



# Forane<sup>®</sup> 134a

## Thermodynamic Properties (Saturation) - ENG

This data was generated using the NIST REFPROP Database

(Lemmon, E.W., Huber, M.L., McLinden, M.O. NIST Standard Reference Database 23: Reference Fluid Thermodynamic and Transport Properties-REFPROP, Version 9.0, National Institute of Standards and Technology, Standard Reference Data Program, Gaithersburg, 2010)



**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
-150	0.072	0.01010	452.12	98.97	0.00221	31.86	144.64	0.10224	0.46645	-150
-149	0.076	0.01011	427.05	98.88	0.00234	32.14	144.78	0.10315	0.46572	-149
-148	0.081	0.01012	403.55	98.79	0.00248	32.42	144.92	0.10406	0.46501	-148
-147	0.086	0.01013	381.52	98.69	0.00262	32.71	145.06	0.10497	0.46430	-147
-146	0.091	0.01014	360.84	98.60	0.00277	32.99	145.20	0.10587	0.46360	-146
-145	0.097	0.01015	341.44	98.51	0.00293	33.27	145.34	0.10677	0.46291	-145
-144	0.103	0.01016	323.21	98.42	0.00309	33.55	145.48	0.10767	0.46223	-144
-143	0.109	0.01017	306.09	98.33	0.00327	33.84	145.62	0.10857	0.46155	-143
-142	0.115	0.01018	290.00	98.24	0.00345	34.12	145.76	0.10946	0.46088	-142
-141	0.122	0.01019	274.87	98.14	0.00364	34.40	145.90	0.11035	0.46022	-141
-140	0.129	0.01020	260.63	98.05	0.00384	34.69	146.04	0.11124	0.45957	-140
-139	0.136	0.01021	247.24	97.96	0.00404	34.97	146.18	0.11213	0.45892	-139
-138	0.144	0.01022	234.62	97.87	0.00426	35.25	146.32	0.11301	0.45829	-138
-137	0.152	0.01023	222.74	97.77	0.00449	35.54	146.46	0.11389	0.45766	-137
-136	0.161	0.01024	211.54	97.68	0.00473	35.82	146.60	0.11477	0.45703	-136
-135	0.170	0.01025	200.99	97.59	0.00498	36.11	146.75	0.11564	0.45642	-135
-134	0.179	0.01026	191.03	97.50	0.00523	36.39	146.89	0.11651	0.45581	-134
-133	0.189	0.01027	181.64	97.41	0.00551	36.67	147.03	0.11739	0.45521	-133
-132	0.199	0.01028	172.78	97.31	0.00579	36.96	147.17	0.11825	0.45461	-132
-131	0.210	0.01029	164.41	97.22	0.00608	37.24	147.32	0.11912	0.45403	-131
-130	0.221	0.01030	156.50	97.13	0.00639	37.53	147.46	0.11998	0.45345	-130
-129	0.233	0.01031	149.02	97.04	0.00671	37.81	147.60	0.12084	0.45287	-129
-128	0.245	0.01032	141.96	96.94	0.00704	38.09	147.75	0.12170	0.45231	-128
-127	0.258	0.01033	135.28	96.85	0.00739	38.38	147.89	0.12256	0.45174	-127
-126	0.271	0.01034	128.96	96.76	0.00775	38.66	148.03	0.12341	0.45119	-126
-125	0.285	0.01035	122.98	96.67	0.00813	38.95	148.18	0.12426	0.45064	-125
-124	0.300	0.01036	117.31	96.57	0.00852	39.23	148.32	0.12511	0.45010	-124
-123	0.315	0.01037	111.95	96.48	0.00893	39.52	148.47	0.12596	0.44957	-123
-122	0.331	0.01038	106.87	96.39	0.00936	39.80	148.61	0.12681	0.44904	-122
-121	0.348	0.01039	102.05	96.29	0.00980	40.09	148.76	0.12765	0.44852	-121
-120	0.365	0.01040	97.48	96.20	0.01026	40.37	148.90	0.12849	0.44800	-120
-119	0.383	0.01041	93.15	96.11	0.01074	40.66	149.05	0.12933	0.44749	-119
-118	0.402	0.01042	89.04	96.01	0.01123	40.94	149.19	0.13017	0.44699	-118
-117	0.422	0.01043	85.14	95.92	0.01175	41.23	149.34	0.13100	0.44649	-117
-116	0.442	0.01044	81.43	95.83	0.01228	41.52	149.48	0.13183	0.44599	-116
-115	0.463	0.01045	77.91	95.73	0.01284	41.80	149.63	0.13266	0.44551	-115
-114	0.486	0.01046	74.57	95.64	0.01341	42.09	149.78	0.13349	0.44503	-114
-113	0.509	0.01047	71.39	95.55	0.01401	42.37	149.92	0.13432	0.44455	-113
-112	0.533	0.01048	68.37	95.45	0.01463	42.66	150.07	0.13514	0.44408	-112
