		0.14616	501.6	2.0694	0.9872	1.0992	182.1	110
115	0.15571	506.7	2.0864	0.9936	1.0976	183.4		0.14819	506.6	2.0822	0.9942	1.0980	183.3	115
120	0.15783	511.7	2.0991	1.0007	1.0965	184.7		0.15020	511.6	2.0950	1.0013	1.0968	184.5	120
125	0.15995	516.7	2.1118	1.0078	1.0954	185.9		0.15223	516.6	2.1077	1.0083	1.0957	185.8	125
130	0.16207	521.8	2.1244	1.0148	1.0944	187.1		0.15423	521.7	2.1203	1.0153	1.0947	187.0	130
135	0.16418	526.8	2.1370	1.0218	1.0934	188.2		0.15623	526.8	2.1329	1.0223	1.0937	188.1	135
140	0.16628	532.0	2.1495	1.0288	1.0924	189.4		0.15825	531.9	2.1454	1.0293	1.0927	189.3	140
145	—	—	—	—	—	—		0.16028	537.1	2.1578	1.0362	1.0917	190.5	145

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 220.00 kPa (abs)							Pressure = 230.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−7.64	0.00076	189.8	0.9624	1.3190	1.5144	660.2	SAT LIQ	0.00076	191.3	0.9681	1.3222	1.5154	654.9	−6.49
−7.64	0.09117	394.3	1.7325	0.8564	1.1686	147.0	SAT VAP	0.08737	395.0	1.7317	0.8611	1.1699	147.0	−6.49
−5	0.09237	396.5	1.7410	0.8569	1.1649	148.0		0.08803	396.3	1.7365	0.8612	1.1677	147.6	−5
0	0.09462	400.8	1.7568	0.8585	1.1584	149.8		0.09020	400.6	1.7524	0.8624	1.1609	149.5	0
5	0.09683	405.1	1.7724	0.8611	1.1527	151.6		0.09234	404.9	1.7681	0.8645	1.1549	151.3	5
10	0.09901	409.4	1.7878	0.8643	1.1476	153.4		0.09444	409.2	1.7835	0.8674	1.1495	153.0	10
15	0.10116	413.8	1.8029	0.8682	1.1430	155.1		0.09651	413.6	1.7987	0.8709	1.1447	154.8	15
20	0.10330	418.1	1.8179	0.8725	1.1388	156.7		0.09856	417.9	1.8137	0.8751	1.1404	156.4	20
25	0.10540	422.5	1.8327	0.8774	1.1350	158.3		0.10059	422.3	1.8286	0.8796	1.1364	158.1	25
30	0.10749	426.9	1.8473	0.8825	1.1316	159.9		0.10260	426.7	1.8433	0.8846	1.1329	159.7	30
35	0.10957	431.3	1.8618	0.8880	1.1284	161.5		0.10459	431.2	1.8578	0.8900	1.1296	161.2	35
40	0.11162	435.8	1.8762	0.8938	1.1255	163.0		0.10656	435.6	1.8721	0.8956	1.1265	162.7	40
45	0.11365	440.3	1.8904	0.8998	1.1228	164.5		0.10853	440.1	1.8864	0.9014	1.1237	164.2	45
50	0.11569	444.8	1.9044	0.9060	1.1202	165.9		0.11047	444.6	1.9005	0.9075	1.1211	165.7	50
55	0.11772	449.3	1.9184	0.9124	1.1179	167.4		0.11242	449.2	1.9145	0.9138	1.1187	167.2	55
60	0.11970	453.9	1.9322	0.9189	1.1157	168.8		0.11435	453.8	1.9283	0.9202	1.1165	168.6	60
65	0.12171	458.5	1.9460	0.9255	1.1136	170.2		0.11627	458.4	1.9421	0.9267	1.1144	170.0	65
70	0.12370	463.2	1.9596	0.9322	1.1117	171.6		0.11818	463.0	1.9557	0.9333	1.1124	171.4	70
75	0.12569	467.8	1.9732	0.9390	1.1099	172.9		0.12008	467.7	1.9693	0.9400	1.1105	172.7	75
80	0.12765	472.6	1.9866	0.9459	1.1082	174.3		0.12198	472.4	1.9827	0.9468	1.1088	174.1	80
85	0.12962	477.3	1.9999	0.9528	1.1066	175.6		0.12387	477.2	1.9961	0.9537	1.1071	175.4	85
90	0.13158	482.1	2.0132	0.9598	1.1050	176.9		0.12574	482.0	2.0094	0.9606	1.1055	176.7	90
95	0.13355	486.9	2.0264	0.9667	1.1035	178.2		0.12763	486.8	2.0225	0.9675	1.1040	178.0	95
100	0.13550	491.7	2.0395	0.9737	1.1022	179.5		0.12950	491.6	2.0356	0.9745	1.1026	179.3	100
105	0.13746	496.6	2.0525	0.9808	1.1008	180.7		0.13135	496.5	2.0487	0.9814	1.1012	180.6	105
110	0.13939	501.6	2.0654	0.9878	1.0996	182.0		0.13323	501.5	2.0616	0.9884	1.1000	181.8	110
115	0.14132	506.5	2.0782	0.9948	1.0983	183.2		0.13508	506.4	2.0745	0.9954	1.0987	183.1	115
120	0.14327	511.5	2.0910	1.0018	1.0972	184.4		0.13693	511.4	2.0872	1.0024	1.0975	184.3	120
125	0.14520	516.5	2.1037	1.0088	1.0961	185.7		0.13879	516.4	2.1000	1.0094	1.0964	185.5	125
130	0.14712	521.6	2.1164	1.0158	1.0950	186.9		0.14063	521.5	2.1126	1.0163	1.0953	186.8	130
135	0.14905	526.7	2.1289	1.0228	1.0940	188.0		0.14247	526.6	2.1252	1.0233	1.0943	188.0	135
140	0.15099	531.8	2.1414	1.0297	1.0930	189.2		0.14430	531.7	2.1377	1.0302	1.0933	189.1	140
145	0.15288	537.0	2.1538	1.0366	1.0920	190.4		0.14616	536.9	2.1501	1.0371	1.0923	190.3	145

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 240.00 kPa (abs)							Pressure = 250.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−5.37	0.00076	192.8	0.9736	1.3254	1.5164	649.7	SAT LIQ	0.00077	194.3	0.9790	1.3285	1.5174	644.8	−4.29
−5.37	0.08389	395.6	1.7310	0.8656	1.1711	147.0	SAT VAP	0.08067	396.3	1.7303	0.8701	1.1724	147.0	−4.29
−5	0.08405	396.0	1.7322	0.8657	1.1706	147.2		—	—	—	—	—	—	−5
0	0.08615	400.3	1.7482	0.8663	1.1634	149.1		0.08241	400.0	1.7441	0.8703	1.1660	148.7	0
5	0.08821	404.6	1.7639	0.8680	1.1571	150.9		0.08442	404.4	1.7599	0.8715	1.1594	150.6	5
10	0.09024	409.0	1.7794	0.8705	1.1515	152.7		0.08638	408.7	1.7754	0.8737	1.1535	152.4	10
15	0.09224	413.3	1.7947	0.8738	1.1465	154.4		0.08832	413.1	1.7908	0.8766	1.1483	154.1	15
20	0.09422	417.7	1.8097	0.8776	1.1420	156.1		0.09023	417.5	1.8059	0.8802	1.1436	155.8	20
25	0.09618	422.1	1.8246	0.8820	1.1379	157.8		0.09212	421.9	1.8208	0.8843	1.1393	157.5	25
30	0.09812	426.5	1.8393	0.8867	1.1341	159.4		0.09399	426.3	1.8355	0.8889	1.1355	159.1	30
35	0.10004	431.0	1.8539	0.8919	1.1307	161.0		0.09584	430.8	1.8501	0.8938	1.1319	160.7	35
40	0.10194	435.4	1.8683	0.8973	1.1276	162.5		0.09768	435.3	1.8645	0.8991	1.1287	162.3	40
45	0.10383	439.9	1.8825	0.9030	1.1247	164.0		0.09951	439.8	1.8788	0.9047	1.1257	163.8	45
50	0.10571	444.5	1.8967	0.9090	1.1220	165.5		0.10131	444.3	1.8930	0.9105	1.1230	165.3	50
55	0.10757	449.0	1.9107	0.9151	1.1196	167.0		0.10310	448.9	1.9070	0.9165	1.1204	166.8	55
60	0.10942	453.6	1.9245	0.9214	1.1172	168.4		0.10489	453.5	1.9209	0.9227	1.1180	168.2	60
65	0.11127	458.3	1.9383	0.9278	1.1151	169.8		0.10668	458.1	1.9347	0.9290	1.1158	169.6	65
70	0.11311	462.9	1.9520	0.9344	1.1130	171.2		0.10845	462.8	1.9484	0.9355	1.1137	171.0	70
75	0.11494	467.6	1.9656	0.9410	1.1111	172.6		0.11019	467.5	1.9620	0.9421	1.1118	172.4	75
80	0.11675	472.3	1.9790	0.9478	1.1093	173.9		0.11197	472.2	1.9755	0.9487	1.1099	173.8	80
85	0.11857	477.1	1.9924	0.9546	1.1076	175.3		0.11371	477.0	1.9888	0.9554	1.1082	175.1	85
90	0.12038	481.9	2.0057	0.9614	1.1060	176.6		0.11545	481.8	2.0021	0.9622	1.1065	176.5	90
95	0.12219	486.7	2.0189	0.9683	1.1045	177.9		0.11718	486.6	2.0153	0.9690	1.1050	177.8	95
100	0.12398	491.5	2.0320	0.9752	1.1030	179.2		0.11891	491.4	2.0285	0.9759	1.1035	179.1	100
105	0.12577	496.4	2.0450	0.9821	1.1017	180.5		0.12064	496.3	2.0415	0.9828	1.1021	180.3	105
110	0.12755	501.4	2.0579	0.9891	1.1004	181.7		0.12235	501.3	2.0544	0.9897	1.1008	181.6	110
115	0.12935	506.3	2.0708	0.9960	1.0991	183.0		0.12407	506.2	2.0673	0.9966	1.0995	182.9	115
120	0.13111	511.3	2.0836	1.0030	1.0979	184.2		0.12579	511.2	2.0801	1.0035	1.0983	184.1	120
125	0.13291	516.4	2.0963	1.0099	1.0967	185.4		0.12750	516.3	2.0928	1.0104	1.0971	185.3	125
130	0.13466	521.4	2.1090	1.0168	1.0956	186.7		0.12920	521.3	2.1055	1.0173	1.0960	186.5	130
135	0.13646	526.5	2.1216	1.0237	1.0946	187.9		0.13092	526.4	2.1181	1.0242	1.0949	187.8	135
140	0.13824	531.7	2.1341	1.0306	1.0936	189.0		0.13261	531.6	2.1306	1.0311	1.0938	189.0	140
145	0.13998	536.8	2.1465	1.0375	1.0926	190.2		0.13432	536.8	2.1430	1.0379	1.0929	190.1	145
150	—	—	—	—	—	—		0.13600	542.0	2.1554	1.0448	1.0919	191.3	150

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 260.00 kPa (abs)							Pressure = 270.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−3.24	0.00077	195.7	0.9841	1.3315	1.5184	640.0	SAT LIQ	0.00077	197.0	0.9891	1.3345	1.5194	635.3	−2.23
−3.24	0.07769	396.9	1.7297	0.8745	1.1737	147.0	SAT VAP	0.07493	397.5	1.7291	0.8787	1.1749	147.0	−2.23
0	0.07897	399.7	1.7401	0.8744	1.1687	148.3		0.07578	399.5	1.7363	0.8785	1.1714	147.1	0
5	0.08091	404.1	1.7560	0.8752	1.1617	150.2		0.07766	403.8	1.7522	0.8788	1.1641	149.8	5
10	0.08282	408.5	1.7716	0.8769	1.1556	152.0		0.07951	408.2	1.7679	0.8802	1.1577	151.7	10
15	0.08469	412.9	1.7870	0.8795	1.1501	153.8		0.08133	412.6	1.7833	0.8825	1.1520	153.5	15
20	0.08654	417.3	1.8021	0.8828	1.1452	155.5		0.08313	417.1	1.7985	0.8855	1.1469	155.2	20
25	0.08837	421.7	1.8171	0.8867	1.1408	157.2		0.08490	421.5	1.8135	0.8891	1.1423	156.9	25
30	0.09018	426.1	1.8319	0.8910	1.1368	158.9		0.08666	426.0	1.8283	0.8932	1.1381	158.6	30
35	0.09197	430.6	1.8465	0.8958	1.1331	160.5		0.08839	430.4	1.8430	0.8978	1.1344	160.2	35
40	0.09375	435.1	1.8610	0.9009	1.1298	162.0		0.09011	434.9	1.8575	0.9027	1.1309	161.8	40
45	0.09550	439.6	1.8753	0.9063	1.1267	163.6		0.09181	439.5	1.8718	0.9080	1.1277	163.4	45
50	0.09725	444.2	1.8894	0.9120	1.1239	165.1		0.09350	444.0	1.8860	0.9135	1.1248	164.9	50
55	0.09899	448.7	1.9035	0.9179	1.1213	166.6		0.09517	448.6	1.9001	0.9193	1.1221	166.4	55
60	0.10073	453.4	1.9174	0.9240	1.1188	168.0		0.09685	453.2	1.9140	0.9253	1.1196	167.8	60
65	0.10243	458.0	1.9312	0.9302	1.1165	169.5		0.09851	457.9	1.9279	0.9314	1.1173	169.3	65
70	0.10414	462.7	1.9449	0.9366	1.1144	170.9		0.10016	462.5	1.9416	0.9377	1.1151	170.7	70
75	0.10583	467.4	1.9585	0.9431	1.1124	172.3		0.10180	467.2	1.9552	0.9441	1.1130	172.1	75
80	0.10753	472.1	1.9720	0.9497	1.1105	173.6		0.10342	472.0	1.9687	0.9506	1.1111	173.5	80
85	0.10921	476.8	1.9854	0.9563	1.1087	175.0		0.10505	476.7	1.9821	0.9572	1.1093	174.8	85
90	0.11089	481.6	1.9987	0.9630	1.1071	176.3		0.10668	481.5	1.9954	0.9639	1.1076	176.2	90
95	0.11256	486.5	2.0119	0.9698	1.1055	177.6		0.10830	486.4	2.0087	0.9706	1.1059	177.5	95
100	0.11425	491.3	2.0251	0.9766	1.1040	178.9		0.10990	491.2	2.0218	0.9774	1.1044	178.8	100
105	0.11590	496.2	2.0381	0.9835	1.1025	180.2		0.11151	496.1	2.0348	0.9842	1.1029	180.1	105
110	0.11755	501.2	2.0511	0.9903	1.1012	181.5		0.11311	501.1	2.0478	0.9910	1.1016	181.4	110
115	0.11922	506.1	2.0640	0.9972	1.0999	182.7		0.11471	506.1	2.0607	0.9978	1.1002	182.6	115
120	0.12086	511.2	2.0768	1.0041	1.0986	184.0		0.11629	511.1	2.0735	1.0047	1.0990	183.9	120
125	0.12249	516.2	2.0895	1.0110	1.0974	185.2		0.11788	516.1	2.0863	1.0115	1.0978	185.1	125
130	0.12416	521.3	2.1022	1.0178	1.0963	186.4		0.11946	521.2	2.0989	1.0183	1.0966	186.3	130
135	0.12579	526.4	2.1147	1.0247	1.0952	187.7		0.12105	526.3	2.1115	1.0252	1.0955	187.6	135
140	0.12744	531.5	2.1273	1.0315	1.0941	188.9		0.12264	531.4	2.1241	1.0320	1.0944	188.8	140
145	0.12907	536.7	2.1397	1.0384	1.0931	190.0		0.12422	536.6	2.1365	1.0388	1.0934	190.0	145
150	0.13068	541.9	2.1521	1.0452	1.0922	191.2		0.12577	541.8	2.1489	1.0456	1.0924	191.1	150

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 280.00 kPa (abs)							Pressure = 290.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
−1.24	0.00077	198.3	0.9939	1.3374	1.5204	630.8	SAT LIQ	0.00077	199.6	0.9986	1.3403	1.5214	626.4	−0.28
−1.24	0.07235	398.1	1.7285	0.8830	1.1762	147.0	SAT VAP	0.06995	398.6	1.7280	0.8871	1.1774	147.0	−0.28
0	0.07281	399.2	1.7325	0.8827	1.1741	147.5		0.07005	398.9	1.7289	0.8870	1.1770	147.1	0
5	0.07464	403.6	1.7485	0.8826	1.1665	149.5		0.07183	403.3	1.7449	0.8864	1.1690	149.1	5
10	0.07645	408.0	1.7643	0.8835	1.1598	151.3		0.07359	407.8	1.7607	0.8869	1.1620	151.0	10
15	0.07822	412.4	1.7797	0.8854	1.1539	153.2		0.07531	412.2	1.7763	0.8885	1.1558	152.8	15
20	0.07996	416.9	1.7950	0.8881	1.1486	154.9		0.07701	416.6	1.7916	0.8909	1.1503	154.6	20
25	0.08168	421.3	1.8100	0.8915	1.1438	156.7		0.07867	421.1	1.8067	0.8939	1.1454	156.4	25
30	0.08338	425.8	1.8249	0.8954	1.1395	158.3		0.08033	425.6	1.8216	0.8976	1.1409	158.1	30
35	0.08506	430.3	1.8396	0.8998	1.1356	160.0		0.08196	430.1	1.8363	0.9018	1.1369	159.7	35
40	0.08672	434.8	1.8541	0.9045	1.1320	161.6		0.08358	434.6	1.8508	0.9064	1.1332	161.3	40
45	0.08837	439.3	1.8685	0.9096	1.1288	163.1		0.08517	439.1	1.8652	0.9113	1.1298	162.9	45
50	0.09001	443.9	1.8827	0.9150	1.1258	164.7		0.08676	443.7	1.8795	0.9166	1.1267	164.4	50
55	0.09163	448.5	1.8968	0.9207	1.1230	166.2		0.08835	448.3	1.8936	0.9221	1.1239	166.0	55
60	0.09325	453.1	1.9108	0.9266	1.1204	167.6		0.08990	452.9	1.9076	0.9279	1.1212	167.4	60
65	0.09485	457.7	1.9246	0.9326	1.1180	169.1		0.09145	457.6	1.9215	0.9338	1.1187	168.9	65
70	0.09645	462.4	1.9383	0.9388	1.1158	170.5		0.09301	462.3	1.9352	0.9399	1.1164	170.3	70
75	0.09804	467.1	1.9520	0.9451	1.1137	171.9		0.09455	467.0	1.9489	0.9462	1.1143	171.8	75
80	0.09962	471.8	1.9655	0.9516	1.1117	173.3		0.09606	471.7	1.9624	0.9525	1.1123	173.1	80
85	0.10118	476.6	1.9789	0.9581	1.1098	174.7		0.09760	476.5	1.9758	0.9590	1.1104	174.5	85
90	0.10275	481.4	1.9922	0.9647	1.1081	176.0		0.09911	481.3	1.9892	0.9656	1.1086	175.9	90
95	0.10432	486.3	2.0055	0.9714	1.1064	177.3		0.10062	486.2	2.0024	0.9722	1.1069	177.2	95
100	0.10588	491.1	2.0186	0.9781	1.1049	178.7		0.10213	491.0	2.0156	0.9788	1.1053	178.5	100
105	0.10743	496.1	2.0317	0.9848	1.1034	180.0		0.10363	496.0	2.0286	0.9855	1.1038	179.8	105
110	0.10897	501.0	2.0447	0.9916	1.1020	181.2		0.10512	500.9	2.0416	0.9923	1.1024	181.1	110
115	0.11052	506.0	2.0576	0.9984	1.1006	182.5		0.10663	505.9	2.0546	0.9990	1.1010	182.4	115
120	0.11206	511.0	2.0704	1.0052	1.0993	183.8		0.10812	510.9	2.0674	1.0058	1.0997	183.7	120
125	0.11358	516.0	2.0831	1.0120	1.0981	185.0		0.10960	515.9	2.0801	1.0126	1.0985	184.9	125
130	0.11511	521.1	2.0958	1.0189	1.0969	186.2		0.11107	521.0	2.0928	1.0194	1.0973	186.1	130
135	0.11665	526.2	2.1084	1.0257	1.0958	187.5		0.11256	526.1	2.1054	1.0262	1.0961	187.4	135
140	0.11818	531.4	2.1209	1.0325	1.0947	188.7		0.11404	531.3	2.1180	1.0329	1.0950	188.6	140
145	0.11969	536.5	2.1334	1.0392	1.0937	189.9		0.11550	536.5	2.1304	1.0397	1.0940	189.8	145
150	0.12121	541.7	2.1458	1.0460	1.0927	191.0		0.11697	541.7	2.1428	1.0464	1.0930	191.0	150

