

# R-134a

1,1,1,2 - TETRAFLUOROETHANE  $CH_2F-CF_3$

Molecular weight (g/mol) .....	102.03
Melting point (°C) .....	-103.3
Boiling point (at 1.013 bar) .....	-26.08
Temperature glide at 1.013 bar (K) .....	0
Critical temperature (°C) .....	101.1
Critical pressure (bar absolute) .....	40.59
Specific heat (liquid) at + 25°C (kJ/kg.K) .....	1.425
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K) .....	0.851
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar .....	1.120
Viscosity (liquid) at + 25°C in Centipoise (10 <sup>-3</sup> Pa.s) .....	0.195
Surface tension at + 25°C in dyne per centimetre (10 <sup>-3</sup> N/m) .....	8.03
Classification NF-EN 378 .....	A1
GWP (IPCC 4) .....	1430

## ◆ Main applications

R-134a is a hydrofluorocarbon (HFC) which can be used for domestic, commercial, and industrial refrigerated applications, as well as for air conditioning, fluid cooling, and heat pump applications. R-134a was the fluid of choice of automotive and agricultural air-conditioning system manufacturers. New cars now use R-1234yf.

This fluid could also replace R-12 in existing systems by following the correct conversion procedure.

## ◆ Commercial specifications

Purity: ≥ 99.5 % weight.

Water content: ≤ 10 ppm weight.

Non-condensables (gas phase): ≤ 1.5 % volume.

High boiling residue: ≤ 0.01 % volume.

Acidity (HCl): ≤ 1 ppm weight.

Chloride ion test: negative.

## ◆ Oils

Use a polyol ester (POE) oil.

For car air conditioning we recommend to take the advice of the constructor as PAG oils are normally used.

Check with **Climalife** regarding the viscosity of the oil selected for your application, and the miscibility with the fluid under consideration.

## ◆ Regulation

The use and implementation of R-134a are governed by EU Regulation n° 517/2014.

The recovery of R-134a is mandatory under EU Regulation n° 517/2014.

(Refer to the regulations in each country).