-111	0.557	0.01049	65.50	95.36	0.01527	42.95	150.22	0.13597	0.44362	-111
-110	0.583	0.01050	62.76	95.27	0.01593	43.23	150.36	0.13679	0.44316	-110
-109	0.610	0.01051	60.16	95.17	0.01662	43.52	150.51	0.13761	0.44271	-109
-108	0.638	0.01052	57.69	95.08	0.01734	43.81	150.66	0.13842	0.44226	-108
-107	0.667	0.01053	55.33	94.99	0.01808	44.09	150.80	0.13924	0.44182	-107
-106	0.697	0.01054	53.08	94.89	0.01884	44.38	150.95	0.14005	0.44138	-106
-105	0.728	0.01055	50.94	94.80	0.01963	44.67	151.10	0.14086	0.44095	-105
-104	0.761	0.01056	48.90	94.70	0.02045	44.96	151.25	0.14167	0.44052	-104
-103	0.794	0.01057	46.95	94.61	0.02130	45.24	151.40	0.14248	0.44010	-103
-102	0.829	0.01058	45.10	94.52	0.02217	45.53	151.54	0.14328	0.43968	-102
-101	0.865	0.01059	43.33	94.42	0.02308	45.82	151.69	0.14409	0.43927	-101
-100	0.903	0.01060	41.64	94.33	0.02402	46.11	151.84	0.14489	0.43886	-100
-99	0.942	0.01061	40.03	94.23	0.02499	46.40	151.99	0.14569	0.43846	-99
-98	0.982	0.01062	38.49	94.14	0.02598	46.68	152.14	0.14649	0.43806	-98

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
-97	1.024	0.01063	37.01	94.04	0.02702	46.97	152.29	0.14728	0.43767	-97
-96	1.067	0.01064	35.61	93.95	0.02808	47.26	152.44	0.14808	0.43728	-96
-95	1.111	0.01066	34.27	93.85	0.02918	47.55	152.58	0.14887	0.43690	-95
-94	1.158	0.01067	32.98	93.76	0.03032	47.84	152.73	0.14966	0.43652	-94
-93	1.205	0.01068	31.75	93.66	0.03149	48.13	152.88	0.15045	0.43615	-93
-92	1.255	0.01069	30.58	93.57	0.03270	48.42	153.03	0.15124	0.43578	-92
-91	1.306	0.01070	29.46	93.47	0.03395	48.71	153.18	0.15203	0.43541	-91
-90	1.359	0.01071	28.38	93.38	0.03524	49.00	153.33	0.15281	0.43505	-90
-89	1.413	0.01072	27.35	93.28	0.03656	49.29	153.48	0.15360	0.43469	-89
-88	1.470	0.01073	26.37	93.19	0.03793	49.58	153.63	0.15438	0.43434	-88
-87	1.528	0.01074	25.42	93.09	0.03934	49.87	153.78	0.15516	0.43400	-87
-86	1.588	0.01075	24.52	93.00	0.04079	50.16	153.93	0.15593	0.43365	-86
-85	1.651	0.01076	23.65	92.90	0.04228	50.45	154.08	0.15671	0.43331	-85
-84	1.715	0.01078	22.82	92.81	0.04382	50.74	154.23	0.15749	0.43298	-84
-83	1.781	0.01079	22.02	92.71	0.04540	51.03	154.38	0.15826	0.43265	-83
-82	1.849	0.01080	21.26	92.62	0.04704	51.32	154.53	0.15903	0.43232	-82
-81	1.920	0.01081	20.53	92.52	0.04871	51.61	154.68	0.15980	0.43200	-81
-80	1.993	0.01082	19.83	92.42	0.05044	51.90	154.84	0.16057	0.43168	-80
-79	2.068	0.01083	19.15	92.33	0.05222	52.20	154.99	0.16134	0.43136	-79
-78	2.145	0.01084	18.50	92.23	0.05405	52.49	155.14	0.16210	0.43105	-78
-77	2.225	0.01085	17.88	92.14	0.05592	52.78	155.29	0.16287	0.43074	-77
-76	2.307	0.01087	17.28	92.04	0.05786	53.07	155.44	0.16363	0.43044	-76
-75	2.392	0.01088	16.71	91.94	0.05984	53.37	155.59	0.16439	0.43014	-75
-74	2.479	0.01089	16.16	91.85	0.06188	53.66	155.74	0.16515	0.42984	-74
-73	2.569	0.01090	15.63	91.75	0.06398	53.95	155.89	0.16591	0.42955	-73
-72	2.661	0.01091	15.12	91.65	0.06613	54.24	156.04	0.16666	0.42926	-72
-71	2.757	0.01092	14.63	91.56	0.06835	54.54	156.20	0.16742	0.42897	-71
-70	2.855	0.01093	14.16	91.46	0.07062	54.83	156.35	0.16817	0.42869	-70
-69	2.955	0.01095	13.71	91.36	0.07295	55.12	156.50	0.16892	0.42841	-69
-68	3.059	0.01096	13.27	91.27	0.07535	55.42	156.65	0.16967	0.42814	-68
-67	3.166	0.01097	12.85	91.17	0.07781	55.71	156.80	0.17042	0.42787	-67
-66	3.276	0.01098	12.45	91.07	0.08033	56.01	156.95	0.17117	0.42760	-66
