PROPERTY TABLES FOR THERMAL FLUIDS ENGINEERING

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FOR THERMAL FLUIDS ENGINEERING

SI AND U.S. CUSTOMARY UNITS

Stephen R. Turns

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Preface

The tables in the booklet complement the property tables in the appendices to *Thermodynamics: Concepts and Applications* and *Thermal-Fluid Science: An Integrated Approach* by Stephen R. Turns. In addition to duplicating the SI tables in these books in both SI and US Customary units, the present booklet contains property data for the refrigerant R-134a and properties of the atmosphere at high altitudes.

Part One

SI Units, Appendices A–M

Appendix A
Thermodynamic Properties of Refrigerant-134a

Table A.1 Saturation Properties of Refrigerant R-134a: Temperature Increments

		Specific Volume, m^3/kg		Internal Energy, kJ/kg		Enthalpy, kJ/kg			Entropy, kJ/kg·K	
Temp., °C	Press., P_{sat}, MPa	Sat. Liquid, v_f	Sat. Vapor, v_g	Sat. Liquid, u_f	Sat. Vapor, u_g	Sat. Liquid, h_f	Evap., h_{fg}	Sat. Vapor, h_g	Sat. Liquid, s_f	Sat. Vapor, s_g
−40	0.051209	0.00070537	0.36108	148.11	355.51	148.14	225.86	374.00	0.79561	1.7643
−36	0.062908	0.00071120	0.29771	153.14	357.81	153.18	223.36	376.54	0.81700	1.7588
−32	0.076658	0.00071719	0.24727	158.19	360.11	158.25	220.81	379.06	0.83814	1.7538
−28	0.092703	0.00072336	0.20680	163.28	362.40	163.34	218.23	381.57	0.85906	1.7492
−24	0.11130	0.00072970	0.17407	168.39	364.70	168.47	215.60	384.07	0.87975	1.7451
−22	0.12165	0.00073294	0.16006	170.96	365.84	171.05	214.27	385.32	0.89002	1.7432
−20	0.13273	0.00073623	0.14739	173.54	366.99	173.64	212.91	386.55	0.90025	1.7413
−18	0.14460	0.00073958	0.13592	176.12	368.13	176.23	211.56	387.79	0.91042	1.7396
−16	0.15728	0.00074297	0.12551	178.72	369.28	178.83	210.19	389.02	0.92054	1.7379
−12	0.18524	0.00074994	0.10744	183.93	371.55	184.07	207.39	391.46	0.94066	1.7348
−8	0.21693	0.00075714	0.092422	189.17	373.82	189.34	204.53	393.87	0.96060	1.7320
−4	0.25268	0.00076460	0.079866	194.45	376.07	194.65	201.60	396.25	0.98037	1.7294
0	0.29280	0.00077233	0.069309	199.77	378.31	200.00	198.60	398.60	1.0000	1.7271
2	0.31462	0.00077631	0.064663	202.45	379.42	202.69	197.08	399.77	1.0098	1.7260
4	0.33766	0.00078037	0.060385	205.13	380.53	205.40	195.52	400.92	1.0195	1.7250
6	0.36198	0.00078451	0.056443	207.83	381.63	208.11	193.95	402.06	1.0292	1.7240
8	0.38761	0.00078873	0.052804	210.53	382.73	210.84	192.36	403.20	1.0388	1.7230
10	0.41461	0.00079305	0.049442	213.25	383.82	213.58	190.74	404.32	1.0485	1.7221
12	0.44301	0.00079745	0.046332	215.98	384.90	216.33	189.10	405.43	1.0581	1.7212
14	0.47288	0.00080196	0.043451	218.71	385.98	219.09	187.44	406.53	1.0677	1.7204
16	0.50425	0.00080657	0.040780	221.46	387.05	221.87	185.74	407.61	1.0772	1.7196
18	0.53718	0.00081128	0.038301	224.23	388.11	224.66	184.03	408.69	1.0867	1.7188
20	0.57171	0.00081610	0.035997	227.00	389.17	227.47	182.28	409.75	1.0962	1.7180
22	0.60789	0.00082105	0.033854	229.79	390.21	230.29	180.50	410.79	1.1057	1.7173
24	0.64578	0.00082612	0.031858	232.59	391.25	233.12	178.70	411.82	1.1152	1.7166
26	0.68543	0.00083131	0.029998	235.40	392.28	235.97	176.87	412.84	1.1246	1.7159
28	0.72688	0.00083665	0.028263	238.23	393.29	238.84	175.00	413.84	1.1341	1.7152