## Thermodynamic properties of R-134a - Saturated state

Absolute pressure	LIQUID					VAPOUR					Latent heat
	Bubble point	Volume	Density	Enthalpy	Entropy	Dew point	Volume	Density	Enthalpy	Entropy	
P	t'	v'	ρ'	h'	s'	t''	v''	ρ''	h''	s''	Lv
(bar)	(°C)	(dm <sup>3</sup> /kg)	(kg/dm <sup>3</sup> )	(kJ/kg)	(kJ/kg.K)	(°C)	(m <sup>3</sup> /kg)	(kg/m <sup>3</sup> )	(kJ/kg)	(kJ/kg.K)	(kJ/kg)
0.006	-100	0.632	1.582	75.362	0.435	-100.0	25.193	0.040	336.852	1.946	261.490
0.009	-95	0.637	1.569	81.288	0.469	-95.0	15.435	0.065	339.784	1.920	258.497
0.015	-90	0.643	1.556	87.226	0.502	-90.0	9.770	0.102	342.759	1.897	255.534
0.024	-85	0.648	1.542	93.182	0.534	-85.0	6.371	0.157	345.774	1.877	252.592
0.037	-80	0.654	1.529	99.161	0.565	-80.0	4.268	0.234	348.826	1.858	249.665
0.055	-75	0.660	1.515	105.165	0.596	-75.0	2.931	0.341	351.909	1.841	246.744
0.080	-70	0.666	1.502	111.199	0.626	-70.0	2.059	0.486	355.021	1.826	243.822
0.114	-65	0.672	1.488	117.265	0.656	-65.0	1.476	0.677	358.157	1.813	240.892
0.159	-60	0.678	1.474	123.364	0.685	-60.0	1.079	0.927	361.310	1.801	237.946
0.218	-55	0.685	1.460	129.500	0.713	-55.0	0.802	1.246	364.477	1.790	234.978
0.295	-50	0.691	1.446	135.674	0.741	-50.0	0.606	1.650	367.652	1.781	231.978
0.391	-45	0.698	1.432	141.888	0.769	-45.0	0.465	2.152	370.829	1.772	228.941
0.512	-40	0.705	1.418	148.144	0.796	-40.0	0.361	2.769	374.003	1.764	225.859
0.661	-35	0.713	1.403	154.445	0.822	-35.0	0.284	3.521	377.168	1.758	222.723
0.844	-30	0.720	1.388	160.792	0.849	-30.0	0.226	4.426	380.319	1.751	219.527
1.013	-26.08	0.726	1.377	165.803	0.869	-26.08	0.190	5.257	382.775	1.747	216.972
1.064	-25	0.728	1.373	167.188	0.875	-25.0	0.182	5.506	383.449	1.746	216.261
1.327	-20	0.736	1.358	173.636	0.900	-20.0	0.147	6.784	386.554	1.741	212.919
1.639	-15	0.745	1.343	180.138	0.926	-15.0	0.121	8.287	389.628	1.737	209.491
2.006	-10	0.754	1.327	186.697	0.951	-10.0	0.100	10.041	392.665	1.733	205.968
2.433	-5	0.763	1.311	193.316	0.975	-5.0	0.083	12.077	395.659	1.730	202.343
2.928	0	0.772	1.295	200.000	1.000	0.0	0.069	14.428	398.603	1.727	198.603
3.497	5	0.782	1.278	206.752	1.024	5.0	0.058	17.131	401.492	1.724	194.740
4.146	10	0.793	1.261	213.577	1.048	10.0	0.049	20.226	404.318	1.722	190.741
4.884	15	0.804	1.243	220.480	1.072	15.0	0.042	23.758	407.073	1.720	186.593
5.717	20	0.816	1.225	227.468	1.096	20.0	0.036	27.780	409.748	1.718	182.281
6.654	25	0.829	1.207	234.546	1.120	25.0	0.031	32.350	412.334	1.716	177.788
7.702	30	0.842	1.187	241.722	1.144	30.0	0.027	37.535	414.819	1.714	173.096
8.870	35	0.857	1.168	249.007	1.167	35.0	0.023	43.416	417.189	1.713	168.182
10.166	40	0.872	1.147	256.409	1.190	40.0	0.020	50.085	419.429	1.711	163.019
11.599	45	0.889	1.125	263.943	1.214	45.0	0.017	57.657	421.519	1.709	157.576
13.179	50	0.907	1.102	271.623	1.237	50.0	0.015	66.272	423.437	1.707	151.814
14.915	55	0.927	1.078	279.469	1.261	55.0	0.013	76.104	425.153	1.705	145.684
16.818	60	0.950	1.053	287.505	1.285	60.0	0.011	87.379	426.630	1.702	139.125
18.898	65	0.975	1.026	295.762	1.309	65.0	0.010	100.898	427.818	1.699	132.056
21.168	70	1.004	0.996	304.282	1.333	70.0	0.009	115.572	428.650	1.696	124.367
23.641	75	1.037	0.964	313.128	1.358	75.0	0.007	133.494	429.030	1.691	115.902
26.332	80	1.077	0.928	322.390	1.384	80.0	0.006	155.078	428.814	1.685	106.423
29.258	85	1.127	0.887	332.224	1.410	85.0	0.005	181.853	427.760	1.677	95.536
32.442	90	1.194	0.838	342.928	1.439	90.0	0.005	216.761	425.416	1.666	82.487
35.912	95	1.284	0.773	355.246	1.472	95.0	0.004	267.139	420.670	1.649	65.423
39.724	100	1.536	0.651	373.298	1.519	100.0	0.003	373.011	407.683	1.611	34.385