-65	3.389	0.01099	12.06	90.97	0.08292	56.30	157.11	0.17192	0.42733	-65
-64	3.505	0.01100	11.69	90.88	0.08557	56.60	157.26	0.17266	0.42707	-64
-63	3.624	0.01102	11.33	90.78	0.08830	56.89	157.41	0.17341	0.42681	-63
-62	3.747	0.01103	10.98	90.68	0.09109	57.19	157.56	0.17415	0.42656	-62
-61	3.873	0.01104	10.64	90.58	0.09395	57.48	157.71	0.17489	0.42631	-61
-60	4.002	0.01105	10.32	90.49	0.09689	57.78	157.86	0.17563	0.42606	-60
-59	4.135	0.01106	10.01	90.39	0.09990	58.07	158.02	0.17637	0.42581	-59
-58	4.271	0.01108	9.710	90.29	0.10298	58.37	158.17	0.17711	0.42557	-58
-57	4.412	0.01109	9.421	90.19	0.10614	58.66	158.32	0.17784	0.42533	-57
-56	4.556	0.01110	9.142	90.09	0.10938	58.96	158.47	0.17858	0.42509	-56
-55	4.703	0.01111	8.873	90.00	0.11270	59.26	158.62	0.17931	0.42486	-55
-54	4.855	0.01112	8.614	89.90	0.11609	59.55	158.78	0.18004	0.42463	-54
-53	5.010	0.01114	8.363	89.80	0.11957	59.85	158.93	0.18077	0.42440	-53
-52	5.170	0.01115	8.121	89.70	0.12313	60.15	159.08	0.18150	0.42417	-52
-51	5.334	0.01116	7.888	89.60	0.12678	60.45	159.23	0.18223	0.42395	-51
-50	5.501	0.01117	7.662	89.50	0.13051	60.74	159.38	0.18296	0.42373	-50
-49	5.674	0.01119	7.444	89.40	0.13433	61.04	159.53	0.18368	0.42352	-49
-48	5.850	0.01120	7.234	89.30	0.13824	61.34	159.69	0.18441	0.42330	-48
-47	6.031	0.01121	7.030	89.20	0.14224	61.64	159.84	0.18513	0.42309	-47
-46	6.216	0.01122	6.834	89.10	0.14633	61.94	159.99	0.18585	0.42288	-46
-45	6.406	0.01124	6.644	89.00	0.15052	62.24	160.14	0.18657	0.42268	-45

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
-44	6.601	0.01125	6.460	88.91	0.15480	62.54	160.29	0.18729	0.42247	-44
-43	6.800	0.01126	6.283	88.81	0.15917	62.83	160.45	0.18801	0.42227	-43
-42	7.004	0.01127	6.111	88.71	0.16365	63.13	160.60	0.18873	0.42208	-42
-41	7.213	0.01129	5.945	88.61	0.16822	63.43	160.75	0.18944	0.42188	-41
-40	7.427	0.01130	5.784	88.50	0.17289	63.73	160.90	0.19016	0.42169	-40
-39	7.646	0.01131	5.628	88.40	0.17767	64.03	161.05	0.19087	0.42150	-39
-38	7.871	0.01133	5.478	88.30	0.18256	64.33	161.20	0.19158	0.42131	-38
-37	8.100	0.01134	5.332	88.20	0.18754	64.63	161.35	0.19229	0.42112	-37
-36	8.335	0.01135	5.191	88.10	0.19264	64.94	161.51	0.19300	0.42094	-36
-35	8.576	0.01136	5.054	88.00	0.19785	65.24	161.66	0.19371	0.42076	-35
-34	8.822	0.01138	4.922	87.90	0.20317	65.54	161.81	0.19442	0.42058	-34
-33	9.073	0.01139	4.794	87.80	0.20860	65.84	161.96	0.19513	0.42040	-33
-32	9.330	0.01140	4.670	87.70	0.21414	66.14	162.11	0.19583	0.42023	-32
-31	9.593	0.01142	4.550	87.60	0.21980	66.44	162.26	0.19654	0.42006	-31
-30	9.862	0.01143	4.433	87.49	0.22558	66.75	162.41	0.19724	0.41989	-30
-29	10.14	0.01144	4.320	87.39	0.23148	67.05	162.56	0.19794	0.41972	-29
-28	10.42	0.01146	4.210	87.29	0.23751	67.35	162.71	0.19864	0.41956	-28
-27	10.71	0.01147	4.104	87.19	0.24365	67.66	162.86	0.19934	0.41939	-27
-26	11.00	0.01148	4.001	87.09	0.24992	67.96	163.02	0.20004	0.41923	-26
-25	11.30	0.01150	3.901	86.98	0.25632	68.26	163.17	0.20074	0.41907	-25
-24	11.61	0.01151	3.805	86.88	0.26285	68.57	163.32	0.20144	0.41892	-24
-23	11.92	0.01152	3.711	86.78	0.26951	68.87	163.47	0.20213	0.41876	-23
-22	12.24	0.01154	3.619	86.68	0.27630	69.17	163.62	0.20283	0.41861	-22
-21	12.56	0.01155	3.531	86.57	0.28322	69.48	163.77	0.20352	0.41846	-21
-20	12.90	0.01157	3.445	86.47	0.29029	69.78	163.92	0.20421	0.41831	-20