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 300.00 kPa (abs)							Pressure = 310.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
0.66	0.00077	200.9	1.0032	1.3431	1.5225	622.1	SAT LIQ	0.00078	202.1	1.0077	1.3459	1.5235	617.9	1.57
0.66	0.06770	399.2	1.7275	0.8912	1.1787	147.0	SAT VAP	0.06559	399.7	1.7270	0.8952	1.1800	146.9	1.57
5	0.06921	403.1	1.7415	0.8902	1.1715	148.7		0.06676	402.8	1.7381	0.8942	1.1741	148.3	5
10	0.07092	407.5	1.7573	0.8904	1.1642	150.7		0.06842	407.3	1.7540	0.8938	1.1665	150.3	10
15	0.07260	412.0	1.7729	0.8915	1.1578	152.5		0.07006	411.7	1.7696	0.8947	1.1598	152.2	15
20	0.07424	416.4	1.7883	0.8936	1.1521	154.3		0.07166	416.2	1.7850	0.8964	1.1538	154.0	20
25	0.07587	420.9	1.8034	0.8964	1.1469	156.1		0.07325	420.7	1.8002	0.8989	1.1485	155.8	25
30	0.07748	425.4	1.8183	0.8998	1.1423	157.8		0.07481	425.2	1.8152	0.9021	1.1438	157.5	30
35	0.07906	429.9	1.8331	0.9038	1.1381	159.5		0.07635	429.7	1.8300	0.9059	1.1394	159.2	35
40	0.08063	434.4	1.8477	0.9082	1.1343	161.1		0.07788	434.3	1.8446	0.9101	1.1355	160.8	40
45	0.08219	439.0	1.8621	0.9130	1.1309	162.7		0.07939	438.8	1.8590	0.9147	1.1319	162.4	45
50	0.08372	443.6	1.8764	0.9181	1.1277	164.2		0.08090	443.4	1.8734	0.9197	1.1287	164.0	50
55	0.08525	448.2	1.8905	0.9236	1.1247	165.8		0.08239	448.0	1.8875	0.9250	1.1256	165.6	55
60	0.08678	452.8	1.9045	0.9292	1.1220	167.3		0.08385	452.7	1.9015	0.9305	1.1228	167.1	60
65	0.08829	457.5	1.9184	0.9350	1.1195	168.7		0.08532	457.3	1.9154	0.9363	1.1203	168.5	65
70	0.08978	462.1	1.9322	0.9411	1.1171	170.2		0.08678	462.0	1.9292	0.9422	1.1178	170.0	70
75	0.09128	466.9	1.9458	0.9472	1.1149	171.6		0.08821	466.7	1.9429	0.9483	1.1156	171.4	75
80	0.09276	471.6	1.9594	0.9535	1.1129	173.0		0.08967	471.5	1.9565	0.9545	1.1135	172.8	80
85	0.09424	476.4	1.9728	0.9599	1.1110	174.4		0.09111	476.3	1.9699	0.9608	1.1115	174.2	85
90	0.09571	481.2	1.9862	0.9664	1.1091	175.7		0.09253	481.1	1.9833	0.9672	1.1097	175.6	90
95	0.09718	486.1	1.9994	0.9730	1.1074	177.1		0.09395	486.0	1.9966	0.9737	1.1079	176.9	95
100	0.09863	490.9	2.0126	0.9796	1.1058	178.4		0.09536	490.8	2.0097	0.9803	1.1063	178.3	100
105	0.10009	495.9	2.0257	0.9862	1.1042	179.7		0.09678	495.8	2.0228	0.9869	1.1047	179.6	105
110	0.10153	500.8	2.0387	0.9929	1.1028	181.0		0.09818	500.7	2.0359	0.9936	1.1032	180.9	110
115	0.10299	505.8	2.0516	0.9996	1.1014	182.3		0.09958	505.7	2.0488	1.0003	1.1018	182.2	115
120	0.10444	510.8	2.0645	1.0064	1.1001	183.5		0.10098	510.7	2.0616	1.0070	1.1004	183.4	120
125	0.10585	515.9	2.0772	1.0131	1.0988	184.8		0.10236	515.8	2.0744	1.0137	1.0991	184.7	125
130	0.10730	520.9	2.0899	1.0199	1.0976	186.0		0.10376	520.9	2.0871	1.0204	1.0979	185.9	130
135	0.10873	526.1	2.1025	1.0266	1.0964	187.3		0.10514	526.0	2.0997	1.0271	1.0967	187.2	135
140	0.11017	531.2	2.1151	1.0334	1.0953	188.5		0.10654	531.1	2.1122	1.0338	1.0956	188.4	140
145	0.11158	536.4	2.1275	1.0401	1.0943	189.7		0.10791	536.3	2.1247	1.0406	1.0945	189.6	145
150	0.11301	541.6	2.1399	1.0468	1.0932	190.9		0.10929	541.5	2.1371	1.0472	1.0935	190.8	150
155	0.11442	546.9	2.1523	1.0535	1.0922	192.1		0.11067	546.8	2.1495	1.0539	1.0925	192.0	155

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 320.00 kPa (abs)							Pressure = 330.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
2.46	0.00078	203.3	1.0120	1.3486	1.5245	613.8	SAT LIQ	0.00078	204.5	1.0162	1.3514	1.5256	609.8	3.33
2.46	0.06361	400.2	1.7265	0.8991	1.1813	146.9	SAT VAP	0.06174	400.7	1.7260	0.9030	1.1825	146.9	3.33
5	0.06445	402.5	1.7347	0.8982	1.1768	148.0		0.06229	402.2	1.7315	0.9023	1.1795	147.6	5
10	0.06608	407.0	1.7507	0.8974	1.1688	149.9		0.06388	406.8	1.7475	0.9010	1.1712	149.6	10
15	0.06768	411.5	1.7664	0.8978	1.1618	151.9		0.06544	411.3	1.7633	0.9010	1.1639	151.5	15
20	0.06924	416.0	1.7819	0.8992	1.1557	153.7		0.06697	415.8	1.7788	0.9021	1.1575	153.4	20
25	0.07079	420.5	1.7971	0.9015	1.1501	155.5		0.06848	420.3	1.7941	0.9040	1.1518	155.2	25
30	0.07231	425.0	1.8121	0.9044	1.1452	157.3		0.06996	424.8	1.8091	0.9067	1.1467	157.0	30
35	0.07382	429.5	1.8269	0.9080	1.1407	159.0		0.07143	429.3	1.8240	0.9101	1.1421	158.7	35
40	0.07530	434.1	1.8416	0.9120	1.1367	160.6		0.07288	433.9	1.8387	0.9139	1.1379	160.4	40
45	0.07678	438.7	1.8561	0.9165	1.1330	162.2		0.07432	438.5	1.8532	0.9182	1.1341	162.0	45
50	0.07824	443.2	1.8704	0.9213	1.1296	163.8		0.07574	443.1	1.8675	0.9229	1.1306	163.6	50
55	0.07967	447.9	1.8846	0.9264	1.1265	165.3		0.07715	447.7	1.8818	0.9279	1.1274	165.1	55
60	0.08112	452.5	1.8986	0.9319	1.1237	166.9		0.07854	452.4	1.8958	0.9332	1.1245	166.7	60
65	0.08254	457.2	1.9126	0.9375	1.1210	168.4		0.07993	457.0	1.9098	0.9387	1.1218	168.2	65
70	0.08396	461.9	1.9264	0.9433	1.1186	169.8		0.08131	461.8	1.9236	0.9445	1.1193	169.6	70
75	0.08537	466.6	1.9401	0.9493	1.1163	171.3		0.08267	466.5	1.9373	0.9504	1.1169	171.1	75
80	0.08676	471.4	1.9536	0.9555	1.1141	172.7		0.08403	471.3	1.9509	0.9565	1.1147	172.5	80
85	0.08816	476.2	1.9671	0.9617	1.1121	174.1		0.08538	476.1	1.9644	0.9627	1.1127	173.9	85
90	0.08953	481.0	1.9805	0.9681	1.1102	175.4		0.08675	480.9	1.9778	0.9690	1.1107	175.3	90
95	0.09092	485.9	1.9938	0.9745	1.1084	176.8		0.08807	485.7	1.9910	0.9753	1.1089	176.7	95
100	0.09229	490.7	2.0070	0.9811	1.1067	178.1		0.08941	490.6	2.0042	0.9818	1.1072	178.0	100
105	0.09366	495.7	2.0201	0.9876	1.1051	179.5		0.09074	495.6	2.0174	0.9883	1.1056	179.3	105
110	0.09504	500.6	2.0331	0.9942	1.1036	180.8		0.09208	500.5	2.0304	0.9949	1.1040	180.6	110
115	0.09639	505.6	2.0460	1.0009	1.1022	182.0		0.09339	505.5	2.0433	1.0015	1.1026	181.9	115
120	0.09775	510.6	2.0589	1.0075	1.1008	183.3		0.09471	510.5	2.0562	1.0081	1.1012	183.2	120
125	0.09910	515.7	2.0716	1.0142	1.0995	184.6		0.09603	515.6	2.0690	1.0148	1.0998	184.5	125
130	0.10046	520.8	2.0843	1.0209	1.0983	185.8		0.09735	520.7	2.0817	1.0214	1.0986	185.7	130
135	0.10180	525.9	2.0970	1.0276	1.0971	187.1		0.09864	525.8	2.0943	1.0281	1.0974	187.0	135
140	0.10316	531.0	2.1095	1.0343	1.0959	188.3		0.09995	531.0	2.1069	1.0348	1.0962	188.2	140
145	0.10448	536.2	2.1220	1.0410	1.0948	189.5		0.10126	536.2	2.1194	1.0414	1.0951	189.4	145
150	0.10582	541.5	2.1344	1.0477	1.0938	190.7		0.10255	541.4	2.1318	1.0481	1.0940	190.6	150
155	0.10717	546.7	2.1468	1.0543	1.0928	191.9		0.10384	546.6	2.1441	1.0547	1.0930	191.8	155

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 340.00 kPa (abs)							Pressure = 350.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
4.18	0.00078	205.6	1.0204	1.3541	1.5266	605.9	SAT LIQ	0.00078	206.8	1.0244	1.3567	1.5276	602.1	5.01
4.18	0.05998	401.2	1.7256	0.9069	1.1838	146.8	SAT VAP	0.05832	401.7	1.7252	0.9106	1.1851	146.8	5.01
5	0.06024	402.0	1.7283	0.9064	1.1823	147.2		—	—	—	—	—	—	5
10	0.06180	406.5	1.7444	0.9047	1.1736	149.2		0.05985	406.2	1.7414	0.9084	1.1761	148.9	10
15	0.06333	411.0	1.7602	0.9043	1.1660	151.2		0.06134	410.8	1.7572	0.9076	1.1682	150.9	15
20	0.06483	415.5	1.7758	0.9050	1.1594	153.1		0.06281	415.3	1.7729	0.9079	1.1613	152.8	20
25	0.06630	420.1	1.7911	0.9066	1.1535	154.9		0.06425	419.9	1.7882	0.9093	1.1552	154.6	25
30	0.06776	424.6	1.8062	0.9091	1.1482	156.7		0.06567	424.4	1.8034	0.9115	1.1497	156.4	30
35	0.06919	429.2	1.8211	0.9122	1.1434	158.4		0.06706	429.0	1.8183	0.9143	1.1448	158.2	35
40	0.07060	433.7	1.8358	0.9158	1.1391	160.1		0.06845	433.6	1.8330	0.9178	1.1403	159.9	40
45	0.07200	438.3	1.8504	0.9200	1.1352	161.8		0.06981	438.2	1.8476	0.9217	1.1363	161.5	45
50	0.07339	442.9	1.8648	0.9245	1.1316	163.4		0.07116	442.8	1.8620	0.9261	1.1327	163.1	50
55	0.07476	447.6	1.8790	0.9294	1.1284	164.9		0.07250	447.4	1.8763	0.9309	1.1293	164.7	55
60	0.07612	452.2	1.8931	0.9346	1.1254	166.5		0.07383	452.1	1.8904	0.9359	1.1262	166.3	60
65	0.07747	456.9	1.9070	0.9400	1.1226	168.0		0.07515	456.8	1.9044	0.9412	1.1234	167.8	65
70	0.07880	461.6	1.9209	0.9456	1.1200	169.5		0.07645	461.5	1.9182	0.9468	1.1207	169.3	70
75	0.08013	466.4	1.9346	0.9515	1.1176	170.9		0.07775	466.2	1.9320	0.9525	1.1183	170.7	75
80	0.08146	471.1	1.9482	0.9575	1.1153	172.3		0.07904	471.0	1.9456	0.9585	1.1160	172.2	80
85	0.08280	475.9	1.9617	0.9636	1.1132	173.8		0.08033	475.8	1.9591	0.9645	1.1138	173.6	85
90	0.08410	480.8	1.9751	0.9698	1.1113	175.1		0.08161	480.7	1.9725	0.9707	1.1118	175.0	90
95	0.08540	485.6	1.9884	0.9761	1.1094	176.5		0.08287	485.5	1.9858	0.9770	1.1099	176.4	95
100	0.08669	490.5	2.0016	0.9826	1.1077	177.9		0.08414	490.4	1.9991	0.9833	1.1081	177.7	100
105	0.08800	495.5	2.0147	0.9890	1.1060	179.2		0.08541	495.4	2.0122	0.9897	1.1065	179.1	105
110	0.08929	500.4	2.0278	0.9955	1.1044	180.5		0.08666	500.3	2.0252	0.9962	1.1049	180.4	110
115	0.09058	505.4	2.0407	1.0021	1.1030	181.8		0.08790	505.3	2.0382	1.0027	1.1034	181.7	115
120	0.09184	510.4	2.0536	1.0087	1.1015	183.1		0.08916	510.4	2.0511	1.0093	1.1019	183.0	120
125	0.09314	515.5	2.0664	1.0153	1.1002	184.4		0.09041	515.4	2.0639	1.0159	1.1006	184.3	125
130	0.09440	520.6	2.0791	1.0220	1.0989	185.6		0.09165	520.5	2.0766	1.0225	1.0993	185.5	130
135	0.09568	525.7	2.0917	1.0286	1.0977	186.9		0.09289	525.6	2.0892	1.0291	1.0980	186.8	135
140	0.09696	530.9	2.1043	1.0352	1.0965	188.1		0.09413	530.8	2.1018	1.0357	1.0968	188.0	140
145	0.09822	536.1	2.1168	1.0419	1.0954	189.3		0.09536	536.0	2.1143	1.0423	1.0957	189.2	145
150	0.09948	541.3	2.1292	1.0485	1.0943	190.5		0.09658	541.2	2.1267	1.0489	1.0946	190.4	150
155	0.10074	546.6	2.1416	1.0551	1.0933	191.7		0.09781	546.5	2.1391	1.0555	1.0935	191.6	155
160	—	—	—	—	—	—		0.09904	551.8	2.1514	1.0621	1.0925	192.8	160