30	0.77020	0.00084213	0.026642	241.07	394.30	241.72	173.10	414.82	1.1435	1.7145
32	0.81543	0.00084777	0.025126	243.93	395.29	244.62	171.16	415.78	1.1529	1.7138
34	0.86263	0.00085357	0.023708	246.80	396.27	247.54	169.18	416.72	1.1623	1.7131
36	0.91185	0.00085954	0.022380	249.69	397.24	250.48	167.17	417.65	1.1717	1.7124
38	0.96315	0.00086569	0.021135	252.60	398.19	253.43	165.12	418.55	1.1811	1.7118
40	1.0166	0.00087204	0.019966	255.52	399.13	256.41	163.02	419.43	1.1905	1.7111
42	1.0722	0.00087859	0.018868	258.46	400.05	259.41	160.87	420.28	1.1999	1.7103
44	1.1301	0.00088537	0.017837	261.42	400.96	262.43	158.68	421.11	1.2092	1.7096
48	1.2529	0.00089965	0.015951	267.41	402.71	268.53	154.16	422.69	1.2280	1.7081
52	1.3854	0.00091502	0.014276	273.47	404.37	274.74	149.41	424.15	1.2469	1.7064
56	1.5282	0.00093166	0.012782	279.64	405.94	281.06	144.41	425.47	1.2658	1.7045
60	1.6818	0.00094979	0.011444	285.91	407.38	287.50	139.13	426.63	1.2848	1.7024
70	2.1168	0.0010038	0.0086527	302.16	410.33	304.28	124.37	428.65	1.3332	1.6956
80	2.6332	0.0010773	0.0064483	319.55	411.83	322.39	106.42	428.81	1.3836	1.6850
90	3.2442	0.0011936	0.0046134	339.06	410.45	342.93	82.490	425.42	1.4390	1.6662
100	3.9724	0.0015357	0.0026809	367.20	397.03	373.30	34.380	407.68	1.5188	1.6109