-19	13.24	0.01158	3.362	86.37	0.29749	70.09	164.07	0.20490	0.41817	-19
-18	13.59	0.01159	3.281	86.26	0.30483	70.40	164.22	0.20560	0.41802	-18
-17	13.94	0.01161	3.202	86.16	0.31232	70.70	164.37	0.20629	0.41788	-17
-16	14.30	0.01162	3.126	86.05	0.31995	71.01	164.52	0.20697	0.41774	-16
-15	14.67	0.01164	3.051	85.95	0.32772	71.31	164.67	0.20766	0.41760	-15
-14	15.05	0.01165	2.979	85.85	0.33565	71.62	164.81	0.20835	0.41746	-14
-13	15.43	0.01166	2.909	85.74	0.34372	71.93	164.96	0.20903	0.41733	-13
-12	15.82	0.01168	2.841	85.64	0.35195	72.23	165.11	0.20972	0.41719	-12
-11	16.22	0.01169	2.775	85.53	0.36034	72.54	165.26	0.21040	0.41706	-11
-10	16.63	0.01171	2.711	85.43	0.36888	72.85	165.41	0.21109	0.41693	-10
-9	17.05	0.01172	2.649	85.32	0.37758	73.16	165.56	0.21177	0.41680	-9
-8	17.47	0.01174	2.588	85.22	0.38644	73.46	165.71	0.21245	0.41668	-8
-7	17.90	0.01175	2.529	85.11	0.39546	73.77	165.86	0.21313	0.41655	-7
-6	18.35	0.01176	2.471	85.01	0.40465	74.08	166.00	0.21381	0.41643	-6
-5	18.79	0.01178	2.415	84.90	0.41401	74.39	166.15	0.21449	0.41631	-5
-4	19.25	0.01179	2.361	84.79	0.42354	74.70	166.30	0.21516	0.41619	-4
-3	19.72	0.01181	2.308	84.69	0.43324	75.01	166.45	0.21584	0.41607	-3
-2	20.19	0.01182	2.257	84.58	0.44312	75.32	166.59	0.21652	0.41595	-2
-1	20.68	0.01184	2.207	84.47	0.45317	75.63	166.74	0.21719	0.41584	-1
0	21.17	0.01185	2.158	84.37	0.46341	75.94	166.89	0.21786	0.41572	0
1	21.67	0.01187	2.111	84.26	0.47382	76.25	167.04	0.21854	0.41561	1
2	22.19	0.01188	2.064	84.15	0.48442	76.56	167.18	0.21921	0.41550	2
3	22.71	0.01190	2.019	84.05	0.49520	76.87	167.33	0.21988	0.41539	3
4	23.24	0.01191	1.976	83.94	0.50618	77.19	167.48	0.22055	0.41528	4
5	23.78	0.01193	1.933	83.83	0.51734	77.50	167.62	0.22122	0.41518	5
6	24.33	0.01194	1.891	83.72	0.52870	77.81	167.77	0.22189	0.41507	6
7	24.89	0.01196	1.851	83.61	0.54025	78.12	167.91	0.22256	0.41497	7
8	25.46	0.01198	1.812	83.51	0.55201	78.44	168.06	0.22322	0.41487	8

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
9	26.04	0.01199	1.773	83.40	0.56396	78.75	168.20	0.22389	0.41476	9
10	26.63	0.01201	1.736	83.29	0.57612	79.06	168.35	0.22456	0.41467	10
11	27.23	0.01202	1.699	83.18	0.58849	79.38	168.49	0.22522	0.41457	11
12	27.84	0.01204	1.664	83.07	0.60106	79.69	168.64	0.22588	0.41447	12
13	28.46	0.01205	1.629	82.96	0.61385	80.00	168.78	0.22655	0.41437	13
14	29.10	0.01207	1.595	82.85	0.62685	80.32	168.93	0.22721	0.41428	14
15	29.74	0.01209	1.562	82.74	0.64007	80.63	169.07	0.22787	0.41419	15
16	30.39	0.01210	1.530	82.63	0.65350	80.95	169.22	0.22853	0.41410	16
17	31.06	0.01212	1.499	82.52	0.66716	81.27	169.36	0.22919	0.41401	17
18	31.74	0.01214	1.468	82.41	0.68105	81.58	169.50	0.22985	0.41392	18
19	32.42	0.01215	1.439	82.30	0.69516	81.90	169.65	0.23051	0.41383	19
20	33.12	0.01217	1.409	82.19	0.70951	82.21	169.79	0.23117	0.41374	20
21	33.84	0.01218	1.381	82.07	0.72408	82.53	169.93	0.23182	0.41366	21
22	34.56	0.01220	1.353	81.96	0.73890	82.85	170.07	0.23248	0.41357	22
23	35.29	0.01222	1.326	81.85	0.75395	83.17	170.22	0.23314	0.41349	23
24	36.04	0.01223	1.300	81.74	0.76925	83.49	170.36	0.23379	0.41341	24
25	36.80	0.01225	1.274	81.63	0.78479	83.80	170.50	0.23445	0.41332	25
26	37.57	0.01227	1.249	81.51	0.80058	84.12	170.64	0.23510	0.41324	26
27	38.36	0.01229	1.225	81.40	0.81663	84.44	170.78	0.23575	0.41316	27
28	39.15	0.01230	1.201	81.29	0.83292	84.76	170.92	0.23640	0.41309	28