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 360.00 kPa (abs)							Pressure = 370.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
5.82	0.00078	207.9	1.0283	1.3593	1.5287	598.3	SAT LIQ	0.00079	209.0	1.0322	1.3619	1.5297	594.7	6.62
5.82	0.05675	402.2	1.7248	0.9144	1.1864	146.7	SAT VAP	0.05526	402.6	1.7244	0.9181	1.1877	146.7	6.62
10	0.05800	406.0	1.7384	0.9122	1.1786	148.5		0.05625	405.7	1.7354	0.9160	1.1812	148.1	10
15	0.05946	410.5	1.7543	0.9109	1.1704	150.5		0.05769	410.3	1.7514	0.9143	1.1727	150.2	15
20	0.06090	415.1	1.7700	0.9109	1.1632	152.5		0.05909	414.9	1.7672	0.9140	1.1652	152.1	20
25	0.06231	419.7	1.7854	0.9120	1.1569	154.3		0.06047	419.4	1.7826	0.9147	1.1586	154.0	25
30	0.06370	424.2	1.8006	0.9139	1.1512	156.2		0.06184	424.0	1.7979	0.9163	1.1528	155.9	30
35	0.06507	428.8	1.8156	0.9165	1.1462	157.9		0.06317	428.6	1.8129	0.9187	1.1476	157.7	35
40	0.06641	433.4	1.8303	0.9198	1.1416	159.6		0.06449	433.2	1.8277	0.9217	1.1429	159.4	40
45	0.06775	438.0	1.8449	0.9235	1.1375	161.3		0.06580	437.8	1.8423	0.9253	1.1386	161.1	45
50	0.06907	442.6	1.8594	0.9278	1.1337	162.9		0.06708	442.5	1.8568	0.9294	1.1347	162.7	50
55	0.07037	447.3	1.8736	0.9324	1.1302	164.5		0.06836	447.1	1.8711	0.9339	1.1312	164.3	55
60	0.07167	451.9	1.8878	0.9373	1.1271	166.1		0.06962	451.8	1.8852	0.9387	1.1279	165.9	60
65	0.07296	456.6	1.9018	0.9425	1.1242	167.6		0.07088	456.5	1.8992	0.9438	1.1250	167.4	65
70	0.07423	461.4	1.9156	0.9480	1.1215	169.1		0.07213	461.2	1.9131	0.9491	1.1222	168.9	70
75	0.07551	466.1	1.9294	0.9536	1.1189	170.6		0.07336	466.0	1.9269	0.9547	1.1196	170.4	75
80	0.07676	470.9	1.9430	0.9595	1.1166	172.0		0.07459	470.8	1.9406	0.9605	1.1172	171.9	80
85	0.07800	475.7	1.9566	0.9654	1.1144	173.4		0.07582	475.6	1.9541	0.9664	1.1150	173.3	85
90	0.07925	480.6	1.9700	0.9716	1.1124	174.9		0.07702	480.4	1.9675	0.9724	1.1129	174.7	90
95	0.08050	485.4	1.9833	0.9778	1.1104	176.2		0.07824	485.3	1.9809	0.9786	1.1109	176.1	95
100	0.08173	490.3	1.9966	0.9841	1.1086	177.6		0.07945	490.2	1.9941	0.9848	1.1091	177.5	100
105	0.08295	495.3	2.0097	0.9904	1.1069	178.9		0.08065	495.2	2.0073	0.9912	1.1074	178.8	105
110	0.08418	500.2	2.0228	0.9969	1.1053	180.3		0.08184	500.1	2.0203	0.9975	1.1057	180.1	110
115	0.08540	505.2	2.0357	1.0034	1.1038	181.6		0.08304	505.1	2.0333	1.0040	1.1042	181.5	115
120	0.08663	510.3	2.0486	1.0099	1.1023	182.9		0.08420	510.2	2.0462	1.0105	1.1027	182.8	120
125	0.08783	515.3	2.0614	1.0164	1.1009	184.2		0.08540	515.3	2.0590	1.0170	1.1013	184.0	125
130	0.08904	520.4	2.0741	1.0230	1.0996	185.4		0.08657	520.4	2.0718	1.0235	1.0999	185.3	130
135	0.09024	525.6	2.0868	1.0296	1.0983	186.7		0.08776	525.5	2.0844	1.0301	1.0986	186.6	135
140	0.09146	530.7	2.0994	1.0362	1.0971	187.9		0.08891	530.7	2.0970	1.0366	1.0974	187.8	140
145	0.09264	535.9	2.1119	1.0428	1.0960	189.1		0.09009	535.9	2.1095	1.0432	1.0963	189.0	145
150	0.09385	541.2	2.1243	1.0493	1.0949	190.3		0.09126	541.1	2.1219	1.0498	1.0951	190.3	150
155	0.09504	546.4	2.1367	1.0559	1.0938	191.6		0.09241	546.4	2.1343	1.0563	1.0941	191.5	155
160	0.09623	551.7	2.1490	1.0625	1.0928	192.7		0.09358	551.7	2.1466	1.0628	1.0930	192.7	160

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 380.00 kPa (abs)							Pressure = 390.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
7.4	0.00079	210.0	1.0360	1.3645	1.5308	591.1	SAT LIQ	0.00079	211.1	1.0397	1.3670	1.5318	587.6	8.16
7.4	0.05384	403.1	1.7240	0.9218	1.1890	146.6	SAT VAP	0.05250	403.5	1.7237	0.9254	1.1903	146.6	8.16
10	0.05459	405.5	1.7325	0.9200	1.1838	147.8		0.05302	405.2	1.7297	0.9240	1.1865	147.4	10
15	0.05600	410.1	1.7486	0.9178	1.1750	149.8		0.05440	409.8	1.7459	0.9213	1.1773	149.5	15
20	0.05738	414.6	1.7644	0.9170	1.1672	151.8		0.05576	414.4	1.7617	0.9201	1.1693	151.5	20
25	0.05874	419.2	1.7799	0.9174	1.1604	153.7		0.05708	419.0	1.7773	0.9202	1.1622	153.4	25
30	0.06007	423.8	1.7952	0.9188	1.1544	155.6		0.05839	423.6	1.7926	0.9213	1.1560	155.3	30
35	0.06138	428.4	1.8102	0.9209	1.1490	157.4		0.05968	428.2	1.8077	0.9232	1.1504	157.1	35
40	0.06267	433.0	1.8251	0.9238	1.1441	159.1		0.06094	432.8	1.8225	0.9258	1.1454	158.9	40
45	0.06395	437.7	1.8397	0.9272	1.1398	160.8		0.06219	437.5	1.8372	0.9290	1.1409	160.6	45
50	0.06521	442.3	1.8542	0.9311	1.1358	162.5		0.06342	442.1	1.8517	0.9328	1.1368	162.3	50
55	0.06645	447.0	1.8686	0.9354	1.1321	164.1		0.06465	446.8	1.8661	0.9369	1.1331	163.9	55
60	0.06769	451.7	1.8827	0.9401	1.1288	165.7		0.06586	451.5	1.8803	0.9415	1.1297	165.5	60
65	0.06892	456.4	1.8968	0.9451	1.1258	167.2		0.06706	456.2	1.8944	0.9464	1.1266	167.0	65
70	0.07014	461.1	1.9107	0.9503	1.1229	168.8		0.06825	461.0	1.9083	0.9515	1.1237	168.6	70
75	0.07135	465.9	1.9245	0.9558	1.1203	170.2		0.06942	465.7	1.9221	0.9569	1.1210	170.1	75
80	0.07254	470.7	1.9381	0.9615	1.1179	171.7		0.07061	470.5	1.9358	0.9625	1.1185	171.5	80
85	0.07374	475.5	1.9517	0.9673	1.1156	173.1		0.07177	475.4	1.9494	0.9683	1.1162	173.0	85
90	0.07492	480.3	1.9652	0.9733	1.1135	174.6		0.07293	480.2	1.9628	0.9742	1.1140	174.4	90
95	0.07611	485.2	1.9785	0.9794	1.1115	176.0		0.07407	485.1	1.9762	0.9802	1.1120	175.8	95
100	0.07729	490.1	1.9918	0.9856	1.1096	177.3		0.07523	490.0	1.9894	0.9864	1.1101	177.2	100
105	0.07846	495.1	2.0049	0.9919	1.1078	178.7		0.07637	495.0	2.0026	0.9926	1.1083	178.6	105
110	0.07962	500.1	2.0180	0.9982	1.1061	180.0		0.07750	500.0	2.0157	0.9989	1.1066	179.9	110
115	0.08078	505.1	2.0310	1.0046	1.1046	181.3		0.07865	505.0	2.0287	1.0053	1.1050	181.2	115
120	0.08193	510.1	2.0439	1.0111	1.1031	182.6		0.07978	510.0	2.0416	1.0117	1.1034	182.5	120
125	0.08308	515.2	2.0567	1.0175	1.1016	183.9		0.08089	515.1	2.0544	1.0181	1.1020	183.8	125
130	0.08423	520.3	2.0694	1.0241	1.1003	185.2		0.08202	520.2	2.0672	1.0246	1.1006	185.1	130
135	0.08538	525.4	2.0821	1.0306	1.0990	186.5		0.08314	525.3	2.0798	1.0311	1.0993	186.4	135
140	0.08653	530.6	2.0947	1.0371	1.0977	187.7		0.08425	530.5	2.0924	1.0376	1.0980	187.6	140
145	0.08767	535.8	2.1072	1.0437	1.0966	189.0		0.08536	535.7	2.1049	1.0441	1.0968	188.9	145
150	0.08881	541.0	2.1196	1.0502	1.0954	190.2		0.08648	540.9	2.1174	1.0506	1.0957	190.1	150
155	0.08994	546.3	2.1320	1.0567	1.0943	191.4		0.08757	546.2	2.1298	1.0571	1.0946	191.3	155
160	0.09107	551.6	2.1443	1.0632	1.0933	192.6		0.08868	551.5	2.1421	1.0636	1.0935	192.5	160

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 400.00 kPa (abs)							Pressure = 425.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
8.91	0.00079	212.1	1.0433	1.3695	1.5329	584.1	SAT LIQ	0.00080	214.6	1.0520	1.3757	1.5355	575.8	10.72
8.91	0.05122	403.9	1.7234	0.9290	1.1916	146.5	SAT VAP	0.04827	404.9	1.7226	0.9378	1.1949	146.4	10.72
10	0.05152	404.9	1.7269	0.9281	1.1893	147.0		—	—	—	—	—	—	10
15	0.05288	409.6	1.7432	0.9249	1.1797	149.1		0.04939	408.9	1.7366	0.9341	1.1859	148.3	15
20	0.05421	414.2	1.7590	0.9233	1.1714	151.2		0.05067	413.6	1.7526	0.9314	1.1768	150.4	20
25	0.05552	418.8	1.7747	0.9230	1.1641	153.1		0.05192	418.3	1.7683	0.9302	1.1688	152.4	25
30	0.05680	423.4	1.7900	0.9238	1.1576	155.0		0.05314	422.9	1.7838	0.9302	1.1618	154.3	30
35	0.05806	428.0	1.8051	0.9254	1.1519	156.9		0.05434	427.6	1.7990	0.9312	1.1556	156.2	35
40	0.05930	432.7	1.8201	0.9278	1.1467	158.6		0.05553	432.2	1.8140	0.9331	1.1501	158.0	40
45	0.06052	437.3	1.8348	0.9309	1.1421	160.4		0.05669	436.9	1.8288	0.9356	1.1451	159.8	45
50	0.06172	442.0	1.8493	0.9345	1.1379	162.0		0.05785	441.6	1.8434	0.9388	1.1407	161.5	50
55	0.06293	446.7	1.8637	0.9385	1.1341	163.7		0.05899	446.3	1.8579	0.9424	1.1366	163.2	55
60	0.06411	451.4	1.8779	0.9429	1.1306	165.3		0.06010	451.0	1.8722	0.9465	1.1329	164.8	60
65	0.06529	456.1	1.8920	0.9477	1.1274	166.9		0.06123	455.7	1.8863	0.9510	1.1295	166.4	65
70	0.06645	460.8	1.9059	0.9527	1.1244	168.4		0.06233	460.5	1.9003	0.9558	1.1264	167.9	70
75	0.06761	465.6	1.9198	0.9580	1.1217	169.9		0.06343	465.3	1.9142	0.9608	1.1235	169.5	75
80	0.06876	470.4	1.9335	0.9635	1.1192	171.4		0.06452	470.1	1.9279	0.9661	1.1208	171.0	80
85	0.06989	475.3	1.9471	0.9692	1.1168	172.8		0.06559	475.0	1.9415	0.9716	1.1183	172.4	85
90	0.07102	480.1	1.9605	0.9751	1.1146	174.3		0.06668	479.8	1.9550	0.9773	1.1160	173.9	90
95	0.07215	485.0	1.9739	0.9810	1.1125	175.7		0.06774	484.7	1.9684	0.9831	1.1138	175.3	95
100	0.07328	489.9	1.9872	0.9871	1.1106	177.1		0.06880	489.7	1.9817	0.9891	1.1118	176.7	100
105	0.07440	494.9	2.0004	0.9933	1.1087	178.4		0.06986	494.6	1.9949	0.9951	1.1099	178.1	105
110	0.07551	499.9	2.0134	0.9996	1.1070	179.8		0.07092	499.6	2.0081	1.0013	1.1081	179.5	110
115	0.07661	504.9	2.0264	1.0059	1.1054	181.1		0.07196	504.6	2.0211	1.0075	1.1064	180.8	115
120	0.07772	509.9	2.0394	1.0123	1.1038	182.4		0.07300	509.7	2.0340	1.0138	1.1048	182.1	120
125	0.07881	515.0	2.0522	1.0187	1.1023	183.7		0.07404	514.8	2.0469	1.0201	1.1033	183.4	125
130	0.07991	520.1	2.0649	1.0251	1.1009	185.0		0.07508	519.9	2.0596	1.0264	1.1018	184.7	130
135	0.08101	525.2	2.0776	1.0316	1.0996	186.3		0.07611	525.0	2.0723	1.0328	1.1004	186.0	135
140	0.08210	530.4	2.0902	1.0381	1.0983	187.5		0.07714	530.2	2.0849	1.0393	1.0991	187.3	140
145	0.08318	535.6	2.1028	1.0445	1.0971	188.8		0.07817	535.4	2.0975	1.0457	1.0979	188.5	145
150	0.08426	540.9	2.1152	1.0510	1.0960	190.0		0.07920	540.7	2.1099	1.0521	1.0967	189.8	150
155	0.08535	546.1	2.1276	1.0575	1.0949	191.2		0.08021	546.0	2.1223	1.0585	1.0955	191.0	155
160	0.08642	551.4	2.1399	1.0640	1.0938	192.4		0.08123	551.3	2.1347	1.0650	1.0944	192.2	160
165	—	—	—	—	—	—		0.08224	556.6	2.1469	1.0714	1.0934	193.4	165

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 450.00 kPa (abs)							Pressure = 475.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
12.45	0.00080	217.0	1.0603	1.3818	1.5382	567.8	SAT LIQ	0.00080	219.3	1.0683	1.3878	1.5409	560.1	14.11
12.45	0.04564	405.9	1.7218	0.9465	1.1982	146.2	SAT VAP	0.04327	406.8	1.7211	0.9549	1.2015	146.0	14.11
15	0.04628	408.3	1.7302	0.9437	1.1925	147.4		0.04349	407.7	1.7241	0.9538	1.1994	146.4	15
20	0.04751	413.0	1.7464	0.9399	1.1825	149.5		0.04468	412.4	1.7404	0.9487	1.1884	148.7	20
25	0.04871	417.7	1.7623	0.9377	1.1738	151.6		0.04584	417.2	1.7565	0.9454	1.1790	150.8	25
30	0.04989	422.4	1.7779	0.9369	1.1662	153.6		0.04697	421.9	1.7722	0.9438	1.1708	152.9	30
35	0.05104	427.1	1.7932	0.9372	1.1595	155.5		0.04808	426.6	1.7876	0.9433	1.1635	154.8	35
40	0.05217	431.8	1.8083	0.9384	1.1536	157.4		0.04917	431.3	1.8028	0.9439	1.1572	156.7	40
45	0.05329	436.5	1.8232	0.9405	1.1482	159.2		0.05024	436.0	1.8177	0.9454	1.1515	158.6	45
50	0.05439	441.2	1.8379	0.9432	1.1435	160.9		0.05130	440.8	1.8325	0.9477	1.1464	160.4	50
55	0.05548	445.9	1.8524	0.9464	1.1391	162.6		0.05234	445.5	1.8471	0.9505	1.1418	162.1	55
60	0.05655	450.6	1.8667	0.9502	1.1352	164.3		0.05336	450.3	1.8615	0.9539	1.1376	163.8	60
65	0.05761	455.4	1.8809	0.9543	1.1316	165.9		0.05438	455.0	1.8757	0.9578	1.1338	165.4	65
70	0.05867	460.2	1.8949	0.9589	1.1283	167.5		0.05539	459.8	1.8898	0.9620	1.1303	167.0	70
75	0.05971	465.0	1.9088	0.9637	1.1253	169.0		0.05639	464.7	1.9038	0.9666	1.1271	168.6	75
80	0.06075	469.8	1.9226	0.9688	1.1225	170.6		0.05737	469.5	1.9176	0.9714	1.1242	170.1	80
85	0.06178	474.7	1.9363	0.9741	1.1199	172.1		0.05836	474.4	1.9313	0.9765	1.1214	171.7	85
90	0.06279	479.6	1.9498	0.9796	1.1174	173.5		0.05934	479.3	1.9448	0.9819	1.1189	173.1	90
95	0.06381	484.5	1.9632	0.9852	1.1152	175.0		0.06030	484.2	1.9583	0.9874	1.1165	174.6	95
100	0.06482	489.4	1.9766	0.9910	1.1130	176.4		0.06126	489.2	1.9717	0.9930	1.1143	176.0	100
105	0.06583	494.4	1.9898	0.9970	1.1111	177.8		0.06221	494.1	1.9849	0.9988	1.1122	177.5	105
110	0.06683	499.4	2.0029	1.0030	1.1092	179.2		0.06317	499.1	1.9981	1.0047	1.1103	178.8	110
115	0.06782	504.4	2.0160	1.0091	1.1074	180.5		0.06411	504.2	2.0111	1.0107	1.1085	180.2	115
120	0.06882	509.5	2.0289	1.0153	1.1057	181.9		0.06506	509.3	2.0241	1.0168	1.1067	181.6	120
125	0.06979	514.6	2.0418	1.0215	1.1042	183.2		0.06600	514.3	2.0370	1.0230	1.1051	182.9	125
130	0.07078	519.7	2.0546	1.0278	1.1027	184.5		0.06694	519.5	2.0498	1.0291	1.1036	184.2	130
135	0.07176	524.8	2.0673	1.0341	1.1013	185.8		0.06787	524.6	2.0625	1.0354	1.1021	185.5	135
140	0.07274	530.0	2.0799	1.0405	1.0999	187.0		0.06880	529.8	2.0752	1.0417	1.1007	186.8	140
145	0.07371	535.2	2.0925	1.0468	1.0986	188.3		0.06972	535.1	2.0877	1.0480	1.0994	188.1	145
150	0.07468	540.5	2.1050	1.0532	1.0974	189.6		0.07065	540.3	2.1002	1.0543	1.0981	189.3	150
155	0.07565	545.8	2.1174	1.0596	1.0962	190.8		0.07157	545.6	2.1127	1.0606	1.0969	190.6	155
160	0.07662	551.1	2.1297	1.0659	1.0951	192.0		0.07249	550.9	2.1250	1.0669	1.0957	191.8	160
165	0.07757	556.4	2.1420	1.0723	1.0940	193.2		0.07341	556.3	2.1373	1.0732	1.0946	193.0	165