Table A.2 Saturation Properties of Refrigerant R-134a: Pressure Increments

		Specific Volume, m^3/kg		Internal Energy, kJ/kg		Enthalpy, kJ/kg			Entropy, kJ/kg·K	
Press., MPa	Temp., T_{sat}, °C	Sat. Liquid, v_f	Sat. Vapor, v_g	Sat. Liquid, u_f	Sat. Vapor, u_g	Sat. Liquid, h_f	Evap., h_{fg}	Sat. Vapor, h_g	Sat. Liquid, s_f	Sat. Vapor, s_g
0.06	−36.935	0.00070982	0.31123	151.96	357.27	152.00	223.94	375.94	0.81202	1.7601
0.08	−31.115	0.00071854	0.23755	159.31	360.61	159.37	220.25	379.62	0.84278	1.7528
0.1	−26.361	0.00072593	0.19256	165.37	363.34	165.44	217.16	382.60	0.86756	1.7475
0.12	−22.310	0.00073244	0.16214	170.56	365.67	170.65	214.47	385.12	0.88844	1.7435
0.14	−18.760	0.00073830	0.14015	175.14	367.70	175.24	212.08	387.32	0.90656	1.7402
0.16	−15.588	0.00074368	0.12349	179.25	369.51	179.37	209.90	389.27	0.92262	1.7376
0.18	−12.712	0.00074868	0.11042	183.00	371.15	183.13	207.89	391.02	0.93709	1.7353
0.2	−10.076	0.00075337	0.099877	186.45	372.64	186.60	206.02	392.62	0.95027	1.7334
0.24	−5.3653	0.00076202	0.083906	192.65	375.30	192.83	202.61	395.44	0.97364	1.7303
0.28	−1.2277	0.00076993	0.072360	198.14	377.62	198.35	199.54	397.89	0.99399	1.7278
0.32	2.4768	0.00077727	0.063611	203.09	379.69	203.34	196.70	400.04	1.0121	1.7257
0.36	5.8412	0.00078418	0.056744	207.61	381.54	207.90	194.07	401.97	1.0284	1.7240
0.4	8.9306	0.00079073	0.051207	211.79	383.24	212.11	191.61	403.72	1.0433	1.7226
0.5	15.735	0.00080595	0.041123	221.10	386.91	221.50	185.97	407.47	1.0759	1.7197
0.6	21.572	0.00081998	0.034300	229.19	389.99	229.68	180.89	410.57	1.1037	1.7175
0.7	26.713	0.00083320	0.029365	236.41	392.64	236.99	176.21	413.20	1.1280	1.7156
0.8	31.327	0.00084585	0.025625	242.97	394.96	243.65	171.81	415.46	1.1497	1.7140
0.9	35.526	0.00085811	0.022687	249.01	397.01	249.78	167.65	417.43	1.1695	1.7126
1	39.388	0.00087007	0.020316	254.63	398.85	255.50	163.66	419.16	1.1876	1.7113
1.2	46.315	0.00089351	0.016718	264.88	401.98	265.95	156.09	422.04	1.2201	1.7087
1.4	52.422	0.00091671	0.014110	274.12	404.54	275.40	148.90	424.30	1.2489	1.7062
1.6	57.906	0.00094010	0.012126	282.61	406.64	284.11	141.93	426.04	1.2748	1.7036
1.8	62.895	0.00096400	0.010562	290.52	408.35	292.26	135.10	427.36	1.2987	1.7007
2	67.481	0.00098877	0.0092915	297.98	409.70	299.95	128.33	428.28	1.3209	1.6976
2.5	77.577	0.0010569	0.0069403	315.20	411.65	317.84	111.17	429.01	1.3711	1.6881
3	86.203	0.0011413	0.0052813	331.28	411.49	334.70	92.640	427.34	1.4171	1.6748

Table A.3 Superheated Vapor

Table A.3A $P = 0.06$ MPa ($T_{sat} = -36.935°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.311230	357.27	375.94	1.7601
−20	0.336080	368.74	388.91	1.8131
−10	0.350490	375.70	396.73	1.8434
0	0.364760	382.80	404.69	1.8730
10	0.378930	390.07	412.81	1.9022
20	0.39303	397.50	421.08	1.9310
30	0.40705	405.10	429.52	1.9593
40	0.42102	412.86	438.12	1.9872
50	0.43495	420.79	446.88	2.0147
60	0.44884	428.88	455.81	2.0419
70	0.46269	437.14	464.90	2.0688
80	0.47652	445.56	474.15	2.0954
90	0.49032	454.14	483.56	2.1217

Table A.3B $P = 0.10$ MPa ($T_{sat} = -26.361°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.192560	363.34	382.60	1.7475
−20	0.198410	367.81	387.65	1.7677
−10	0.207430	374.89	395.64	1.7986
0	0.216300	382.10	403.73	1.8288
10	0.225060	389.45	411.95	1.8584
20	0.23373	396.94	420.31	1.8874
30	0.24233	404.59	428.82	1.9160
40	0.25088	412.40	437.49	1.9441
50	0.25938	420.37	446.30	1.9718
60	0.26784	428.49	455.28	1.9991
70	0.27626	436.78	464.41	2.0261
80	0.28466	445.23	473.70	2.0528
90	0.29303	453.84	483.14	2.0792

Table A.3C $P = 0.14$ MPa ($T_{sat} = -18.760°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.140150	367.70	387.32	1.7402
−10	0.146060	374.05	394.50	1.7680
0	0.152630	381.37	402.74	1.7987
10	0.159080	388.81	411.08	1.8287
20	0.165440	396.37	419.53	1.8580
30	0.17172	404.08	428.12	1.8868
40	0.17795	411.93	436.84	1.9151
50	0.18412	419.94	445.72	1.9430
60	0.19025	428.10	454.74	1.9705
70	0.19635	436.42	463.91	1.9977
80	0.20243	444.90	473.24	2.0244
90	0.20847	453.53	482.72	2.0509
100	0.21450	462.32	492.35	2.0771