29	39.96	0.01232	1.177	81.17	0.84948	85.08	171.06	0.23706	0.41301	29
30	40.78	0.01234	1.154	81.06	0.86629	85.40	171.20	0.23771	0.41293	30
31	41.62	0.01235	1.132	80.95	0.88338	85.72	171.34	0.23836	0.41286	31
32	42.47	0.01237	1.110	80.83	0.90072	86.04	171.48	0.23901	0.41278	32
33	43.33	0.01239	1.089	80.72	0.91834	86.36	171.62	0.23965	0.41271	33
34	44.20	0.01241	1.068	80.60	0.93623	86.69	171.76	0.24030	0.41264	34
35	45.09	0.01243	1.048	80.49	0.95441	87.01	171.90	0.24095	0.41257	35
36	45.99	0.01244	1.028	80.37	0.97286	87.33	172.04	0.24160	0.41250	36
37	46.91	0.01246	1.009	80.25	0.99159	87.65	172.18	0.24224	0.41243	37
38	47.84	0.01248	0.990	80.14	1.0106	87.98	172.31	0.24289	0.41236	38
39	48.78	0.01250	0.971	80.02	1.0299	88.30	172.45	0.24353	0.41229	39
40	49.74	0.01252	0.953	79.90	1.0495	88.62	172.59	0.24418	0.41222	40
41	50.71	0.01253	0.935	79.79	1.0694	88.95	172.73	0.24482	0.41216	41
42	51.70	0.01255	0.918	79.67	1.0897	89.27	172.86	0.24547	0.41209	42
43	52.70	0.01257	0.901	79.55	1.1102	89.60	173.00	0.24611	0.41203	43
44	53.72	0.01259	0.884	79.43	1.1310	89.92	173.13	0.24675	0.41196	44
45	54.75	0.01261	0.868	79.32	1.1521	90.25	173.27	0.24739	0.41190	45
46	55.80	0.01263	0.852	79.20	1.1736	90.57	173.41	0.24803	0.41184	46
47	56.86	0.01265	0.837	79.08	1.1954	90.90	173.54	0.24867	0.41178	47
48	57.93	0.01267	0.821	78.96	1.2175	91.23	173.67	0.24931	0.41171	48
49	59.03	0.01268	0.807	78.84	1.2399	91.56	173.81	0.24995	0.41165	49
50	60.13	0.01270	0.792	78.72	1.2627	91.88	173.94	0.25059	0.41159	50
51	61.26	0.01272	0.778	78.60	1.2858	92.21	174.08	0.25123	0.41154	51
52	62.40	0.01274	0.764	78.48	1.3092	92.54	174.21	0.25187	0.41148	52
53	63.55	0.01276	0.750	78.36	1.3330	92.87	174.34	0.25250	0.41142	53
54	64.73	0.01278	0.737	78.24	1.3571	93.20	174.47	0.25314	0.41136	54
55	65.91	0.01280	0.724	78.11	1.3816	93.53	174.60	0.25378	0.41131	55
56	67.12	0.01282	0.711	77.99	1.4065	93.86	174.74	0.25441	0.41125	56
57	68.34	0.01284	0.698	77.87	1.4317	94.19	174.87	0.25505	0.41120	57
58	69.58	0.01286	0.686	77.75	1.4572	94.52	175.00	0.25568	0.41114	58
59	70.83	0.01288	0.674	77.62	1.4832	94.85	175.13	0.25632	0.41109	59
60	72.11	0.01290	0.662	77.50	1.5095	95.19	175.26	0.25695	0.41103	60
61	73.40	0.01292	0.651	77.38	1.5362	95.52	175.39	0.25759	0.41098	61

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
62	74.70	0.01295	0.640	77.25	1.5633	95.85	175.51	0.25822	0.41093	62
63	76.03	0.01297	0.629	77.13	1.5908	96.18	175.64	0.25885	0.41088	63
64	77.37	0.01299	0.618	77.00	1.6187	96.52	175.77	0.25948	0.41082	64
65	78.73	0.01301	0.607	76.88	1.6470	96.85	175.90	0.26011	0.41077	65
66	80.11	0.01303	0.597	76.75	1.6757	97.19	176.03	0.26075	0.41072	66
67	81.50	0.01305	0.587	76.62	1.7048	97.52	176.15	0.26138	0.41067	67
68	82.92	0.01307	0.577	76.50	1.7343	97.86	176.28	0.26201	0.41062	68
69	84.35	0.01310	0.567	76.37	1.7642	98.20	176.40	0.26264	0.41057	69
70	85.81	0.01312	0.557	76.24	1.7946	98.53	176.53	0.26327	0.41052	70
71	87.28	0.01314	0.548	76.11	1.8254	98.87	176.65	0.26390	0.41047	71
72	88.77	0.01316	0.539	75.98	1.8566	99.21	176.78	0.26453	0.41043	72
73	90.27	0.01318	0.530	75.85	1.8883	99.55	176.90	0.26516	0.41038	73
74	91.80	0.01321	0.521	75.72	1.9204	99.88	177.02	0.26578	0.41033	74
75	93.35	0.01323	0.512	75.59	1.9530	100.22	177.15	0.26641	0.41028	75
76	94.92	0.01325	0.504	75.46	1.9860	100.56	177.27	0.26704	0.41023	76