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 500.00 kPa (abs)							Pressure = 525.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
15.71	0.00081	221.5	1.0759	1.3937	1.5436	552.8	SAT LIQ	0.00081	223.6	1.0833	1.3995	1.5463	545.7	17.24
15.71	0.04114	407.7	1.7205	0.9633	1.2049	145.8	SAT VAP	0.03920	408.5	1.7199	0.9715	1.2083	145.6	17.24
20	0.04213	411.8	1.7347	0.9578	1.1947	147.8		0.03982	411.2	1.7291	0.9674	1.2013	146.9	20
25	0.04325	416.6	1.7508	0.9535	1.1844	150.0		0.04090	416.0	1.7454	0.9618	1.1901	149.2	25
30	0.04434	421.3	1.7667	0.9509	1.1755	152.1		0.04196	420.8	1.7613	0.9582	1.1804	151.4	30
35	0.04541	426.1	1.7822	0.9496	1.1677	154.1		0.04300	425.6	1.7770	0.9562	1.1721	153.4	35
40	0.04646	430.8	1.7975	0.9496	1.1609	156.1		0.04401	430.4	1.7924	0.9554	1.1647	155.4	40
45	0.04749	435.6	1.8125	0.9505	1.1548	158.0		0.04501	435.2	1.8075	0.9558	1.1582	157.3	45
50	0.04851	440.4	1.8274	0.9523	1.1493	159.8		0.04599	439.9	1.8224	0.9570	1.1524	159.2	50
55	0.04951	445.1	1.8420	0.9547	1.1444	161.5		0.04695	444.7	1.8371	0.9590	1.1472	161.0	55
60	0.05050	449.9	1.8565	0.9577	1.1400	163.3		0.04790	449.5	1.8517	0.9616	1.1425	162.7	60
65	0.05147	454.7	1.8708	0.9612	1.1360	164.9		0.04884	454.3	1.8660	0.9648	1.1383	164.5	65
70	0.05244	459.5	1.8849	0.9652	1.1323	166.6		0.04976	459.2	1.8802	0.9685	1.1344	166.1	70
75	0.05339	464.3	1.8989	0.9695	1.1290	168.2		0.05068	464.0	1.8942	0.9725	1.1309	167.7	75
80	0.05434	469.2	1.9128	0.9741	1.1259	169.7		0.05159	468.9	1.9081	0.9769	1.1276	169.3	80
85	0.05528	474.1	1.9265	0.9791	1.1230	171.3		0.05250	473.8	1.9219	0.9816	1.1246	170.9	85
90	0.05621	479.0	1.9401	0.9842	1.1204	172.8		0.05338	478.7	1.9355	0.9866	1.1219	172.4	90
95	0.05713	483.9	1.9536	0.9895	1.1179	174.2		0.05428	483.7	1.9491	0.9917	1.1193	173.9	95
100	0.05806	488.9	1.9670	0.9950	1.1156	175.7		0.05516	488.6	1.9625	0.9971	1.1169	175.4	100
105	0.05898	493.9	1.9803	1.0007	1.1134	177.1		0.05603	493.6	1.9758	1.0026	1.1147	176.8	105
110	0.05989	498.9	1.9934	1.0065	1.1114	178.5		0.05691	498.7	1.9890	1.0083	1.1126	178.2	110
115	0.06078	503.9	2.0065	1.0124	1.1095	179.9		0.05777	503.7	2.0021	1.0140	1.1106	179.6	115
120	0.06169	509.0	2.0195	1.0183	1.1077	181.3		0.05864	508.8	2.0151	1.0199	1.1087	181.0	120
125	0.06258	514.1	2.0324	1.0244	1.1060	182.6		0.05950	513.9	2.0281	1.0259	1.1070	182.4	125
130	0.06348	519.3	2.0452	1.0305	1.1044	184.0		0.06035	519.1	2.0409	1.0319	1.1053	183.7	130
135	0.06437	524.4	2.0580	1.0367	1.1029	185.3		0.06120	524.2	2.0536	1.0380	1.1038	185.0	135
140	0.06526	529.6	2.0707	1.0429	1.1015	186.6		0.06205	529.4	2.0663	1.0441	1.1023	186.3	140
145	0.06613	534.9	2.0832	1.0491	1.1001	187.8		0.06289	534.7	2.0789	1.0503	1.1009	187.6	145
150	0.06702	540.1	2.0957	1.0554	1.0988	189.1		0.06373	539.9	2.0914	1.0565	1.0995	188.9	150
155	0.06790	545.4	2.1082	1.0616	1.0975	190.4		0.06457	545.2	2.1039	1.0627	1.0982	190.2	155
160	0.06877	550.7	2.1205	1.0679	1.0964	191.6		0.06541	550.6	2.1163	1.0689	1.0970	191.4	160
165	0.06964	556.1	2.1328	1.0742	1.0952	192.8		0.06624	555.9	2.1286	1.0751	1.0958	192.6	165
170	0.07052	561.5	2.1450	1.0804	1.0941	194.0		0.06707	561.3	2.1408	1.0813	1.0947	193.9	170

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 550.00 kPa (abs)							Pressure = 575.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
18.72	0.00081	225.7	1.0904	1.4052	1.5490	538.8	SAT LIQ	0.00082	227.7	1.0972	1.4109	1.5518	532.2	20.15
18.72	0.03743	409.3	1.7193	0.9795	1.2117	145.4	SAT VAP	0.03581	410.1	1.7188	0.9875	1.2152	145.2	20.15
20	0.03771	410.6	1.7236	0.9774	1.2083	146.0		—	—	—	—	—	—	20
25	0.03877	415.4	1.7401	0.9705	1.1961	148.4		0.03681	414.8	1.7349	0.9796	1.2023	147.5	25
30	0.03980	420.3	1.7562	0.9658	1.1856	150.6		0.03781	419.7	1.7512	0.9737	1.1910	149.8	30
35	0.04080	425.1	1.7720	0.9629	1.1766	152.7		0.03879	424.6	1.7671	0.9699	1.1813	152.0	35
40	0.04178	429.9	1.7874	0.9614	1.1687	154.8		0.03974	429.4	1.7827	0.9676	1.1728	154.1	40
45	0.04274	434.7	1.8027	0.9611	1.1617	156.7		0.04068	434.3	1.7980	0.9666	1.1654	156.1	45
50	0.04369	439.5	1.8177	0.9618	1.1556	158.6		0.04159	439.1	1.8131	0.9668	1.1588	158.0	50
55	0.04462	444.3	1.8324	0.9633	1.1501	160.5		0.04249	443.9	1.8279	0.9678	1.1530	159.9	55
60	0.04554	449.2	1.8470	0.9656	1.1451	162.2		0.04338	448.8	1.8426	0.9696	1.1477	161.7	60
65	0.04644	454.0	1.8614	0.9684	1.1406	164.0		0.04425	453.6	1.8570	0.9721	1.1430	163.5	65
70	0.04733	458.8	1.8757	0.9718	1.1366	165.6		0.04511	458.5	1.8713	0.9751	1.1387	165.2	70
75	0.04822	463.7	1.8898	0.9755	1.1328	167.3		0.04597	463.4	1.8854	0.9786	1.1348	166.9	75
80	0.04909	468.6	1.9037	0.9797	1.1294	168.9		0.04681	468.3	1.8994	0.9825	1.1313	168.5	80
85	0.04996	473.5	1.9175	0.9842	1.1263	170.5		0.04765	473.2	1.9133	0.9868	1.1280	170.1	85
90	0.05082	478.4	1.9312	0.9889	1.1234	172.0		0.04847	478.1	1.9270	0.9914	1.1250	171.6	90
95	0.05167	483.4	1.9447	0.9939	1.1207	173.5		0.04930	483.1	1.9406	0.9962	1.1222	173.2	95
100	0.05252	488.4	1.9582	0.9991	1.1182	175.0		0.05011	488.1	1.9540	1.0012	1.1196	174.7	100
105	0.05336	493.4	1.9715	1.0045	1.1159	176.5		0.05092	493.1	1.9674	1.0065	1.1171	176.1	105
110	0.05419	498.4	1.9847	1.0100	1.1137	177.9		0.05172	498.2	1.9806	1.0119	1.1149	177.6	110
115	0.05503	503.5	1.9979	1.0157	1.1117	179.3		0.05253	503.2	1.9938	1.0174	1.1128	179.0	115
120	0.05585	508.6	2.0109	1.0215	1.1097	180.7		0.05332	508.3	2.0069	1.0231	1.1108	180.4	120
125	0.05668	513.7	2.0239	1.0273	1.1079	182.1		0.05412	513.5	2.0198	1.0288	1.1089	181.8	125
130	0.05749	518.8	2.0367	1.0333	1.1062	183.4		0.05490	518.6	2.0327	1.0347	1.1071	183.2	130
135	0.05832	524.0	2.0495	1.0393	1.1046	184.8		0.05568	523.8	2.0455	1.0406	1.1055	184.5	135
140	0.05913	529.2	2.0622	1.0453	1.1031	186.1		0.05647	529.0	2.0582	1.0466	1.1039	185.8	140
145	0.05994	534.5	2.0748	1.0514	1.1016	187.4		0.05724	534.3	2.0708	1.0526	1.1024	187.2	145
150	0.06074	539.8	2.0873	1.0576	1.1002	188.7		0.05801	539.6	2.0834	1.0587	1.1010	188.4	150
155	0.06155	545.1	2.0998	1.0637	1.0989	189.9		0.05879	544.9	2.0958	1.0648	1.0996	189.7	155
160	0.06235	550.4	2.1122	1.0699	1.0977	191.2		0.05956	550.2	2.1082	1.0709	1.0983	191.0	160
165	0.06315	555.8	2.1245	1.0761	1.0965	192.4		0.06032	555.6	2.1206	1.0770	1.0971	192.2	165
170	0.06395	561.2	2.1367	1.0822	1.0953	193.7		0.06109	561.0	2.1328	1.0831	1.0959	193.5	170
175	—	—	—	—	—	—		0.06185	566.4	2.1450	1.0893	1.0948	194.7	175

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 600.00 kPa (abs)							Pressure = 625.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
21.54	0.00082	229.7	1.1038	1.4165	1.5545	525.8	SAT LIQ	0.00082	231.6	1.1102	1.4221	1.5573	519.5	22.88
21.54	0.03432	410.8	1.7183	0.9954	1.2187	145.0	SAT VAP	0.03295	411.5	1.7179	1.0033	1.2223	144.7	22.88
25	0.03502	414.2	1.7299	0.9890	1.2090	146.7		0.03336	413.6	1.7250	0.9988	1.2159	145.8	25
30	0.03600	419.2	1.7463	0.9819	1.1967	149.0		0.03432	418.6	1.7415	0.9904	1.2026	148.2	30
35	0.03695	424.1	1.7623	0.9771	1.1862	151.3		0.03525	423.5	1.7577	0.9845	1.1913	150.5	35
40	0.03787	428.9	1.7780	0.9740	1.1771	153.4		0.03615	428.4	1.7735	0.9805	1.1816	152.7	40
45	0.03878	433.8	1.7934	0.9723	1.1692	155.5		0.03703	433.3	1.7890	0.9781	1.1731	154.8	45
50	0.03967	438.7	1.8086	0.9718	1.1622	157.4		0.03790	438.2	1.8042	0.9771	1.1657	156.8	50
55	0.04054	443.5	1.8235	0.9724	1.1560	159.3		0.03874	443.1	1.8192	0.9771	1.1591	158.8	55
60	0.04140	448.4	1.8382	0.9738	1.1505	161.2		0.03957	448.0	1.8340	0.9780	1.1532	160.6	60
65	0.04224	453.3	1.8527	0.9759	1.1455	163.0		0.04040	452.9	1.8486	0.9797	1.1480	162.5	65
70	0.04308	458.1	1.8671	0.9786	1.1410	164.7		0.04121	457.8	1.8630	0.9820	1.1432	164.2	70
75	0.04390	463.0	1.8813	0.9818	1.1369	166.4		0.04200	462.7	1.8772	0.9850	1.1389	166.0	75
80	0.04472	468.0	1.8953	0.9854	1.1331	168.1		0.04279	467.7	1.8913	0.9884	1.1350	167.6	80
85	0.04552	472.9	1.9092	0.9895	1.1297	169.7		0.04357	472.6	1.9052	0.9922	1.1314	169.3	85
90	0.04633	477.9	1.9229	0.9938	1.1265	171.3		0.04434	477.6	1.9190	0.9963	1.1282	170.9	90
95	0.04712	482.8	1.9365	0.9985	1.1236	172.8		0.04511	482.6	1.9327	1.0008	1.1251	172.4	95
100	0.04790	487.8	1.9500	1.0033	1.1209	174.3		0.04587	487.6	1.9462	1.0055	1.1223	174.0	100
105	0.04868	492.9	1.9634	1.0084	1.1184	175.8		0.04663	492.6	1.9596	1.0104	1.1197	175.5	105
110	0.04945	497.9	1.9767	1.0137	1.1161	177.3		0.04738	497.7	1.9729	1.0155	1.1173	177.0	110
115	0.05023	503.0	1.9899	1.0191	1.1139	178.7		0.04812	502.8	1.9861	1.0208	1.1150	178.4	115
120	0.05100	508.1	2.0030	1.0247	1.1118	180.1		0.04886	507.9	1.9992	1.0263	1.1129	179.8	120
125	0.05175	513.3	2.0159	1.0303	1.1099	181.5		0.04959	513.0	2.0122	1.0318	1.1109	181.3	125
130	0.05252	518.4	2.0288	1.0361	1.1081	182.9		0.05033	518.2	2.0251	1.0375	1.1090	182.6	130
135	0.05327	523.6	2.0417	1.0419	1.1063	184.3		0.05105	523.4	2.0380	1.0433	1.1072	184.0	135
140	0.05402	528.8	2.0544	1.0478	1.1047	185.6		0.05177	528.6	2.0507	1.0491	1.1055	185.4	140
145	0.05477	534.1	2.0670	1.0538	1.1032	186.9		0.05250	533.9	2.0633	1.0550	1.1040	186.7	145
150	0.05552	539.4	2.0796	1.0598	1.1017	188.2		0.05321	539.2	2.0759	1.0609	1.1024	188.0	150
155	0.05626	544.7	2.0921	1.0658	1.1003	189.5		0.05393	544.5	2.0884	1.0669	1.1010	189.3	155
160	0.05700	550.0	2.1045	1.0719	1.0990	190.8		0.05465	549.9	2.1008	1.0729	1.0997	190.6	160
165	0.05774	555.4	2.1168	1.0780	1.0977	192.0		0.05536	555.2	2.1132	1.0789	1.0984	191.8	165
170	0.05848	560.8	2.1291	1.0840	1.0965	193.3		0.05607	560.7	2.1255	1.0850	1.0971	193.1	170
175	0.05921	566.3	2.1413	1.0901	1.0954	194.5		0.05678	566.1	2.1377	1.0910	1.0959	194.3	175

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 650.00 kPa (abs)							Pressure = 675.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
24.18	0.00083	233.5	1.1163	1.4276	1.5601	513.5	SAT LIQ	0.00083	235.3	1.1224	1.4331	1.5630	507.6	25.45
24.18	0.03167	412.2	1.7174	1.0111	1.2259	144.5	SAT VAP	0.03049	412.8	1.7170	1.0188	1.2295	144.2	25.45
25	0.03183	413.0	1.7202	1.0091	1.2233	144.9		—	—	—	—	—	—	25
30	0.03277	418.0	1.7369	0.9993	1.2089	147.4		0.03133	417.4	1.7323	1.0086	1.2154	146.6	30
35	0.03367	423.0	1.7532	0.9922	1.1967	149.8		0.03222	422.5	1.7487	1.0002	1.2022	149.0	35
40	0.03456	428.0	1.7691	0.9873	1.1862	152.0		0.03308	427.4	1.7648	0.9943	1.1910	151.3	40
45	0.03542	432.9	1.7847	0.9841	1.1772	154.2		0.03392	432.4	1.7805	0.9903	1.1814	153.5	45
50	0.03626	437.8	1.8000	0.9824	1.1693	156.2		0.03474	437.4	1.7959	0.9879	1.1730	155.6	50
55	0.03708	442.7	1.8151	0.9819	1.1623	158.2		0.03555	442.3	1.8111	0.9868	1.1656	157.6	55
60	0.03789	447.6	1.8300	0.9823	1.1561	160.1		0.03633	447.2	1.8260	0.9867	1.1590	159.6	60
65	0.03869	452.5	1.8446	0.9836	1.1505	162.0		0.03711	452.2	1.8407	0.9876	1.1532	161.5	65
70	0.03948	457.5	1.8591	0.9856	1.1456	163.8		0.03787	457.1	1.8552	0.9892	1.1479	163.3	70
75	0.04025	462.4	1.8733	0.9882	1.1411	165.5		0.03862	462.1	1.8695	0.9915	1.1432	165.1	75
80	0.04102	467.3	1.8874	0.9913	1.1370	167.2		0.03937	467.0	1.8837	0.9944	1.1389	166.8	80
85	0.04177	472.3	1.9014	0.9949	1.1332	168.9		0.04010	472.0	1.8977	0.9977	1.1350	168.5	85
90	0.04252	477.3	1.9152	0.9988	1.1298	170.5		0.04083	477.0	1.9116	1.0014	1.1314	170.1	90
95	0.04326	482.3	1.9289	1.0031	1.1266	172.1		0.04155	482.0	1.9253	1.0054	1.1282	171.7	95
100	0.04399	487.3	1.9425	1.0076	1.1237	173.6		0.04226	487.0	1.9389	1.0098	1.1251	173.3	100
105	0.04472	492.4	1.9559	1.0124	1.1210	175.1		0.04296	492.1	1.9523	1.0144	1.1223	174.8	105
110	0.04545	497.4	1.9693	1.0174	1.1185	176.6		0.04367	497.2	1.9657	1.0193	1.1197	176.3	110
115	0.04617	502.5	1.9825	1.0226	1.1161	178.1		0.04437	502.3	1.9789	1.0243	1.1173	177.8	115
120	0.04688	507.7	1.9956	1.0279	1.1139	179.6		0.04505	507.4	1.9921	1.0296	1.1150	179.3	120
125	0.04760	512.8	2.0086	1.0334	1.1119	181.0		0.04574	512.6	2.0051	1.0349	1.1129	180.7	125
130	0.04830	518.0	2.0215	1.0389	1.1099	182.4		0.04642	517.8	2.0181	1.0404	1.1109	182.1	130
135	0.04900	523.2	2.0344	1.0446	1.1081	183.8		0.04711	523.0	2.0309	1.0460	1.1090	183.5	135
140	0.04970	528.4	2.0471	1.0504	1.1064	185.1		0.04778	528.2	2.0437	1.0516	1.1072	184.9	140
145	0.05040	533.7	2.0598	1.0562	1.1047	186.5		0.04845	533.5	2.0564	1.0574	1.1055	186.2	145
150	0.05109	539.0	2.0724	1.0620	1.1032	187.8		0.04913	538.8	2.0690	1.0632	1.1039	187.6	150
155	0.05178	544.3	2.0849	1.0680	1.1017	189.1		0.04979	544.2	2.0815	1.0690	1.1024	188.9	155
160	0.05247	549.7	2.0973	1.0739	1.1003	190.4		0.05046	549.5	2.0940	1.0749	1.1010	190.2	160
165	0.05316	555.1	2.1097	1.0799	1.0990	191.6		0.05112	554.9	2.1063	1.0809	1.0996	191.5	165
170	0.05384	560.5	2.1220	1.0859	1.0977	192.9		0.05178	560.3	2.1186	1.0868	1.0983	192.7	170
175	0.05453	565.9	2.1342	1.0919	1.0965	194.2		0.05244	565.8	2.1309	1.0928	1.0971	194.0	175
180	0.05520	571.4	2.1464	1.0979	1.0954	195.4		0.05310	571.2	2.1430	1.0987	1.0959	195.2	180