Table A.3D $P = 0.18$ MPa ($T_{sat} = -12.712$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.110420	371.15	391.02	1.7353
−10	0.111900	373.17	393.31	1.7441
0	0.117220	380.62	401.72	1.7754
10	0.122400	388.15	410.18	1.8059
20	0.127480	395.79	418.73	1.8355
30	0.13248	403.55	427.40	1.8646
40	0.13742	411.46	436.19	1.8931
50	0.14230	419.51	445.13	1.9212
60	0.14715	427.71	454.20	1.9489
70	0.15196	436.06	463.41	1.9761
80	0.15674	444.56	472.78	2.0030
90	0.16149	453.22	482.29	2.0296
100	0.16622	462.03	491.95	2.0558

Table A.3E $P = 0.20$ MPa ($T_{sat} = -10.076$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.099877	372.64	392.62	1.7334
−10	0.099915	372.70	392.68	1.7337
0	0.104810	380.23	401.20	1.7654
10	0.109550	387.82	409.73	1.7961
20	0.114190	395.49	418.33	1.8259
30	0.11874	403.29	427.04	1.8551
40	0.12323	411.22	435.87	1.8838
50	0.12766	419.29	444.83	1.9120
60	0.13206	427.51	453.92	1.9397
70	0.13642	435.88	463.16	1.9670
80	0.14074	444.39	472.54	1.9939
90	0.14505	453.06	482.07	2.0206
100	0.14933	461.88	491.75	2.0468

Table A.3F $P = 0.24$ MPa ($T_{sat} = -5.3653$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.083906	375.30	395.44	1.7303
0	0.086170	379.43	400.11	1.7475
10	0.090262	387.13	408.79	1.7787
20	0.094233	394.89	417.51	1.8090
30	0.098118	402.75	426.30	1.8385
40	0.10193	410.74	435.20	1.8674
50	0.10570	418.86	444.22	1.8957
60	0.10942	427.11	453.37	1.9236
70	0.11310	435.51	462.65	1.9511
80	0.11675	444.06	472.08	1.9781
90	0.12038	452.75	481.64	2.0048
100	0.12398	461.59	491.35	2.0312

Table A.3G $P = 0.28$ MPa ($T_{sat} = -1.2277°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.072360	377.62	397.89	1.7278
0	0.072819	378.59	398.98	1.7318
10	0.076460	386.42	407.83	1.7636
20	0.079966	394.27	416.67	1.7943
30	0.083378	402.21	425.55	1.8241
40	0.086719	410.25	434.53	1.8532
50	0.090003	418.41	443.61	1.8818
60	0.093242	426.71	452.82	1.9098
70	0.096443	435.14	462.14	1.9374
80	0.099612	443.71	471.61	1.9646
90	0.10275	452.43	481.20	1.9914
100	0.10587	461.30	490.94	2.0178
110	0.10897	470.31	500.82	2.0440
120	0.11206	479.47	510.85	2.0698

Table A.3H $P = 0.32$ MPa ($T_{sat} = 2.4768°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.063611	379.69	400.04	1.7257
10	0.066088	385.69	406.83	1.7501
20	0.069252	393.64	415.80	1.7812
30	0.072313	401.65	424.79	1.8113
40	0.075299	409.75	433.85	1.8407
50	0.078226	417.96	443.00	1.8695
60	0.081106	426.30	452.25	1.8977
70	0.083947	434.77	461.63	1.9254
80	0.086755	443.37	471.13	1.9527
90	0.089536	452.11	480.77	1.9796
100	0.092293	461.00	490.54	2.0062
110	0.095030	470.03	500.44	2.0324
120	0.097749	479.21	510.49	2.0583