77	96.51	0.01327	0.495	75.33	2.0195	100.90	177.39	0.26767	0.41019	77
78	98.11	0.01330	0.487	75.20	2.0535	101.24	177.51	0.26829	0.41014	78
79	99.74	0.01332	0.479	75.07	2.0880	101.59	177.63	0.26892	0.41009	79
80	101.4	0.01335	0.471	74.94	2.1229	101.93	177.75	0.26955	0.41005	80
81	103.1	0.01337	0.463	74.80	2.1584	102.27	177.87	0.27017	0.41000	81
82	104.7	0.01339	0.456	74.67	2.1943	102.61	177.99	0.27080	0.40996	82
83	106.5	0.01342	0.448	74.54	2.2308	102.96	178.11	0.27143	0.40991	83
84	108.2	0.01344	0.441	74.40	2.2678	103.30	178.23	0.27205	0.40986	84
85	109.9	0.01347	0.434	74.27	2.3052	103.65	178.34	0.27268	0.40982	85
86	111.7	0.01349	0.427	74.13	2.3433	103.99	178.46	0.27330	0.40977	86
87	113.5	0.01351	0.420	74.00	2.3818	104.34	178.58	0.27393	0.40973	87
88	115.3	0.01354	0.413	73.86	2.4209	104.68	178.69	0.27455	0.40968	88
89	117.2	0.01357	0.406	73.72	2.4605	105.03	178.80	0.27518	0.40964	89
90	119.0	0.01359	0.400	73.58	2.5007	105.38	178.92	0.27580	0.40959	90
91	120.9	0.01362	0.393	73.44	2.5415	105.73	179.03	0.27643	0.40955	91
92	122.8	0.01364	0.387	73.31	2.5828	106.08	179.14	0.27705	0.40950	92
93	124.7	0.01367	0.381	73.17	2.6247	106.42	179.26	0.27767	0.40946	93
94	126.7	0.01369	0.375	73.03	2.6672	106.77	179.37	0.27830	0.40941	94
95	128.7	0.01372	0.369	72.89	2.7103	107.13	179.48	0.27892	0.40937	95
96	130.6	0.01375	0.363	72.74	2.7541	107.48	179.59	0.27955	0.40932	96
97	132.7	0.01377	0.357	72.60	2.7984	107.83	179.70	0.28017	0.40928	97
98	134.7	0.01380	0.352	72.46	2.8433	108.18	179.81	0.28079	0.40923	98
99	136.8	0.01383	0.346	72.32	2.8889	108.53	179.91	0.28142	0.40918	99
100	138.9	0.01386	0.341	72.17	2.9352	108.89	180.02	0.28204	0.40914	100
101	141.0	0.01388	0.335	72.03	2.9820	109.24	180.13	0.28266	0.40909	101
102	143.1	0.01391	0.330	71.88	3.0296	109.60	180.23	0.28328	0.40905	102
103	145.3	0.01394	0.325	71.74	3.0778	109.95	180.34	0.28391	0.40900	103
104	147.4	0.01397	0.320	71.59	3.1267	110.31	180.44	0.28453	0.40895	104
105	149.7	0.01400	0.315	71.44	3.1763	110.67	180.55	0.28515	0.40891	105
106	151.9	0.01403	0.310	71.29	3.2266	111.03	180.65	0.28578	0.40886	106
107	154.2	0.01406	0.305	71.14	3.2776	111.38	180.75	0.28640	0.40881	107
108	156.4	0.01409	0.300	71.00	3.3294	111.74	180.85	0.28702	0.40876	108
109	158.7	0.01412	0.296	70.84	3.3819	112.10	180.95	0.28765	0.40871	109
110	161.1	0.01415	0.291	70.69	3.4351	112.46	181.05	0.28827	0.40867	110
111	163.4	0.01418	0.287	70.54	3.4891	112.83	181.15	0.28889	0.40862	111
112	165.8	0.01421	0.282	70.39	3.5439	113.19	181.25	0.28952	0.40857	112
113	168.2	0.01424	0.278	70.24	3.5994	113.55	181.34	0.29014	0.40852	113
114	170.7	0.01427	0.274	70.08	3.6558	113.91	181.44	0.29076	0.40847	114

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
115	173.1	0.01430	0.269	69.93	3.7130	114.28	181.53	0.29139	0.40842	115
116	175.6	0.01433	0.265	69.77	3.7710	114.64	181.63	0.29201	0.40836	116
117	178.2	0.01437	0.261	69.61	3.8298	115.01	181.72	0.29263	0.40831	117
118	180.7	0.01440	0.257	69.46	3.8895	115.38	181.81	0.29326	0.40826	118
119	183.3	0.01443	0.253	69.30	3.9501	115.75	181.90	0.29388	0.40821	119
120	185.9	0.01446	0.249	69.14	4.0116	116.12	181.99	0.29451	0.40815	120
121	188.5	0.01450	0.245	68.98	4.0739	116.48	182.08	0.29513	0.40810	121
122	191.2	0.01453	0.242	68.82	4.1372	116.86	182.17	0.29576	0.40804	122
123	193.8	0.01457	0.238	68.65	4.2014	117.23	182.25	0.29638	0.40799	123