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 700.00 kPa (abs)							Pressure = 725.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
26.68	0.00083	237.0	1.1282	1.4385	1.5658	501.8	SAT LIQ	0.00084	238.8	1.1339	1.4440	1.5687	496.2	27.88
26.68	0.02939	413.5	1.7166	1.0265	1.2332	144.0	SAT VAP	0.02836	414.1	1.7162	1.0341	1.2370	143.7	27.88
30	0.02999	416.8	1.7278	1.0182	1.2223	145.7		0.02874	416.2	1.7234	1.0283	1.2295	144.9	30
35	0.03086	421.9	1.7444	1.0085	1.2081	148.2		0.02960	421.4	1.7401	1.0172	1.2142	147.4	35
40	0.03171	426.9	1.7606	1.0015	1.1960	150.6		0.03043	426.4	1.7564	1.0090	1.2013	149.9	40
45	0.03253	431.9	1.7764	0.9967	1.1857	152.8		0.03123	431.5	1.7724	1.0033	1.1903	152.2	45
50	0.03333	436.9	1.7919	0.9935	1.1768	155.0		0.03202	436.5	1.7880	0.9994	1.1807	154.4	50
55	0.03412	441.9	1.8071	0.9918	1.1689	157.0		0.03278	441.4	1.8033	0.9970	1.1724	156.5	55
60	0.03488	446.8	1.8221	0.9913	1.1620	159.0		0.03353	446.4	1.8184	0.9959	1.1651	158.5	60
65	0.03564	451.8	1.8369	0.9917	1.1559	160.9		0.03427	451.4	1.8332	0.9959	1.1587	160.4	65
70	0.03638	456.7	1.8515	0.9929	1.1504	162.8		0.03500	456.4	1.8478	0.9967	1.1529	162.3	70
75	0.03711	461.7	1.8658	0.9949	1.1454	164.6		0.03571	461.4	1.8623	0.9983	1.1477	164.1	75
80	0.03784	466.7	1.8801	0.9974	1.1409	166.3		0.03641	466.4	1.8765	1.0006	1.1430	165.9	80
85	0.03855	471.7	1.8941	1.0005	1.1369	168.0		0.03711	471.4	1.8906	1.0033	1.1387	167.6	85
90	0.03925	476.7	1.9080	1.0040	1.1331	169.7		0.03779	476.4	1.9045	1.0066	1.1349	169.3	90
95	0.03995	481.7	1.9217	1.0078	1.1297	171.3		0.03847	481.5	1.9183	1.0103	1.1313	171.0	95
100	0.04064	486.8	1.9354	1.0120	1.1266	172.9		0.03914	486.5	1.9320	1.0143	1.1280	172.6	100
105	0.04133	491.9	1.9489	1.0165	1.1236	174.5		0.03981	491.6	1.9455	1.0186	1.1250	174.1	105
110	0.04201	496.9	1.9622	1.0212	1.1209	176.0		0.04047	496.7	1.9589	1.0231	1.1222	175.7	110
115	0.04269	502.1	1.9755	1.0261	1.1184	177.5		0.04112	501.8	1.9722	1.0279	1.1196	177.2	115
120	0.04336	507.2	1.9887	1.0312	1.1161	179.0		0.04177	507.0	1.9854	1.0329	1.1172	178.7	120
125	0.04402	512.4	2.0018	1.0365	1.1139	180.4		0.04243	512.2	1.9985	1.0380	1.1149	180.1	125
130	0.04468	517.6	2.0147	1.0419	1.1118	181.8		0.04307	517.4	2.0115	1.0433	1.1128	181.6	130
135	0.04535	522.8	2.0276	1.0473	1.1099	183.2		0.04371	522.6	2.0244	1.0487	1.1108	183.0	135
140	0.04600	528.0	2.0404	1.0529	1.1081	184.6		0.04434	527.8	2.0372	1.0542	1.1089	184.4	140
145	0.04665	533.3	2.0531	1.0586	1.1063	186.0		0.04497	533.1	2.0499	1.0598	1.1071	185.8	145
150	0.04730	538.6	2.0657	1.0643	1.1047	187.3		0.04560	538.4	2.0625	1.0655	1.1055	187.1	150
155	0.04795	544.0	2.0782	1.0701	1.1032	188.7		0.04622	543.8	2.0751	1.0712	1.1039	188.4	155
160	0.04859	549.3	2.0907	1.0760	1.1017	190.0		0.04685	549.2	2.0875	1.0770	1.1024	189.8	160
165	0.04923	554.7	2.1031	1.0818	1.1003	191.3		0.04747	554.6	2.0999	1.0828	1.1009	191.1	165
170	0.04987	560.2	2.1154	1.0877	1.0990	192.5		0.04809	560.0	2.1122	1.0887	1.0996	192.3	170
175	0.05051	565.6	2.1276	1.0936	1.0977	193.8		0.04871	565.4	2.1245	1.0945	1.0983	193.6	175
180	0.05114	571.1	2.1398	1.0996	1.0965	195.0		0.04932	570.9	2.1367	1.1004	1.0970	194.9	180

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 750.00 kPa (abs)							Pressure = 800.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
29.04	0.00084	240.5	1.1394	1.4494	1.5716	490.8	SAT LIQ	0.00085	243.7	1.1500	1.4602	1.5775	480.2	31.29
29.04	0.02740	414.6	1.7158	1.0417	1.2408	143.5	SAT VAP	0.02565	415.7	1.7150	1.0569	1.2485	142.9	31.29
30	0.02757	415.6	1.7191	1.0388	1.2372	144.0		—	—	—	—	—	—	30
35	0.02841	420.8	1.7360	1.0262	1.2206	146.6		0.02626	419.6	1.7278	1.0453	1.2344	145.0	35
40	0.02923	425.9	1.7524	1.0168	1.2067	149.1		0.02705	424.8	1.7445	1.0332	1.2184	147.6	40
45	0.03002	431.0	1.7684	1.0100	1.1950	151.5		0.02782	430.0	1.7608	1.0243	1.2049	150.1	45
50	0.03079	436.0	1.7842	1.0053	1.1848	153.7		0.02856	435.1	1.7767	1.0178	1.1935	152.4	50
55	0.03154	441.0	1.7996	1.0023	1.1760	155.9		0.02928	440.2	1.7923	1.0133	1.1836	154.7	55
60	0.03227	446.0	1.8147	1.0006	1.1683	157.9		0.02998	445.2	1.8076	1.0105	1.1750	156.8	60
65	0.03299	451.0	1.8296	1.0001	1.1615	159.9		0.03067	450.3	1.8226	1.0089	1.1674	158.8	65
70	0.03370	456.0	1.8443	1.0005	1.1554	161.8		0.03135	455.3	1.8374	1.0085	1.1607	160.8	70
75	0.03439	461.0	1.8588	1.0018	1.1500	163.7		0.03202	460.4	1.8520	1.0090	1.1548	162.7	75
80	0.03508	466.1	1.8731	1.0037	1.1451	165.5		0.03267	465.4	1.8664	1.0103	1.1494	164.6	80
85	0.03576	471.1	1.8872	1.0063	1.1406	167.2		0.03331	470.5	1.8806	1.0122	1.1446	166.4	85
90	0.03643	476.1	1.9012	1.0093	1.1366	168.9		0.03395	475.5	1.8947	1.0147	1.1402	168.1	90
95	0.03708	481.2	1.9150	1.0127	1.1329	170.6		0.03457	480.6	1.9086	1.0177	1.1362	169.8	95
100	0.03774	486.2	1.9287	1.0165	1.1295	172.2		0.03520	485.7	1.9223	1.0212	1.1325	171.5	100
105	0.03839	491.3	1.9422	1.0207	1.1264	173.8		0.03581	490.8	1.9360	1.0250	1.1292	173.1	105
110	0.03903	496.4	1.9557	1.0251	1.1235	175.4		0.03642	495.9	1.9494	1.0291	1.1261	174.7	110
115	0.03966	501.6	1.9690	1.0297	1.1208	176.9		0.03703	501.1	1.9628	1.0334	1.1232	176.3	115
120	0.04030	506.7	1.9822	1.0346	1.1183	178.4		0.03763	506.3	1.9761	1.0380	1.1205	177.8	120
125	0.04093	511.9	1.9953	1.0396	1.1160	179.9		0.03822	511.5	1.9892	1.0428	1.1181	179.3	125
130	0.04155	517.1	2.0083	1.0448	1.1138	181.3		0.03881	516.7	2.0023	1.0478	1.1157	180.8	130
135	0.04217	522.4	2.0212	1.0501	1.1117	182.7		0.03940	522.0	2.0152	1.0529	1.1136	182.2	135
140	0.04279	527.6	2.0341	1.0555	1.1098	184.1		0.03998	527.2	2.0281	1.0582	1.1115	183.6	140
145	0.04340	532.9	2.0468	1.0611	1.1080	185.5		0.04056	532.5	2.0408	1.0636	1.1096	185.0	145
150	0.04401	538.3	2.0594	1.0667	1.1062	186.9		0.04114	537.9	2.0535	1.0690	1.1078	186.4	150
155	0.04462	543.6	2.0720	1.0723	1.1046	188.2		0.04171	543.2	2.0661	1.0745	1.1061	187.8	155
160	0.04523	549.0	2.0845	1.0780	1.1031	189.5		0.04229	548.6	2.0786	1.0801	1.1045	189.1	160
165	0.04583	554.4	2.0969	1.0838	1.1016	190.9		0.04285	554.0	2.0910	1.0858	1.1029	190.5	165
170	0.04643	559.8	2.1092	1.0896	1.1002	192.1		0.04342	559.5	2.1034	1.0915	1.1015	191.8	170
175	0.04703	565.3	2.1215	1.0954	1.0989	193.4		0.04398	565.0	2.1157	1.0972	1.1001	193.1	175
180	0.04762	570.8	2.1336	1.1013	1.0976	194.7		0.04455	570.5	2.1279	1.1030	1.0988	194.3	180
185	—	—	—	—	—	—		0.04511	576.0	2.1400	1.1087	1.0975	195.6	185

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 850.00 kPa (abs)							Pressure = 900.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
33.44	0.00085	246.9	1.1602	1.4710	1.5836	470.1	SAT LIQ	0.00086	249.9	1.1699	1.4818	1.5897	460.4	35.49
33.44	0.02410	416.8	1.7143	1.0720	1.2564	142.4	SAT VAP	0.02271	417.7	1.7137	1.0872	1.2646	141.8	35.49
35	0.02435	418.4	1.7198	1.0663	1.2498	143.3		—	—	—	—	—	—	35
40	0.02512	423.7	1.7368	1.0510	1.2312	146.0		0.02340	422.6	1.7293	1.0702	1.2453	144.4	40
45	0.02586	429.0	1.7534	1.0395	1.2157	148.6		0.02412	427.9	1.7462	1.0559	1.2275	147.2	45
50	0.02658	434.1	1.7695	1.0311	1.2027	151.1		0.02482	433.2	1.7625	1.0452	1.2128	149.7	50
55	0.02728	439.3	1.7853	1.0250	1.1916	153.4		0.02550	438.4	1.7785	1.0373	1.2003	152.2	55
60	0.02796	444.4	1.8008	1.0208	1.1820	155.6		0.02616	443.5	1.7942	1.0316	1.1896	154.5	60
65	0.02862	449.5	1.8159	1.0181	1.1737	157.8		0.02680	448.7	1.8095	1.0278	1.1803	156.7	65
70	0.02927	454.6	1.8309	1.0167	1.1663	159.8		0.02743	453.8	1.8246	1.0253	1.1722	158.8	70
75	0.02991	459.7	1.8456	1.0164	1.1598	161.8		0.02803	458.9	1.8394	1.0242	1.1650	160.8	75
80	0.03053	464.7	1.8601	1.0170	1.1539	163.7		0.02864	464.1	1.8540	1.0240	1.1586	162.8	80
85	0.03115	469.8	1.8744	1.0184	1.1487	165.5		0.02923	469.2	1.8684	1.0247	1.1529	164.7	85
90	0.03176	474.9	1.8885	1.0204	1.1439	167.3		0.02981	474.3	1.8826	1.0261	1.1478	166.5	90
95	0.03236	480.0	1.9025	1.0229	1.1396	169.1		0.03039	479.4	1.8967	1.0282	1.1431	168.3	95
100	0.03295	485.1	1.9163	1.0259	1.1357	170.8		0.03096	484.6	1.9106	1.0308	1.1389	170.1	100
105	0.03353	490.3	1.9300	1.0293	1.1321	172.4		0.03151	489.8	1.9243	1.0338	1.1351	171.7	105
110	0.03412	495.4	1.9435	1.0331	1.1288	174.1		0.03207	494.9	1.9379	1.0373	1.1315	173.4	110
115	0.03469	500.6	1.9569	1.0372	1.1257	175.6		0.03262	500.1	1.9514	1.0410	1.1282	175.0	115
120	0.03526	505.8	1.9703	1.0415	1.1229	177.2		0.03316	505.3	1.9647	1.0451	1.1252	176.6	120
125	0.03582	511.0	1.9834	1.0461	1.1202	178.7		0.03370	510.6	1.9779	1.0494	1.1224	178.2	125
130	0.03639	516.3	1.9965	1.0509	1.1178	180.2		0.03423	515.8	1.9911	1.0540	1.1198	179.7	130
135	0.03695	521.5	2.0095	1.0558	1.1155	181.7		0.03477	521.1	2.0041	1.0587	1.1174	181.2	135
140	0.03750	526.8	2.0224	1.0609	1.1133	183.1		0.03530	526.4	2.0170	1.0636	1.1151	182.7	140
145	0.03805	532.2	2.0352	1.0661	1.1113	184.6		0.03582	531.8	2.0298	1.0687	1.1130	184.1	145
150	0.03860	537.5	2.0479	1.0714	1.1094	186.0		0.03634	537.1	2.0426	1.0738	1.1110	185.5	150
155	0.03914	542.9	2.0605	1.0768	1.1076	187.4		0.03686	542.5	2.0552	1.0791	1.1091	186.9	155
160	0.03969	548.3	2.0731	1.0823	1.1059	188.7		0.03737	547.9	2.0678	1.0844	1.1073	188.3	160
165	0.04023	553.7	2.0855	1.0878	1.1043	190.1		0.03789	553.3	2.0803	1.0898	1.1056	189.7	165
170	0.04076	559.1	2.0979	1.0934	1.1028	191.4		0.03840	558.8	2.0927	1.0953	1.1040	191.0	170
175	0.04130	564.6	2.1102	1.0990	1.1013	192.7		0.03890	564.3	2.1050	1.1009	1.1025	192.3	175
180	0.04183	570.1	2.1224	1.1047	1.0999	194.0		0.03941	569.8	2.1172	1.1064	1.1011	193.6	180
185	0.04236	575.7	2.1346	1.1104	1.0986	195.3		0.03992	575.4	2.1294	1.1120	1.0997	194.9	185
190	—	—	—	—	—	—		0.04042	580.9	2.1415	1.1177	1.0984	196.2	190

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 950.00 kPa (abs)							Pressure = 1000.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
37.46	0.00086	252.8	1.1792	1.4926	1.5960	451.1	SAT LIQ	0.00087	255.6	1.1881	1.5035	1.6025	442.1	39.35
37.46	0.02147	418.6	1.7130	1.1024	1.2730	141.2	SAT VAP	0.02034	419.5	1.7124	1.1177	1.2817	140.6	39.35
40	0.02184	421.4	1.7220	1.0913	1.2609	142.8		0.02044	420.2	1.7147	1.1144	1.2782	141.0	40
45	0.02256	426.8	1.7391	1.0736	1.2404	145.7		0.02114	425.7	1.7322	1.0928	1.2546	144.1	45
50	0.02324	432.2	1.7558	1.0604	1.2236	148.3		0.02181	431.2	1.7491	1.0766	1.2354	146.9	50
55	0.02390	437.4	1.7720	1.0504	1.2095	150.9		0.02246	436.5	1.7655	1.0644	1.2195	149.6	55
60	0.02454	442.7	1.7878	1.0431	1.1976	153.3		0.02308	441.8	1.7816	1.0552	1.2061	152.1	60
65	0.02516	447.9	1.8033	1.0379	1.1873	155.6		0.02368	447.1	1.7972	1.0485	1.1947	154.4	65
70	0.02577	453.1	1.8185	1.0344	1.1783	157.8		0.02427	452.3	1.8126	1.0438	1.1848	156.7	70
75	0.02636	458.2	1.8334	1.0323	1.1705	159.9		0.02485	457.5	1.8277	1.0406	1.1762	158.9	75
80	0.02694	463.4	1.8481	1.0313	1.1635	161.9		0.02541	462.7	1.8425	1.0388	1.1687	160.9	80
85	0.02751	468.5	1.8626	1.0313	1.1573	163.8		0.02596	467.9	1.8571	1.0381	1.1619	162.9	85
90	0.02807	473.7	1.8769	1.0321	1.1518	165.7		0.02650	473.1	1.8715	1.0383	1.1559	164.9	90
95	0.02862	478.9	1.8911	1.0337	1.1468	167.5		0.02703	478.3	1.8857	1.0393	1.1506	166.8	95
100	0.02917	484.0	1.9050	1.0358	1.1422	169.3		0.02756	483.5	1.8997	1.0409	1.1457	168.6	100
105	0.02971	489.2	1.9188	1.0384	1.1381	171.1		0.02807	488.7	1.9136	1.0432	1.1413	170.4	105
110	0.03023	494.4	1.9325	1.0415	1.1343	172.7		0.02859	493.9	1.9273	1.0459	1.1372	172.1	110
115	0.03076	499.6	1.9460	1.0450	1.1309	174.4		0.02909	499.1	1.9409	1.0490	1.1335	173.8	115
120	0.03128	504.9	1.9594	1.0488	1.1277	176.0		0.02959	504.4	1.9543	1.0525	1.1301	175.4	120
125	0.03180	510.1	1.9727	1.0528	1.1247	177.6		0.03008	509.7	1.9676	1.0563	1.1270	177.0	125
130	0.03231	515.4	1.9858	1.0572	1.1219	179.1		0.03058	515.0	1.9809	1.0604	1.1241	178.6	130
135	0.03282	520.7	1.9989	1.0617	1.1194	180.7		0.03106	520.3	1.9940	1.0647	1.1214	180.1	135
140	0.03333	526.0	2.0119	1.0664	1.1170	182.2		0.03155	525.6	2.0070	1.0692	1.1189	181.7	140
145	0.03383	531.4	2.0247	1.0713	1.1147	183.6		0.03203	531.0	2.0198	1.0739	1.1165	183.1	145
150	0.03432	536.7	2.0375	1.0763	1.1126	185.1		0.03250	536.3	2.0326	1.0787	1.1143	184.6	150
155	0.03482	542.1	2.0502	1.0814	1.1107	186.5		0.03298	541.8	2.0453	1.0837	1.1122	186.0	155
160	0.03531	547.5	2.0628	1.0866	1.1088	187.9		0.03345	547.2	2.0579	1.0888	1.1103	187.5	160
165	0.03580	553.0	2.0753	1.0919	1.1070	189.3		0.03392	552.6	2.0705	1.0940	1.1084	188.9	165
170	0.03629	558.5	2.0877	1.0973	1.1054	190.6		0.03438	558.1	2.0829	1.0993	1.1067	190.2	170
175	0.03677	564.0	2.1000	1.1027	1.1038	192.0		0.03485	563.6	2.0953	1.1046	1.1050	191.6	175
180	0.03725	569.5	2.1123	1.1082	1.1023	193.3		0.03531	569.2	2.1076	1.1100	1.1035	192.9	180
185	0.03774	575.0	2.1245	1.1137	1.1009	194.6		0.03577	574.7	2.1198	1.1154	1.1020	194.2	185
190	0.03821	580.6	2.1366	1.1193	1.0995	195.9		0.03623	580.3	2.1319	1.1209	1.1006	195.6	190