Table A.3I $P = 0.40$ MPa ($T_{sat} = 8.9306°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.051207	383.24	403.72	1.7226
10	0.051506	384.12	404.72	1.7261
20	0.054214	392.32	414.01	1.7584
30	0.056797	400.50	423.22	1.7893
40	0.059293	408.73	432.45	1.8192
50	0.061724	417.05	441.74	1.8484
60	0.064104	425.47	451.11	1.8770
70	0.066443	434.01	460.58	1.9050
80	0.068748	442.67	470.17	1.9325
90	0.071023	451.47	479.88	1.9597
100	0.073275	460.41	489.72	1.9864
110	0.075505	469.48	499.68	2.0127
120	0.077717	478.69	509.78	2.0387
130	0.079914	488.05	520.02	2.0645
140	0.082097	497.55	530.39	2.0899

Table A.3J $P = 0.50$ MPa ($T_{sat} = 15.735$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.041123	386.91	407.47	1.7197
20	0.042116	390.55	411.61	1.7339
30	0.044338	398.99	421.16	1.7659
40	0.046456	407.40	430.63	1.7967
50	0.048499	415.86	440.11	1.8265
60	0.050486	424.40	449.64	1.8555
70	0.052427	433.04	459.25	1.8839
80	0.054331	441.78	468.95	1.9118
90	0.056205	450.65	478.76	1.9392
100	0.058054	459.65	488.68	1.9661
110	0.059880	468.78	498.72	1.9927
120	0.061688	478.04	508.88	2.0189
130	0.063479	487.44	519.18	2.0447
140	0.065257	496.98	529.60	2.0703

Table A.3K $P = 0.60$ MPa ($T_{sat} = 21.572$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.034300	389.99	410.57	1.7175
30	0.035984	397.37	418.96	1.7455
40	0.037865	406.01	428.73	1.7772
50	0.039659	414.63	438.43	1.8077
60	0.041389	423.30	448.13	1.8373
70	0.043070	432.04	457.88	1.8661
80	0.044710	440.87	467.70	1.8943
90	0.046319	449.82	477.61	1.9220
100	0.047900	458.88	487.62	1.9492
110	0.049459	468.06	497.74	1.9759
120	0.050998	477.37	507.97	2.0023
130	0.052520	486.82	518.33	2.0283
140	0.054027	496.39	528.81	2.0540
150	0.055522	506.11	539.42	2.0794
160	0.057006	515.96	550.16	2.1045

Table A.3L $P = 0.70$ MPa ($T_{sat} = 26.713$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.029365	392.64	413.20	1.7156
30	0.029966	395.62	416.60	1.7269
40	0.031696	404.53	426.72	1.7598
50	0.033322	413.35	436.67	1.7910
60	0.034875	422.16	446.57	1.8212
70	0.036374	431.01	456.47	1.8505
80	0.037829	439.94	466.42	1.8791
90	0.039250	448.97	476.44	1.9070
100	0.040642	458.09	486.54	1.9345
110	0.042010	467.34	496.74	1.9615
120	0.043358	476.70	507.05	1.9880
130	0.044689	486.19	517.47	2.0142
140	0.046004	495.80	528.01	2.0400
150	0.047307	505.55	538.67	2.0655
160	0.048598	515.44	549.45	2.0907

Table A.3M $P = 0.80$ MPa ($T_{sat} = 31.327°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.025625	394.96	415.46	1.7140
40	0.027036	402.97	424.59	1.7436
50	0.028547	412.00	434.84	1.7758
60	0.029974	420.97	444.95	1.8067
70	0.031340	429.96	455.03	1.8365
80	0.032659	438.99	465.12	1.8654
90	0.033942	448.10	475.25	1.8937
100	0.035193	457.30	485.45	1.9214
110	0.036420	466.60	495.74	1.9486
120	0.037626	476.02	506.12	1.9754
130	0.038813	485.55	516.60	2.0017
140	0.039985	495.21	527.20	2.0277
150	0.041144	504.99	537.91	2.0533
160	0.042291	514.91	548.74	2.0786
170	0.043427	524.96	559.7	2.1036
180	0.044554	535.14	570.78	2.1283