124	196.5	0.01460	0.234	68.49	4.2666	117.60	182.34	0.29701	0.40793	124
125	199.3	0.01464	0.231	68.33	4.3327	117.97	182.42	0.29764	0.40787	125
126	202.1	0.01467	0.227	68.16	4.3999	118.35	182.51	0.29826	0.40781	126
127	204.9	0.01471	0.224	67.99	4.4680	118.72	182.59	0.29889	0.40775	127
128	207.7	0.01474	0.220	67.83	4.5372	119.10	182.67	0.29952	0.40769	128
129	210.5	0.01478	0.217	67.66	4.6074	119.47	182.75	0.30014	0.40763	129
130	213.4	0.01482	0.214	67.49	4.6786	119.85	182.83	0.30077	0.40757	130
131	216.3	0.01486	0.210	67.32	4.7510	120.23	182.91	0.30140	0.40751	131
132	219.3	0.01489	0.207	67.15	4.8245	120.61	182.98	0.30203	0.40744	132
133	222.2	0.01493	0.204	66.97	4.8991	120.99	183.06	0.30266	0.40738	133
134	225.3	0.01497	0.201	66.80	4.9748	121.37	183.13	0.30329	0.40731	134
135	228.3	0.01501	0.198	66.62	5.0517	121.76	183.20	0.30392	0.40725	135
136	231.4	0.01505	0.195	66.45	5.1299	122.14	183.27	0.30455	0.40718	136
137	234.5	0.01509	0.192	66.27	5.2092	122.53	183.34	0.30518	0.40711	137
138	237.6	0.01513	0.189	66.09	5.2898	122.91	183.41	0.30581	0.40704	138
139	240.7	0.01517	0.186	65.91	5.3717	123.30	183.48	0.30645	0.40696	139
140	243.9	0.01521	0.183	65.73	5.4549	123.69	183.54	0.30708	0.40689	140
141	247.1	0.01526	0.181	65.55	5.5395	124.08	183.60	0.30771	0.40681	141
142	250.4	0.01530	0.178	65.36	5.6253	124.47	183.67	0.30835	0.40674	142
143	253.7	0.01534	0.175	65.18	5.7126	124.86	183.73	0.30898	0.40666	143
144	257.0	0.01539	0.172	64.99	5.8014	125.25	183.78	0.30962	0.40658	144
145	260.4	0.01543	0.170	64.80	5.8916	125.65	183.84	0.31026	0.40650	145
146	263.7	0.01548	0.167	64.61	5.9832	126.04	183.90	0.31090	0.40641	146
147	267.2	0.01552	0.165	64.42	6.0765	126.44	183.95	0.31154	0.40633	147
148	270.6	0.01557	0.162	64.22	6.1712	126.84	184.00	0.31218	0.40624	148
149	274.1	0.01562	0.160	64.03	6.2676	127.24	184.05	0.31282	0.40615	149
150	277.6	0.01567	0.157	63.83	6.3657	127.64	184.10	0.31346	0.40606	150
151	281.2	0.01572	0.155	63.63	6.4654	128.04	184.15	0.31410	0.40597	151
152	284.8	0.01576	0.152	63.43	6.5669	128.45	184.19	0.31475	0.40588	152
153	288.4	0.01582	0.150	63.23	6.6702	128.85	184.23	0.31539	0.40578	153
154	292.0	0.01587	0.148	63.03	6.7752	129.26	184.27	0.31604	0.40568	154
155	295.7	0.01592	0.145	62.82	6.8822	129.67	184.31	0.31669	0.40558	155
156	299.5	0.01597	0.143	62.62	6.9911	130.08	184.35	0.31733	0.40547	156
157	303.2	0.01602	0.141	62.41	7.1020	130.49	184.38	0.31798	0.40537	157
158	307.0	0.01608	0.139	62.19	7.2149	130.91	184.41	0.31864	0.40526	158
159	310.9	0.01613	0.136	61.98	7.3299	131.32	184.44	0.31929	0.40515	159
160	314.7	0.01619	0.134	61.76	7.4471	131.74	184.46	0.31995	0.40503	160
161	318.6	0.01625	0.132	61.55	7.5665	132.16	184.49	0.32060	0.40492	161
162	322.6	0.01631	0.130	61.33	7.6882	132.58	184.51	0.32126	0.40480	162
163	326.6	0.01637	0.128	61.10	7.8123	133.00	184.53	0.32192	0.40467	163
164	330.6	0.01643	0.126	60.88	7.9388	133.42	184.54	0.32258	0.40455	164
165	334.7	0.01649	0.124	60.65	8.0678	133.85	184.56	0.32325	0.40442	165
166	338.8	0.01655	0.122	60.42	8.1994	134.28	184.57	0.32391	0.40428	166
167	342.9	0.01662	0.120	60.19	8.3338	134.71	184.57	0.32458	0.40415	167

**Thermodynamic Properties of R-134a - Saturation**

Temperature (°F)	Pressure (psia)	Volume (ft <sup>3</sup> /lb)		Density (lb/ft <sup>3</sup> )		Enthalpy (Btu/lb)		Entropy (Btu/(lb °R))		Temperature (°F)