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 1100.00 kPa (abs)							Pressure = 1200.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
42.93	0.00088	261.0	1.2050	1.5256	1.6158	424.9	SAT LIQ	0.00089	266.2	1.2208	1.5481	1.6300	408.8	46.28
42.93	0.01839	421.0	1.7112	1.1488	1.3000	139.4	SAT VAP	0.01674	422.4	1.7100	1.1807	1.3195	138.1	46.28
45	0.01867	423.4	1.7186	1.1368	1.2876	140.8		—	—	—	—	—	—	45
50	0.01932	429.0	1.7362	1.1131	1.2623	143.9		0.01722	426.8	1.7235	1.1563	1.2951	140.7	50
55	0.01995	434.5	1.7531	1.0952	1.2419	146.8		0.01783	432.5	1.7411	1.1310	1.2685	143.9	55
60	0.02054	440.0	1.7696	1.0817	1.2251	149.5		0.01842	438.1	1.7580	1.1119	1.2471	146.9	60
65	0.02112	445.4	1.7856	1.0716	1.2110	152.1		0.01897	443.6	1.7745	1.0974	1.2296	149.7	65
70	0.02168	450.7	1.8013	1.0640	1.1990	154.5		0.01951	449.1	1.7905	1.0864	1.2149	152.3	70
75	0.02223	456.0	1.8166	1.0586	1.1887	156.8		0.02003	454.5	1.8062	1.0782	1.2025	154.8	75
80	0.02275	461.3	1.8317	1.0548	1.1797	159.1		0.02054	459.8	1.8215	1.0722	1.1918	157.1	80
85	0.02327	466.6	1.8465	1.0525	1.1718	161.2		0.02103	465.2	1.8365	1.0679	1.1825	159.3	85
90	0.02378	471.8	1.8611	1.0513	1.1648	163.2		0.02151	470.5	1.8513	1.0652	1.1743	161.5	90
95	0.02428	477.1	1.8755	1.0511	1.1585	165.2		0.02199	475.8	1.8659	1.0636	1.1671	163.6	95
100	0.02477	482.3	1.8897	1.0517	1.1529	167.1		0.02245	481.2	1.8802	1.0630	1.1607	165.6	100
105	0.02525	487.6	1.9037	1.0530	1.1479	168.9		0.02290	486.5	1.8944	1.0633	1.1549	167.5	105
110	0.02573	492.9	1.9175	1.0549	1.1433	170.7		0.02335	491.8	1.9083	1.0644	1.1497	169.4	110
115	0.02620	498.1	1.9312	1.0573	1.1391	172.5		0.02379	497.1	1.9221	1.0660	1.1450	171.2	115
120	0.02666	503.4	1.9447	1.0602	1.1353	174.2		0.02423	502.5	1.9358	1.0682	1.1407	173.0	120
125	0.02713	508.7	1.9582	1.0634	1.1318	175.9		0.02466	507.8	1.9493	1.0708	1.1368	174.7	125
130	0.02758	514.1	1.9715	1.0670	1.1285	177.5		0.02508	513.2	1.9627	1.0739	1.1331	176.4	130
135	0.02803	519.4	1.9846	1.0709	1.1255	179.1		0.02550	518.5	1.9760	1.0773	1.1298	178.0	135
140	0.02848	524.8	1.9977	1.0750	1.1227	180.6		0.02592	523.9	1.9891	1.0810	1.1267	179.6	140
145	0.02892	530.2	2.0106	1.0793	1.1201	182.2		0.02633	529.4	2.0021	1.0849	1.1239	181.2	145
150	0.02936	535.6	2.0235	1.0838	1.1177	183.7		0.02675	534.8	2.0150	1.0890	1.1212	182.8	150
155	0.02980	541.0	2.0363	1.0885	1.1154	185.2		0.02715	540.2	2.0279	1.0934	1.1187	184.3	155
160	0.03023	546.5	2.0489	1.0933	1.1133	186.6		0.02756	545.7	2.0406	1.0979	1.1164	185.8	160
165	0.03067	551.9	2.0615	1.0982	1.1113	188.0		0.02796	551.2	2.0532	1.1026	1.1142	187.2	165
170	0.03110	557.4	2.0740	1.1033	1.1094	189.5		0.02836	556.8	2.0657	1.1074	1.1122	188.7	170
175	0.03152	563.0	2.0864	1.1084	1.1076	190.8		0.02875	562.3	2.0782	1.1123	1.1102	190.1	175
180	0.03194	568.5	2.0987	1.1136	1.1059	192.2		0.02915	567.9	2.0906	1.1173	1.1084	191.5	180
185	0.03237	574.1	2.1110	1.1188	1.1043	193.6		0.02954	573.5	2.1029	1.1223	1.1067	192.9	185
190	0.03279	579.7	2.1231	1.1241	1.1028	194.9		0.02993	579.1	2.1151	1.1275	1.1050	194.2	190
195	0.03321	585.3	2.1353	1.1295	1.1013	196.2		0.03032	584.7	2.1272	1.1326	1.1035	195.6	195
200	—	—	—	—	—	—		0.03070	590.4	2.1393	1.1379	1.1020	196.9	200

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 1300.00 kPa (abs)							Pressure = 1400.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
49.42	0.00091	271.0	1.2357	1.5714	1.6449	393.5	SAT LIQ	0.00092	275.7	1.2498	1.5954	1.6608	378.9	52.39
49.42	0.01534	423.6	1.7088	1.2137	1.3405	136.9	SAT VAP	0.01413	424.7	1.7076	1.2482	1.3631	135.5	52.39
50	0.01542	424.3	1.7110	1.2088	1.3358	137.3		—	—	—	—	—	—	45
55	0.01602	430.3	1.7292	1.1731	1.3005	140.9		0.01445	427.9	1.7174	1.2239	1.3399	137.6	55
60	0.01660	436.1	1.7468	1.1466	1.2730	144.1		0.01502	434.0	1.7357	1.1872	1.3039	141.2	60
65	0.01714	441.8	1.7637	1.1266	1.2510	147.1		0.01556	439.8	1.7531	1.1600	1.2760	144.5	65
70	0.01767	447.3	1.7801	1.1114	1.2330	150.0		0.01607	445.6	1.7700	1.1395	1.2537	147.5	70
75	0.01817	452.9	1.7961	1.0998	1.2179	152.6		0.01656	451.2	1.7864	1.1239	1.2354	150.4	75
80	0.01865	458.4	1.8117	1.0911	1.2052	155.1		0.01703	456.8	1.8023	1.1119	1.2201	153.0	80
85	0.01912	463.8	1.8270	1.0847	1.1942	157.5		0.01749	462.3	1.8179	1.1029	1.2071	155.6	85
90	0.01959	469.2	1.8420	1.0801	1.1847	159.8		0.01793	467.8	1.8331	1.0962	1.1960	158.0	90
95	0.02003	474.6	1.8568	1.0770	1.1763	161.9		0.01836	473.3	1.8481	1.0913	1.1863	160.2	95
100	0.02047	480.0	1.8713	1.0751	1.1690	164.0		0.01878	478.8	1.8628	1.0880	1.1779	162.4	100
105	0.02091	485.3	1.8856	1.0743	1.1624	166.0		0.01919	484.2	1.8772	1.0859	1.1704	164.6	105
110	0.02133	490.7	1.8997	1.0743	1.1565	168.0		0.01960	489.6	1.8915	1.0849	1.1637	166.6	110
115	0.02175	496.1	1.9136	1.0752	1.1512	169.9		0.01999	495.0	1.9055	1.0847	1.1577	168.6	115
120	0.02216	501.5	1.9274	1.0766	1.1464	171.7		0.02038	500.5	1.9194	1.0854	1.1524	170.5	120
125	0.02257	506.9	1.9410	1.0786	1.1420	173.5		0.02077	505.9	1.9332	1.0866	1.1475	172.3	125
130	0.02297	512.3	1.9545	1.0810	1.1380	175.3		0.02115	511.3	1.9467	1.0885	1.1430	174.1	130
135	0.02336	517.7	1.9678	1.0839	1.1343	177.0		0.02153	516.8	1.9602	1.0908	1.1390	175.9	135
140	0.02375	523.1	1.9810	1.0871	1.1309	178.6		0.02189	522.2	1.9734	1.0935	1.1352	177.6	140
145	0.02414	528.5	1.9941	1.0906	1.1278	180.2		0.02226	527.7	1.9866	1.0966	1.1318	179.3	145
150	0.02453	534.0	2.0071	1.0944	1.1249	181.8		0.02263	533.2	1.9997	1.1000	1.1286	180.9	150
155	0.02491	539.5	2.0200	1.0984	1.1221	183.4		0.02299	538.7	2.0126	1.1036	1.1257	182.5	155
160	0.02529	545.0	2.0328	1.1027	1.1196	184.9		0.02334	544.2	2.0255	1.1075	1.1229	184.1	160
165	0.02566	550.5	2.0455	1.1070	1.1172	186.4		0.02370	549.8	2.0382	1.1116	1.1203	185.6	165
170	0.02604	556.1	2.0581	1.1116	1.1150	187.9		0.02405	555.4	2.0508	1.1159	1.1179	187.1	170
175	0.02641	561.6	2.0706	1.1162	1.1129	189.4		0.02440	561.0	2.0634	1.1203	1.1157	188.6	175
180	0.02677	567.2	2.0830	1.1210	1.1110	190.8		0.02475	566.6	2.0758	1.1249	1.1136	190.1	180
185	0.02714	572.8	2.0953	1.1259	1.1091	192.2		0.02509	572.2	2.0882	1.1295	1.1116	191.5	185
190	0.02751	578.5	2.1075	1.1308	1.1073	193.6		0.02543	577.9	2.1005	1.1343	1.1097	192.9	190
195	0.02787	584.1	2.1197	1.1359	1.1057	194.9		0.02577	583.5	2.1127	1.1391	1.1079	194.3	195
200	0.02823	589.8	2.1318	1.1409	1.1041	196.3		0.02611	589.3	2.1248	1.1440	1.1062	195.7	200
205	—	—	—	—	—	—		0.02645	595.0	2.1369	1.1490	1.1046	197.0	205

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 1500.00 kPa (abs)							Pressure = 1600.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
55.2	0.00093	280.1	1.2632	1.6205	1.6778	365.0	SAT LIQ	0.00094	284.5	1.2759	1.6468	1.6959	351.6	57.88
55.2	0.01308	425.7	1.7063	1.2844	1.3876	134.2	SAT VAP	0.01215	426.5	1.7050	1.3227	1.4142	132.8	57.88
60	0.01363	431.7	1.7246	1.2358	1.3416	138.0		0.01239	429.3	1.7134	1.2953	1.3888	134.7	60
65	0.01417	437.8	1.7427	1.1989	1.3056	141.7		0.01294	435.6	1.7323	1.2448	1.3412	138.7	65
70	0.01468	443.7	1.7601	1.1715	1.2776	145.0		0.01344	441.7	1.7503	1.2083	1.3056	142.3	70
75	0.01516	449.5	1.7769	1.1507	1.2552	148.0		0.01392	447.7	1.7675	1.1811	1.2779	145.6	75
80	0.01562	455.2	1.7932	1.1349	1.2368	150.9		0.01437	453.6	1.7842	1.1604	1.2556	148.7	80
85	0.01606	460.9	1.8090	1.1228	1.2214	153.6		0.01480	459.3	1.8004	1.1447	1.2373	151.5	85
90	0.01649	466.4	1.8245	1.1136	1.2084	156.1		0.01522	465.0	1.8162	1.1325	1.2220	154.2	90
95	0.01690	472.0	1.8397	1.1067	1.1972	158.5		0.01562	470.6	1.8316	1.1233	1.2090	156.8	95
100	0.01731	477.5	1.8546	1.1016	1.1875	160.8		0.01602	476.2	1.8467	1.1163	1.1978	159.2	100
105	0.01770	483.0	1.8692	1.0982	1.1790	163.0		0.01640	481.8	1.8616	1.1112	1.1881	161.5	105
110	0.01809	488.5	1.8837	1.0959	1.1714	165.2		0.01677	487.4	1.8761	1.1077	1.1796	163.7	110
115	0.01847	494.0	1.8978	1.0948	1.1647	167.2		0.01714	492.9	1.8905	1.1054	1.1721	165.9	115
120	0.01885	499.4	1.9119	1.0945	1.1587	169.2		0.01750	498.4	1.9046	1.1042	1.1653	167.9	120
125	0.01921	504.9	1.9257	1.0950	1.1532	171.1		0.01785	503.9	1.9186	1.1038	1.1593	169.9	125
130	0.01958	510.4	1.9394	1.0962	1.1483	173.0		0.01820	509.5	1.9323	1.1042	1.1539	171.8	130
135	0.01993	515.9	1.9529	1.0979	1.1438	174.8		0.01854	515.0	1.9460	1.1053	1.1489	173.7	135
140	0.02028	521.4	1.9663	1.1001	1.1397	176.6		0.01887	520.5	1.9594	1.1069	1.1444	175.5	140
145	0.02063	526.9	1.9795	1.1027	1.1360	178.3		0.01921	526.0	1.9728	1.1090	1.1403	177.3	145
150	0.02098	532.4	1.9926	1.1057	1.1325	180.0		0.01954	531.6	1.9860	1.1115	1.1365	179.0	150
155	0.02132	537.9	2.0056	1.1090	1.1293	181.6		0.01986	537.2	1.9990	1.1144	1.1330	180.7	155
160	0.02166	543.5	2.0185	1.1125	1.1263	183.2		0.02018	542.7	2.0120	1.1176	1.1298	182.4	160
165	0.02199	549.1	2.0313	1.1163	1.1235	184.8		0.02050	548.3	2.0248	1.1211	1.1268	184.0	165
170	0.02233	554.7	2.0440	1.1203	1.1209	186.3		0.02082	554.0	2.0376	1.1248	1.1240	185.5	170
175	0.02265	560.3	2.0566	1.1244	1.1185	187.9		0.02113	559.6	2.0502	1.1287	1.1214	187.1	175
180	0.02298	565.9	2.0691	1.1288	1.1162	189.3		0.02144	565.2	2.0627	1.1328	1.1190	188.6	180
185	0.02331	571.6	2.0815	1.1332	1.1141	190.8		0.02175	570.9	2.0752	1.1370	1.1167	190.1	185
190	0.02363	577.2	2.0939	1.1378	1.1121	192.3		0.02206	576.6	2.0876	1.1414	1.1145	191.6	190
195	0.02395	582.9	2.1061	1.1425	1.1102	193.7		0.02236	582.3	2.0998	1.1458	1.1125	193.1	195
200	0.02427	588.7	2.1183	1.1472	1.1084	195.1		0.02267	588.1	2.1121	1.1504	1.1106	194.5	200
205	0.02459	594.4	2.1303	1.1520	1.1067	196.5		0.02297	593.8	2.1242	1.1551	1.1088	195.9	205
210	0.02491	600.2	2.1424	1.1569	1.1050	197.8		0.02327	599.6	2.1362	1.1598	1.1070	197.3	210