Table A.3N $P = 0.90$ MPa ($T_{sat} = 35.526°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.022687	397.01	417.43	1.7126
40	0.023375	401.28	422.32	1.7283
50	0.024810	410.59	432.92	1.7616
60	0.026146	419.75	443.28	1.7932
70	0.027414	428.87	453.54	1.8236
80	0.028630	438.01	463.78	1.8530
90	0.029807	447.21	474.03	1.8816
100	0.030951	456.48	484.34	1.9096
110	0.032069	465.85	494.71	1.9370
120	0.033164	475.32	505.17	1.9640
130	0.034241	484.91	515.72	1.9905
140	0.035302	494.61	526.38	2.0166
150	0.036349	504.43	537.14	2.0423
160	0.037384	514.38	548.02	2.0678
170	0.038408	524.46	559.02	2.0929
180	0.039423	534.67	570.15	2.1177

Table A.3O $P = 1.00$ MPa ($T_{sat} = 39.388°C$)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.020316	398.85	419.16	1.7113
40	0.020407	399.45	419.86	1.7135
50	0.021796	409.09	430.88	1.7482
60	0.023068	418.46	441.53	1.7806
70	0.024262	427.74	452.00	1.8116
80	0.025399	437.00	462.40	1.8414
90	0.026493	446.30	472.79	1.8705
100	0.027552	455.65	483.21	1.8988
110	0.028584	465.09	493.67	1.9264
120	0.029593	474.62	504.21	1.9536
130	0.030582	484.25	514.83	1.9803
140	0.031554	494.00	525.55	2.0065
150	0.032512	503.86	536.37	2.0324
160	0.033458	513.84	547.30	2.0579
170	0.034392	523.95	558.35	2.0831
180	0.035318	534.19	569.51	2.1080

Table A.3P $P = 1.20$ MPa ($T_{sat} = 46.315$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.016718	401.98	422.04	1.7087
50	0.017201	405.77	426.41	1.7223
60	0.018404	415.70	437.79	1.7570
70	0.019502	425.36	448.76	1.7895
80	0.020530	434.90	459.53	1.8204
90	0.021506	444.41	470.22	1.8502
100	0.022443	453.94	480.87	1.8792
110	0.023348	463.53	491.54	1.9074
120	0.024228	473.18	502.25	1.9350
130	0.025087	482.92	513.03	1.9621
140	0.025928	492.76	523.87	1.9886
150	0.026753	502.70	534.81	2.0148
160	0.027566	512.76	545.84	2.0405
170	0.028367	522.93	556.97	2.0660
180	0.029159	533.23	568.22	2.0911

Table A.3Q $P = 1.40$ MPa ($T_{sat} = 52.422$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.014110	404.54	424.30	1.7062
60	0.015005	412.61	433.62	1.7345
70	0.016060	422.77	445.25	1.7689
80	0.017023	432.65	456.48	1.8012
90	0.017923	442.42	467.52	1.8320
100	0.018778	452.16	478.45	1.8617
110	0.019597	461.90	489.34	1.8905
120	0.020388	471.70	500.24	1.9186
130	0.021156	481.55	511.17	1.9460
140	0.021904	491.49	522.16	1.9730
150	0.022636	501.52	533.21	1.9994
160	0.023355	511.65	544.35	2.0254
170	0.024061	521.89	555.58	2.0510
180	0.024758	532.25	566.91	2.0763

Table A.3R $P = 1.60$ MPa ($T_{sat} = 57.906$°C)

T, °C	v, m³/kg	u, kJ/kg	h, kJ/kg	s, kJ/kg·K
Sat.	0.012126	406.64	426.04	1.7036
60	0.012373	409.04	428.84	1.7120
70	0.013430	419.91	441.40	1.7491
80	0.014362	430.24	453.22	1.7831
90	0.015216	440.32	464.66	1.8150
100	0.016015	450.29	475.91	1.8456
110	0.016773	460.22	487.06	1.8751
120	0.017500	470.16	498.16	1.9037
130	0.018201	480.15	509.27	1.9316
140	0.018882	490.19	520.40	1.9589
150	0.019546	500.32	531.59	1.9856
160	0.020194	510.53	542.84	2.0119
170	0.020830	520.84	554.17	2.0378
180	0.021456	531.26	565.59	2.0632