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	
168	347.1	0.01668	0.118	59.95	8.4709	135.14	184.58	0.32525	0.40400	168
169	351.3	0.01675	0.116	59.71	8.6109	135.58	184.58	0.32592	0.40386	169
170	355.5	0.01682	0.114	59.47	8.7539	136.02	184.57	0.32659	0.40371	170
171	359.8	0.01689	0.112	59.22	8.9000	136.46	184.57	0.32727	0.40356	171
172	364.2	0.01696	0.111	58.98	9.0493	136.90	184.56	0.32795	0.40340	172
173	368.5	0.01703	0.109	58.73	9.2019	137.34	184.54	0.32863	0.40324	173
174	373.0	0.01710	0.107	58.47	9.3580	137.79	184.53	0.32932	0.40307	174
175	377.4	0.01718	0.105	58.21	9.5177	138.24	184.51	0.33001	0.40290	175
176	381.9	0.01726	0.103	57.95	9.6812	138.70	184.48	0.33070	0.40272	176
177	386.5	0.01734	0.102	57.68	9.8486	139.15	184.45	0.33139	0.40254	177
178	391.0	0.01742	0.100	57.41	10.020	139.61	184.42	0.33209	0.40235	178
179	395.7	0.01750	0.098	57.14	10.196	140.07	184.38	0.33279	0.40216	179
180	400.3	0.01759	0.096	56.86	10.376	140.54	184.33	0.33350	0.40196	180
181	405.1	0.01768	0.095	56.57	10.561	141.01	184.28	0.33421	0.40175	181
182	409.8	0.01777	0.093	56.28	10.751	141.48	184.23	0.33492	0.40153	182
183	414.6	0.01786	0.091	55.99	10.946	141.96	184.17	0.33564	0.40131	183
184	419.5	0.01796	0.090	55.69	11.146	142.44	184.10	0.33636	0.40108	184
185	424.4	0.01806	0.088	55.38	11.353	142.93	184.03	0.33709	0.40084	185
186	429.3	0.01816	0.086	55.07	11.565	143.42	183.95	0.33782	0.40060	186
187	434.3	0.01826	0.085	54.75	11.784	143.91	183.86	0.33856	0.40034	187
188	439.3	0.01837	0.083	54.43	12.009	144.41	183.77	0.33931	0.40007	188
189	444.4	0.01849	0.082	54.10	12.242	144.92	183.66	0.34006	0.39980	189
190	449.5	0.01860	0.080	53.76	12.482	145.43	183.55	0.34082	0.39951	190
191	454.7	0.01872	0.079	53.41	12.731	145.94	183.44	0.34159	0.39921	191
192	459.9	0.01885	0.077	53.05	12.988	146.46	183.31	0.34236	0.39890	192
193	465.2	0.01898	0.075	52.68	13.255	146.99	183.17	0.34314	0.39857	193
194	470.5	0.01912	0.074	52.30	13.532	147.53	183.02	0.34394	0.39823	194
195	475.9	0.01926	0.072	51.92	13.820	148.08	182.86	0.34474	0.39787	195
196	481.3	0.01941	0.071	51.51	14.120	148.63	182.68	0.34556	0.39749	196
197	486.8	0.01957	0.069	51.10	14.433	149.19	182.49	0.34638	0.39710	197
198	492.4	0.01974	0.068	50.67	14.761	149.77	182.29	0.34723	0.39668	198
199	497.9	0.01991	0.066	50.22	15.104	150.35	182.07	0.34808	0.39624	199
200	503.6	0.02010	0.065	49.76	15.465	150.95	181.83	0.34896	0.39577	200
201	509.3	0.02029	0.063	49.28	15.846	151.56	181.57	0.34985	0.39528	201
202	515.1	0.02050	0.062	48.77	16.248	152.19	181.29	0.35077	0.39475	202
203	520.9	0.02073	0.060	48.24	16.677	152.83	180.98	0.35171	0.39418	203
204	526.7	0.02098	0.058	47.68	17.135	153.50	180.64	0.35268	0.39357	204
205	532.7	0.02124	0.057	47.08	17.627	154.19	180.26	0.35368	0.39291	205
206	538.7	0.02153	0.055	46.44	18.161	154.91	179.84	0.35473	0.39218	206
207	544.7	0.02186	0.053	45.75	18.745	155.66	179.37	0.35583	0.39138	207
208	550.9	0.02223	0.052	44.99	19.392	156.46	178.83	0.35699	0.39049	208
209	557.1	0.02265	0.050	44.15	20.122	157.32	178.21	0.35824	0.38948	209
210	563.4	0.02315	0.048	43.20	20.967	158.26	177.48	0.35960	0.38830	210
211	569.7	0.02377	0.045	42.07	21.981	159.33	176.58	0.36115	0.38687	211
212	576.1	0.02460	0.043	40.65	23.286	160.60	175.39	0.36300	0.38502	212
213	582.7	0.02592	0.040	38.59	25.243	162.34	173.58	0.36554	0.38226	213