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 1700.00 kPa (abs)							Pressure = 1800.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
60.43	0.00095	288.6	1.2882	1.6746	1.7155	338.6	SAT LIQ	0.00096	292.6	1.2999	1.7040	1.7366	326.1	62.87
60.43	0.01132	427.2	1.7037	1.3635	1.4432	131.4	SAT VAP	0.01058	427.8	1.7022	1.4072	1.4749	130.0	62.87
65	0.01183	433.3	1.7217	1.3004	1.3851	135.5		0.01082	430.8	1.7110	1.3696	1.4408	132.1	65
70	0.01234	439.7	1.7405	1.2514	1.3390	139.5		0.01134	437.4	1.7306	1.3029	1.3794	136.5	70
75	0.01281	445.8	1.7583	1.2158	1.3042	143.1		0.01182	443.8	1.7491	1.2559	1.3352	140.5	75
80	0.01326	451.8	1.7754	1.1891	1.2770	146.4		0.01227	450.0	1.7667	1.2215	1.3016	144.0	80
85	0.01369	457.7	1.7920	1.1687	1.2551	149.5		0.01269	456.1	1.7837	1.1957	1.2752	147.3	85
90	0.01410	463.5	1.8081	1.1532	1.2371	152.3		0.01309	462.0	1.8001	1.1760	1.2538	150.3	90
95	0.01449	469.3	1.8238	1.1412	1.2219	155.0		0.01348	467.8	1.8161	1.1607	1.2361	153.2	95
100	0.01487	474.9	1.8391	1.1321	1.2091	157.5		0.01386	473.6	1.8317	1.1491	1.2213	155.8	100
105	0.01525	480.6	1.8541	1.1252	1.1980	159.9		0.01422	479.3	1.8469	1.1401	1.2087	158.4	105
110	0.01561	486.2	1.8689	1.1202	1.1884	162.3		0.01457	485.0	1.8618	1.1334	1.1978	160.8	110
115	0.01596	491.8	1.8834	1.1166	1.1799	164.5		0.01491	490.7	1.8765	1.1284	1.1882	163.1	115
120	0.01631	497.4	1.8976	1.1143	1.1724	166.6		0.01524	496.3	1.8909	1.1249	1.1798	165.3	120
125	0.01665	502.9	1.9117	1.1130	1.1657	168.7		0.01557	501.9	1.9051	1.1226	1.1724	167.4	125
130	0.01698	508.5	1.9256	1.1126	1.1597	170.7		0.01589	507.5	1.9191	1.1214	1.1657	169.5	130
135	0.01730	514.1	1.9393	1.1130	1.1542	172.6		0.01621	513.1	1.9329	1.1210	1.1598	171.5	135
140	0.01763	519.6	1.9529	1.1140	1.1493	174.5		0.01652	518.7	1.9466	1.1213	1.1544	173.4	140
145	0.01795	525.2	1.9663	1.1156	1.1448	176.3		0.01682	524.3	1.9601	1.1223	1.1495	175.3	145
150	0.01826	530.8	1.9796	1.1176	1.1407	178.1		0.01713	530.0	1.9734	1.1239	1.1450	177.1	150
155	0.01857	536.4	1.9927	1.1201	1.1369	179.8		0.01742	535.6	1.9866	1.1259	1.1409	178.9	155
160	0.01888	542.0	2.0057	1.1229	1.1334	181.5		0.01772	541.2	1.9997	1.1283	1.1371	180.6	160
165	0.01918	547.6	2.0186	1.1260	1.1302	183.1		0.01801	546.9	2.0127	1.1310	1.1336	182.3	165
170	0.01949	553.2	2.0314	1.1294	1.1272	184.8		0.01830	552.5	2.0256	1.1341	1.1304	184.0	170
175	0.01978	558.9	2.0441	1.1330	1.1244	186.4		0.01859	558.2	2.0383	1.1374	1.1274	185.6	175
180	0.02008	564.6	2.0567	1.1368	1.1218	187.9		0.01887	563.9	2.0509	1.1410	1.1246	187.2	180
185	0.02037	570.3	2.0692	1.1408	1.1193	189.4		0.01915	569.6	2.0635	1.1447	1.1220	188.7	185
190	0.02066	576.0	2.0816	1.1450	1.1170	190.9		0.01943	575.4	2.0759	1.1487	1.1196	190.3	190
195	0.02096	581.7	2.0939	1.1493	1.1149	192.4		0.01971	581.1	2.0883	1.1528	1.1173	191.8	195
200	0.02124	587.5	2.1062	1.1537	1.1128	193.9		0.01998	586.9	2.1005	1.1570	1.1151	193.3	200
205	0.02153	593.3	2.1183	1.1582	1.1109	195.3		0.02026	592.7	2.1127	1.1613	1.1130	194.7	205
210	0.02182	599.1	2.1304	1.1628	1.1091	196.7		0.02053	598.5	2.1248	1.1658	1.1111	196.2	210
215	0.02210	604.9	2.1424	1.1674	1.1073	198.1		0.02080	604.3	2.1369	1.1703	1.1093	197.6	215

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 1900.00 kPa (abs)							Pressure = 2000.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
65.22	0.00098	296.6	1.3113	1.7353	1.7594	314.0	SAT LIQ	0.00099	300.4	1.3223	1.7690	1.7844	302.2	67.47
65.22	0.00991	428.3	1.7007	1.4544	1.5098	128.6	SAT VAP	0.00931	428.8	1.6991	1.5055	1.5484	127.2	67.47
70	0.01043	435.1	1.7205	1.3658	1.4297	133.3		0.00959	432.5	1.7101	1.4452	1.4943	129.9	70
75	0.01092	441.7	1.7398	1.3032	1.3722	137.7		0.01009	439.5	1.7303	1.3600	1.4173	134.7	75
80	0.01137	448.1	1.7580	1.2587	1.3301	141.5		0.01055	446.1	1.7493	1.3019	1.3638	138.9	80
85	0.01179	454.3	1.7755	1.2259	1.2980	145.0		0.01097	452.5	1.7673	1.2601	1.3242	142.7	85
90	0.01219	460.4	1.7923	1.2011	1.2725	148.3		0.01137	458.8	1.7845	1.2291	1.2936	146.2	90
95	0.01257	466.4	1.8086	1.1821	1.2518	151.3		0.01175	464.8	1.8011	1.2055	1.2692	149.3	95
100	0.01294	472.2	1.8244	1.1674	1.2346	154.1		0.01211	470.8	1.8173	1.1874	1.2493	152.3	100
105	0.01329	478.0	1.8399	1.1561	1.2202	156.7		0.01246	476.7	1.8330	1.1733	1.2327	155.1	105
110	0.01364	483.8	1.8550	1.1475	1.2078	159.3		0.01279	482.6	1.8483	1.1625	1.2186	157.7	110
115	0.01397	489.5	1.8698	1.1409	1.1971	161.7		0.01312	488.4	1.8633	1.1542	1.2066	160.2	115
120	0.01429	495.2	1.8844	1.1361	1.1877	164.0		0.01344	494.1	1.8781	1.1479	1.1961	162.6	120
125	0.01461	500.9	1.8987	1.1327	1.1795	166.2		0.01374	499.8	1.8925	1.1433	1.1869	164.9	125
130	0.01492	506.5	1.9129	1.1305	1.1721	168.3		0.01405	505.5	1.9068	1.1401	1.1789	167.1	130
135	0.01523	512.2	1.9268	1.1293	1.1656	170.4		0.01434	511.2	1.9208	1.1380	1.1717	169.2	135
140	0.01553	517.8	1.9405	1.1290	1.1597	172.4		0.01463	516.9	1.9347	1.1369	1.1652	171.3	140
145	0.01582	523.5	1.9541	1.1293	1.1543	174.3		0.01492	522.6	1.9483	1.1366	1.1594	173.3	145
150	0.01611	529.1	1.9676	1.1303	1.1495	176.2		0.01520	528.3	1.9619	1.1370	1.1541	175.2	150
155	0.01640	534.8	1.9808	1.1319	1.1450	178.0		0.01547	534.0	1.9752	1.1380	1.1493	177.1	155
160	0.01668	540.5	1.9940	1.1338	1.1410	179.8		0.01575	539.7	1.9884	1.1395	1.1449	178.9	160
165	0.01696	546.1	2.0070	1.1362	1.1372	181.5		0.01602	545.4	2.0015	1.1415	1.1409	180.7	165
170	0.01724	551.8	2.0199	1.1389	1.1337	183.2		0.01629	551.1	2.0145	1.1439	1.1372	182.4	170
175	0.01752	557.5	2.0327	1.1419	1.1305	184.8		0.01655	556.8	2.0274	1.1466	1.1337	184.1	175
180	0.01779	563.2	2.0454	1.1452	1.1275	186.5		0.01681	562.6	2.0401	1.1496	1.1305	185.7	180
185	0.01806	569.0	2.0580	1.1487	1.1248	188.1		0.01707	568.3	2.0527	1.1528	1.1276	187.4	185
190	0.01832	574.7	2.0705	1.1524	1.1221	189.6		0.01733	574.1	2.0653	1.1563	1.1248	189.0	190
195	0.01859	580.5	2.0829	1.1563	1.1197	191.2		0.01758	579.9	2.0777	1.1599	1.1222	190.5	195
200	0.01885	586.3	2.0952	1.1604	1.1174	192.7		0.01784	585.7	2.0900	1.1638	1.1198	192.1	200
205	0.01911	592.1	2.1074	1.1645	1.1152	194.1		0.01809	591.5	2.1023	1.1678	1.1175	193.6	205
210	0.01937	597.9	2.1195	1.1688	1.1132	195.6		0.01834	597.4	2.1145	1.1719	1.1153	195.0	210
215	0.01963	603.8	2.1316	1.1732	1.1113	197.0		0.01858	603.2	2.1265	1.1761	1.1133	196.5	215
220	0.01989	609.7	2.1436	1.1776	1.1095	198.4		0.01883	609.1	2.1386	1.1804	1.1114	197.9	220

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 2200.00 kPa (abs)							Pressure = 2400.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
71.72	0.00102	307.8	1.3433	1.8446	1.8417	279.5	SAT LIQ	0.00104	314.9	1.3632	1.9351	1.9120	257.6	75.69
71.72	0.00825	429.3	1.6956	1.6230	1.6389	124.2	SAT VAP	0.00735	429.5	1.6917	1.7675	1.7530	121.2	75.69
75	0.00860	434.5	1.7105	1.5190	1.5466	128.1		—	—	—	—	—	—	75
80	0.00909	441.8	1.7313	1.4143	1.4531	133.3		0.00782	436.7	1.7122	1.5873	1.5944	126.8	80
85	0.00953	448.7	1.7507	1.3450	1.3903	137.7		0.00829	444.3	1.7336	1.4637	1.4851	132.3	85
90	0.00993	455.3	1.7690	1.2961	1.3449	141.7		0.00870	451.4	1.7533	1.3841	1.4137	136.9	90
95	0.01031	461.6	1.7865	1.2601	1.3103	145.3		0.00909	458.2	1.7718	1.3286	1.3630	141.0	95
100	0.01067	467.9	1.8033	1.2329	1.2831	148.6		0.00945	464.7	1.7894	1.2882	1.3250	144.8	100
105	0.01100	474.0	1.8195	1.2121	1.2612	151.7		0.00978	471.1	1.8064	1.2579	1.2954	148.2	105
110	0.01133	480.0	1.8354	1.1959	1.2429	154.6		0.01010	477.3	1.8227	1.2346	1.2715	151.3	110
115	0.01164	485.9	1.8508	1.1834	1.2276	157.3		0.01041	483.4	1.8386	1.2166	1.2519	154.3	115
120	0.01195	491.8	1.8658	1.1737	1.2145	159.9		0.01070	489.5	1.8541	1.2026	1.2355	157.1	120
125	0.01224	497.7	1.8806	1.1662	1.2032	162.4		0.01098	495.5	1.8692	1.1917	1.2215	159.7	125
130	0.01253	503.5	1.8951	1.1606	1.1934	164.7		0.01126	501.4	1.8841	1.1832	1.2095	162.3	130
135	0.01281	509.3	1.9094	1.1565	1.1847	167.0		0.01153	507.3	1.8986	1.1767	1.1990	164.7	135
140	0.01308	515.1	1.9235	1.1537	1.1770	169.1		0.01179	513.2	1.9129	1.1719	1.1898	167.0	140
145	0.01335	520.8	1.9374	1.1519	1.1701	171.2		0.01205	519.0	1.9270	1.1684	1.1817	169.2	145
150	0.01362	526.6	1.9510	1.1510	1.1639	173.3		0.01230	524.9	1.9408	1.1660	1.1744	171.3	150
155	0.01388	532.3	1.9646	1.1509	1.1583	175.2		0.01255	530.7	1.9545	1.1646	1.1679	173.4	155
160	0.01413	538.1	1.9779	1.1515	1.1532	177.1		0.01279	536.5	1.9680	1.1641	1.1620	175.4	160
165	0.01439	543.9	1.9912	1.1526	1.1485	179.0		0.01303	542.3	1.9814	1.1642	1.1567	177.3	165
170	0.01464	549.6	2.0042	1.1541	1.1443	180.8		0.01326	548.1	1.9946	1.1649	1.1518	179.2	170
175	0.01488	555.4	2.0172	1.1561	1.1404	182.6		0.01349	554.0	2.0077	1.1662	1.1473	181.1	175
180	0.01513	561.2	2.0300	1.1585	1.1367	184.3		0.01372	559.8	2.0206	1.1679	1.1432	182.9	180
185	0.01537	567.0	2.0428	1.1612	1.1334	186.0		0.01395	565.7	2.0335	1.1699	1.1394	184.6	185
190	0.01561	572.8	2.0554	1.1642	1.1302	187.6		0.01417	571.5	2.0462	1.1723	1.1359	186.3	190
195	0.01585	578.6	2.0679	1.1674	1.1273	189.3		0.01440	577.4	2.0588	1.1751	1.1327	188.0	195
200	0.01608	584.5	2.0803	1.1708	1.1246	190.8		0.01462	583.3	2.0713	1.1780	1.1296	189.6	200
205	0.01631	590.3	2.0927	1.1744	1.1221	192.4		0.01483	589.2	2.0837	1.1812	1.1268	191.2	205
210	0.01654	596.2	2.1049	1.1781	1.1197	193.9		0.01505	595.1	2.0960	1.1846	1.1241	192.8	210
215	0.01677	602.1	2.1170	1.1820	1.1174	195.4		0.01526	601.0	2.1082	1.1882	1.1216	194.4	215
220	0.01700	608.0	2.1291	1.1861	1.1153	196.9		0.01548	607.0	2.1203	1.1919	1.1193	195.9	220
225	0.01723	614.0	2.1411	1.1902	1.1133	198.4		0.01569	612.9	2.1324	1.1957	1.1171	197.4	225
230	—	—	—	—	—	—		0.01590	618.9	2.1443	1.1996	1.1150	198.9	230

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 2600.00 kPa (abs)							Pressure = 2800.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
79.41	0.00107	321.8	1.3823	2.0468	2.0008	236.5	SAT LIQ	0.00111	328.6	1.4007	2.1903	2.1171	216.0	82.91
79.41	0.00657	429.3	1.6872	1.9511	1.9009	118.2	SAT VAP	0.00589	428.7	1.6819	2.1936	2.0991	115.2	82.91
80	0.00664	430.4	1.6904	1.9044	1.8601	119.2		—	—	—	—	—	—	80
85	0.00718	439.2	1.7151	1.6459	1.6339	126.1		0.00614	433.0	1.6941	1.9759	1.9096	118.8	85
90	0.00763	447.1	1.7369	1.5063	1.5114	131.7		0.00666	442.1	1.7193	1.6913	1.6622	125.8	90
95	0.00803	454.4	1.7569	1.4179	1.4330	136.5		0.00709	450.2	1.7413	1.5403	1.5307	131.5	95
100	0.00839	461.3	1.7756	1.3571	1.3781	140.7		0.00747	457.6	1.7614	1.4459	1.4477	136.4	100
105	0.00873	468.0	1.7933	1.3131	1.3373	144.5		0.00782	464.7	1.7802	1.3812	1.3897	140.7	105
110	0.00905	474.5	1.8103	1.2801	1.3056	148.0		0.00814	471.4	1.7980	1.3345	1.3469	144.5	110
115	0.00935	480.8	1.8268	1.2549	1.2803	151.2		0.00844	478.0	1.8150	1.2996	1.3137	148.1	115
120	0.00964	487.0	1.8427	1.2354	1.2595	154.2		0.00872	484.5	1.8315	1.2729	1.2873	151.3	120
125	0.00992	493.2	1.8582	1.2201	1.2422	157.1		0.00899	490.8	1.8474	1.2521	1.2657	154.4	125
130	0.01018	499.2	1.8734	1.2081	1.2275	159.8		0.00925	497.0	1.8630	1.2359	1.2477	157.3	130
135	0.01044	505.2	1.8882	1.1988	1.2149	162.3		0.00951	503.1	1.8781	1.2231	1.2324	160.0	135
140	0.01069	511.2	1.9027	1.1916	1.2039	164.8		0.00975	509.2	1.8929	1.2131	1.2193	162.6	140
145	0.01094	517.2	1.9170	1.1861	1.1943	167.1		0.00999	515.3	1.9075	1.2053	1.2080	165.1	145
150	0.01118	523.1	1.9311	1.1821	1.1858	169.4		0.01022	521.3	1.9218	1.1994	1.1981	167.4	150
155	0.01142	529.0	1.9450	1.1793	1.1782	171.5		0.01045	527.3	1.9358	1.1949	1.1893	169.7	155
160	0.01165	534.9	1.9587	1.1775	1.1714	173.6		0.01067	533.2	1.9497	1.1917	1.1814	171.9	160
165	0.01187	540.8	1.9722	1.1765	1.1653	175.7		0.01088	539.2	1.9634	1.1895	1.1744	174.0	165
170	0.01210	546.6	1.9855	1.1763	1.1597	177.6		0.01110	545.1	1.9769	1.1882	1.1681	176.1	170
175	0.01232	552.5	1.9987	1.1767	1.1547	179.6		0.01131	551.1	1.9902	1.1877	1.1624	178.1	175
180	0.01253	558.4	2.0118	1.1776	1.1500	181.4		0.01151	557.0	2.0034	1.1878	1.1572	180.0	180
185	0.01275	564.3	2.0247	1.1790	1.1458	183.2		0.01172	562.9	2.0164	1.1885	1.1524	181.9	185
190	0.01296	570.2	2.0375	1.1808	1.1418	185.0		0.01192	568.9	2.0293	1.1897	1.1480	183.7	190
195	0.01317	576.1	2.0502	1.1830	1.1382	186.7		0.01212	574.8	2.0421	1.1913	1.1440	185.5	195
200	0.01338	582.0	2.0628	1.1855	1.1348	188.4		0.01232	580.8	2.0547	1.1932	1.1402	187.3	200
205	0.01358	588.0	2.0753	1.1883	1.1317	190.1		0.01251	586.8	2.0673	1.1955	1.1367	189.0	205
210	0.01379	593.9	2.0876	1.1912	1.1288	191.7		0.01270	592.8	2.0798	1.1981	1.1335	190.6	210
215	0.01399	599.9	2.0999	1.1944	1.1260	193.3		0.01289	598.8	2.0921	1.2009	1.1305	192.3	215
220	0.01419	605.9	2.1121	1.1978	1.1234	194.9		0.01308	604.8	2.1044	1.2039	1.1277	193.9	220
225	0.01439	611.9	2.1242	1.2014	1.1210	196.4		0.01327	610.8	2.1165	1.2071	1.1250	195.5	225
230	0.01458	617.9	2.1362	1.2050	1.1187	197.9		0.01346	616.8	2.1286	1.2105	1.1225	197.0	230
235	—	—	—	—	—	—		0.01364	622.9	2.1406	1.2140	1.1202	198.6	235

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

Temp [°C]	Pressure = 3000.00 kPa (abs)							Pressure = 3200.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
86.22	0.00114	335.3	1.4188	2.3843	2.2770	195.8	SAT LIQ	0.00118	342.0	1.4367	2.6657	2.5126	175.9	89.35
86.22	0.00528	427.6	1.6758	2.5300	2.3769	112.1	SAT VAP	0.00472	426.0	1.6685	3.0280	2.7912	109.1	89.35
90	0.00575	436.1	1.6992	2.0156	1.9317	119.1		0.00482	427.9	1.6737	2.8017	2.5961	110.6	90
95	0.00624	445.3	1.7245	1.7214	1.6778	126.1		0.00544	439.5	1.7056	2.0237	1.9273	119.9	95
100	0.00665	453.5	1.7466	1.5654	1.5427	131.7		0.00589	448.8	1.7307	1.7365	1.6809	126.7	100
105	0.00701	461.1	1.7667	1.4676	1.4573	136.6		0.00628	457.1	1.7527	1.5813	1.5473	132.3	105
110	0.00733	468.2	1.7855	1.4007	1.3977	140.9		0.00662	464.7	1.7728	1.4831	1.4619	137.2	110
115	0.00764	475.1	1.8034	1.3523	1.3537	144.8		0.00692	472.0	1.7916	1.4156	1.4022	141.4	115
120	0.00792	481.8	1.8204	1.3161	1.3197	148.4		0.00721	478.9	1.8094	1.3667	1.3579	145.3	120
125	0.00819	488.3	1.8369	1.2884	1.2926	151.7		0.00748	485.7	1.8264	1.3299	1.3236	148.9	125
130	0.00845	494.7	1.8528	1.2669	1.2704	154.7		0.00773	492.2	1.8428	1.3017	1.2962	152.2	130
135	0.00869	501.0	1.8683	1.2500	1.2520	157.6		0.00798	498.7	1.8587	1.2797	1.2738	155.3	135
140	0.00893	507.2	1.8835	1.2366	1.2363	160.4		0.00821	505.1	1.8742	1.2624	1.2551	158.2	140
145	0.00916	513.3	1.8983	1.2262	1.2229	163.0		0.00844	511.3	1.8893	1.2487	1.2393	160.9	145
150	0.00939	519.4	1.9128	1.2179	1.2113	165.5		0.00865	517.5	1.9041	1.2379	1.2257	163.5	150
155	0.00960	525.5	1.9271	1.2116	1.2011	167.9		0.00887	523.7	1.9186	1.2294	1.2139	166.0	155
160	0.00982	531.6	1.9411	1.2068	1.1921	170.2		0.00907	529.8	1.9328	1.2228	1.2036	168.4	160
165	0.01003	537.6	1.9549	1.2032	1.1841	172.4		0.00927	535.9	1.9468	1.2177	1.1944	170.7	165
170	0.01023	543.6	1.9686	1.2007	1.1770	174.5		0.00947	542.0	1.9606	1.2140	1.1863	173.0	170
175	0.01043	549.6	1.9820	1.1992	1.1705	176.6		0.00967	548.1	1.9742	1.2113	1.1790	175.1	175
180	0.01063	555.6	1.9953	1.1984	1.1646	178.6		0.00986	554.1	1.9876	1.2095	1.1724	177.2	180
185	0.01083	561.6	2.0085	1.1983	1.1593	180.5		0.01004	560.2	2.0009	1.2086	1.1665	179.2	185
190	0.01102	567.6	2.0215	1.1988	1.1544	182.4		0.01023	566.2	2.0140	1.2083	1.1611	181.2	190
195	0.01121	573.6	2.0344	1.1998	1.1499	184.3		0.01041	572.3	2.0270	1.2086	1.1561	183.1	195
200	0.01139	579.6	2.0471	1.2012	1.1458	186.1		0.01059	578.3	2.0398	1.2094	1.1515	184.9	200
205	0.01158	585.6	2.0598	1.2030	1.1420	187.8		0.01077	584.4	2.0526	1.2107	1.1473	186.7	205
210	0.01176	591.6	2.0723	1.2051	1.1384	189.6		0.01094	590.4	2.0652	1.2123	1.1434	188.5	210
215	0.01194	597.6	2.0847	1.2075	1.1351	191.3		0.01111	596.5	2.0776	1.2143	1.1398	190.2	215
220	0.01212	603.7	2.0970	1.2102	1.1320	192.9		0.01129	602.6	2.0900	1.2166	1.1365	191.9	220
225	0.01230	609.7	2.1092	1.2130	1.1291	194.5		0.01146	608.6	2.1023	1.2191	1.1333	193.6	225
230	0.01248	615.8	2.1214	1.2161	1.1264	196.1		0.01162	614.8	2.1145	1.2218	1.1304	195.2	230
235	0.01265	621.9	2.1334	1.2194	1.1239	197.7		0.01179	620.9	2.1266	1.2248	1.1276	196.8	235
240	0.01283	628.0	2.1454	1.2227	1.1215	199.2		0.01196	627.0	2.1386	1.2279	1.1251	198.4	240

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)
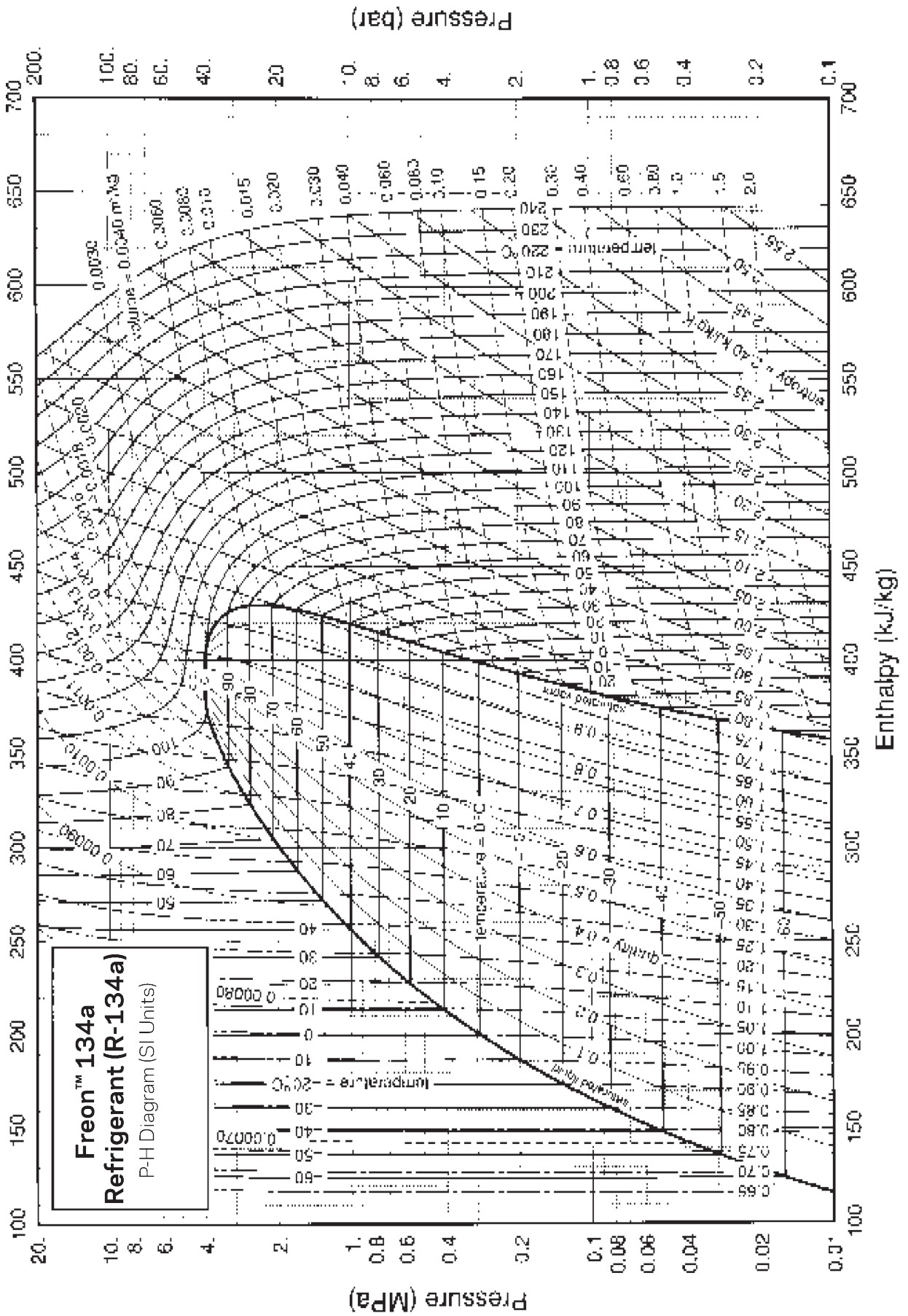
Temp [°C]	Pressure = 3400.00 kPa (abs)							Pressure = 3600.00 kPa (abs)						Temp [°C]
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
92.32	0.00123	348.8	1.4548	3.1183	2.8961	156.1	SAT LIQ	0.00130	356.0	1.4737	3.9821	3.6345	136.2	95.15
92.32	0.00420	423.6	1.6596	3.8377	3.4671	106.0	SAT VAP	0.00370	420.3	1.6483	5.3756	4.7521	102.8	95.15
95	0.00463	432.0	1.6825	2.6656	2.4643	112.6		—	—	—	—	—	—	95
100	0.00518	443.4	1.7132	2.0061	1.9016	121.2		0.00449	436.6	1.6924	2.5079	2.3168	115.0	100
105	0.00561	452.7	1.7379	1.7383	1.6732	127.8		0.00498	447.6	1.7216	1.9711	1.8620	122.9	105
110	0.00597	461.0	1.7597	1.5889	1.5452	133.3		0.00537	456.8	1.7458	1.7296	1.6572	129.2	110
115	0.00629	468.7	1.7796	1.4930	1.4622	138.0		0.00571	465.1	1.7672	1.5896	1.5377	134.5	115
120	0.00658	475.9	1.7983	1.4263	1.4035	142.2		0.00601	472.8	1.7870	1.4978	1.4586	139.1	120
125	0.00685	482.9	1.8160	1.3777	1.3596	146.1		0.00628	480.1	1.8055	1.4333	1.4019	143.2	125
130	0.00710	489.7	1.8329	1.3411	1.3255	149.6		0.00654	487.1	1.8230	1.3859	1.3592	147.0	130
135	0.00734	496.4	1.8493	1.3128	1.2982	152.9		0.00678	494.0	1.8399	1.3499	1.3258	150.5	135
140	0.00757	502.9	1.8651	1.2908	1.2758	156.0		0.00700	500.6	1.8561	1.3220	1.2989	153.8	140
145	0.00779	509.3	1.8805	1.2733	1.2571	158.9		0.00722	507.2	1.8719	1.3001	1.2767	156.8	145
150	0.00801	515.6	1.8956	1.2595	1.2413	161.6		0.00743	513.6	1.8873	1.2828	1.2582	159.7	150
155	0.00821	521.9	1.9103	1.2485	1.2276	164.2		0.00763	520.0	1.9022	1.2690	1.2424	162.4	155
160	0.00842	528.1	1.9247	1.2399	1.2158	166.7		0.00783	526.3	1.9169	1.2581	1.2288	165.0	160
165	0.00861	534.3	1.9389	1.2331	1.2054	169.1		0.00802	532.6	1.9313	1.2494	1.2170	167.5	165
170	0.00880	540.4	1.9529	1.2279	1.1962	171.4		0.00821	538.8	1.9454	1.2425	1.2066	169.9	170
175	0.00899	546.6	1.9667	1.2240	1.1880	173.6		0.00839	545.0	1.9594	1.2373	1.1974	172.2	175
180	0.00917	552.7	1.9802	1.2211	1.1806	175.8		0.00857	551.2	1.9731	1.2333	1.1892	174.4	180
185	0.00935	558.8	1.9936	1.2192	1.1740	177.9		0.00874	557.4	1.9866	1.2303	1.1818	176.6	185
190	0.00953	564.9	2.0068	1.2181	1.1680	179.9		0.00891	563.5	1.9999	1.2284	1.1752	178.7	190
195	0.00971	571.0	2.0199	1.2177	1.1625	181.9		0.00908	569.7	2.0131	1.2272	1.1691	180.7	195
200	0.00988	577.1	2.0328	1.2179	1.1575	183.8		0.00925	575.8	2.0261	1.2267	1.1636	182.7	200
205	0.01005	583.1	2.0457	1.2186	1.1529	185.7		0.00941	581.9	2.0390	1.2267	1.1586	184.6	205
210	0.01022	589.2	2.0583	1.2197	1.1486	187.5		0.00957	588.1	2.0518	1.2273	1.1540	186.5	210
215	0.01038	595.3	2.0709	1.2212	1.1447	189.3		0.00973	594.2	2.0644	1.2284	1.1497	188.3	215
220	0.01055	601.5	2.0834	1.2231	1.1410	191.0		0.00989	600.3	2.0770	1.2298	1.1457	190.1	220
225	0.01071	607.6	2.0957	1.2253	1.1376	192.7		0.01005	606.5	2.0894	1.2316	1.1420	191.8	225
230	0.01087	613.7	2.1080	1.2277	1.1345	194.4		0.01020	612.7	2.1017	1.2336	1.1386	193.5	230
235	0.01103	619.8	2.1201	1.2303	1.1315	196.0		0.01035	618.8	2.1139	1.2359	1.1354	195.2	235
240	0.01119	626.0	2.1322	1.2331	1.1287	197.6		0.01050	625.0	2.1260	1.2385	1.1324	196.8	240
245	0.01134	632.2	2.1441	1.2361	1.1261	199.2		0.01065	631.4	2.1380	1.2412	1.1296	198.4	245
250	—	—	—	—	—	—		0.01080	637.4	2.1500	1.2441	1.1269	200.0	250

Table 2. Freon™ 134a Superheated Vapor—Constant Pressure Table (continued)

V = Volume in m³/kg   H = Enthalpy in kJ/kg   S = Entropy in kJ/(kg)(K) v_s = Velocity of Sound in m/sec

C_p = Heat Capacity at Constant Pressure in kJ/(kg)(°C) C_p/C_v = Heat Capacity Ratio (Dimensionless)

| Temp [°C] | Pressure = 3800.00 kPa (abs) | | | | | | | Pressure = 4000.00 kPa (abs) | | | | | | Temp [°C] |
	V	H	S	C_p	C_p/C_v	v_s		V	H	S	C_p	C_p/C_v	v_s	
97.83	0.00139	364.0	1.4947	6.3049	5.6279	116.1	SAT LIQ	0.00158	375.6	1.5250	28.1470	24.2211	95.7	100.37
97.83	0.00319	415.1	1.6324	9.3686	8.0817	99.5	SAT VAP	0.00254	404.4	1.6022	42.1018	35.2394	95.0	100.37
100	0.00374	427.0	1.6645	3.8743	3.4563	107.3		—	—	—	—	—	—	100
105	0.00438	441.5	1.7031	2.3563	2.1772	117.6		0.00376	433.7	1.6804	3.1309	2.8151	111.6	105
110	0.00482	452.1	1.7309	1.9265	1.8153	124.9		0.00429	446.7	1.7143	2.2216	2.0540	120.4	110
115	0.00517	461.1	1.7543	1.7135	1.6356	130.8		0.00468	456.8	1.7406	1.8780	1.7663	127.1	115
120	0.00549	469.4	1.7754	1.5848	1.5261	135.9		0.00501	465.7	1.7634	1.6927	1.6106	132.7	120
125	0.00577	477.1	1.7948	1.4986	1.4519	140.4		0.00530	473.8	1.7840	1.5762	1.5117	137.5	125
130	0.00602	484.4	1.8131	1.4371	1.3979	144.4		0.00556	481.5	1.8031	1.4963	1.4429	141.8	130
135	0.00626	491.4	1.8306	1.3915	1.3569	148.1		0.00580	488.8	1.8212	1.4384	1.3921	145.8	135
140	0.00649	498.3	1.8473	1.3566	1.3245	151.6		0.00603	495.9	1.8385	1.3950	1.3530	149.4	140
145	0.00671	505.0	1.8634	1.3295	1.2982	154.8		0.00624	502.8	1.8550	1.3615	1.3219	152.8	145
150	0.00691	511.6	1.8791	1.3080	1.2766	157.8		0.00645	509.5	1.8710	1.3354	1.2965	155.9	150
155	0.00711	518.1	1.8944	1.2910	1.2583	160.7		0.00664	516.2	1.8866	1.3146	1.2755	158.9	155
160	0.00731	524.5	1.9093	1.2775	1.2428	163.4		0.00683	522.7	1.9018	1.2981	1.2577	161.7	160
165	0.00749	530.9	1.9239	1.2666	1.2293	166.0		0.00702	529.2	1.9166	1.2849	1.2424	164.4	165
170	0.00767	537.2	1.9382	1.2580	1.2176	168.4		0.00719	535.6	1.9311	1.2743	1.2293	167.0	170
175	0.00785	543.5	1.9523	1.2512	1.2073	170.8		0.00737	541.9	1.9454	1.2658	1.2177	169.4	175
180	0.00802	549.7	1.9661	1.2459	1.1982	173.1		0.00753	548.2	1.9594	1.2591	1.2076	171.8	180
185	0.00819	555.9	1.9798	1.2419	1.1900	175.3		0.00770	554.5	1.9732	1.2539	1.1985	174.1	185
190	0.00836	562.1	1.9932	1.2390	1.1827	177.5		0.00786	560.8	1.9867	1.2499	1.1904	176.3	190
195	0.00852	568.3	2.0065	1.2369	1.1760	179.6		0.00802	567.0	2.0001	1.2470	1.1831	178.4	195
200	0.00868	574.5	2.0197	1.2357	1.1700	181.6		0.00817	573.2	2.0134	1.2450	1.1765	180.5	200
205	0.00884	580.7	2.0326	1.2351	1.1645	183.5		0.00833	579.4	2.0265	1.2438	1.1705	182.5	205
210	0.00900	586.9	2.0455	1.2351	1.1594	185.5		0.00848	585.7	2.0394	1.2432	1.1650	184.5	210
215	0.00915	593.0	2.0582	1.2357	1.1548	187.3		0.00863	591.9	2.0522	1.2431	1.1600	186.4	215
220	0.00930	599.2	2.0708	1.2366	1.1505	189.1		0.00877	598.1	2.0649	1.2436	1.1554	188.3	220
225	0.00945	605.4	2.0833	1.2380	1.1465	190.9		0.00892	604.3	2.0774	1.2445	1.1511	190.1	225
230	0.00960	611.6	2.0957	1.2397	1.1428	192.7		0.00906	610.5	2.0898	1.2458	1.1471	191.9	230
235	0.00975	617.8	2.1079	1.2416	1.1394	194.4		0.00920	616.8	2.1022	1.2475	1.1434	193.6	235
240	0.00989	624.0	2.1201	1.2439	1.1362	196.1		0.00934	623.0	2.1144	1.2494	1.1400	195.3	240
245	0.01004	630.2	2.1322	1.2463	1.1331	197.7		0.00948	629.3	2.1265	1.2515	1.1368	197.0	245
250	0.01018	636.5	2.1441	1.2490	1.1303	199.3		0.00962	635.5	2.1386	1.2539	1.1337	198.6	250

**Freon™ 134a
Refrigerant (R-134a)**
P-H Diagram (SI Units)

Pressure (bar)

Pressure (MPa)

Enthalpy (kJ/kg)