## Thermodynamic properties of R-134a - (superheated vapour) - Volume (dm³/kg)

Sat. Temp. °C	Sat. Pressure bar	Superheat (°C)																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
-100	0.006	25193.019	25925.423	26666.959	27387.861	28118.292	28848.368	29578.171	30307.762	31037.184	31766.471	32495.647	33224.733	33953.741	34682.685	35411.574	36140.414	36869.214	37597.976	38326.706	39055.408	39784.084
-95	0.009	15434.503	15871.610	16308.078	16744.073	17179.711	17615.076	18050.228	18485.212	18920.059	19354.797	19789.442	20224.011	20658.516	21092.965	21527.366	21961.725	22396.048	22830.339	23264.601	23698.837	24133.051
-90	0.015	9769.819	10039.721	10309.145	10578.210	10847.000	11115.576	11383.983	11652.253	11920.413	12188.482	12456.473	12724.400	12992.271	13260.084	13527.876	13795.621	14063.334	14331.018	14598.676	14866.312	15133.927
-85	0.024	6370.662	6542.598	6714.169	6885.462	7056.539	7227.446	7398.216	7568.875	7739.442	7909.932	8080.357	8250.726	8421.048	8591.327	8761.570	8931.781	9101.963	9272.119	9442.252	9612.365	9782.458
-80	0.037	4268.197	4380.990	4493.336	4605.545	4717.580	4829.478	4941.264	5052.957	5164.573	5276.120	5387.616	5499.065	5610.470	5721.838	5833.174	5944.481	6055.762	6167.020	6278.258	6389.476	6500.678
-75	0.055	2931.165	3007.030	3082.669	3158.131	3233.453	3308.661	3383.777	3458.814	3533.789	3608.701	3683.568	3758.393	3833.181	3907.937	3982.664	4057.365	4132.043	4206.700	4281.339	4355.960	4430.566
-70	0.080	2058.959	2113.284	2165.426	2215.424	2267.300	2319.091	2370.799	2422.440	2474.024	2525.560	2577.053	2628.510	2679.933	2731.328	2782.697	2834.043	2885.368	2936.674	2987.963	3039.237	3090.496
-65	0.114	1476.493	1513.409	1550.173	1586.816	1623.362	1659.827	1696.224	1732.565	1768.856	1805.104	1841.315	1877.493	1913.642	1949.765	1985.864	2021.943	2058.003	2094.046	2130.073	2166.086	2202.086
-60	0.159	1079.033	1105.631	1132.101	1158.469	1184.753	1210.967	1237.123	1263.230	1289.292	1315.317	1341.309	1367.272	1393.208	1419.121	1445.013	1470.886	1496.744	1522.581	1548.407	1574.220	1600.021
-55	0.218	802.362	821.907	841.340	860.685	879.958	899.170	918.331	937.448	956.527	975.571	994.587	1013.575	1032.540	1051.484	1070.409	1089.316	1108.208	1127.085	1145.949	1164.801	1183.642
-50	0.295	606.198	620.824	635.354	649.806	664.195	678.530	692.820	707.070	721.287	735.473	749.632	763.767	777.881	791.975	806.052	820.113	834.160	848.194	862.215	876.225	890.226
-45	0.391	464.726	475.861	486.911	497.892	508.816	519.693	530.530	541.330	552.100	562.843	573.561	584.258	594.935	605.594	616.238	626.866	637.482	648.085	658.677	669.259	679.831
-40	0.512	361.076	369.691	378.230	386.706	395.132	403.515	411.861	420.176	428.462	436.723	444.963	453.182	461.383	469.568	477.739	485.896	494.040	502.173	510.296	518.410	526.515
-35	0.661	284.018	290.784	297.482	304.123	310.718	317.275	323.798	330.291	336.760	343.205	349.630	356.037	362.427	368.802	375.164	381.513	387.851	394.178	400.495	406.804	413.105
-30	0.844	225.945	231.336	236.663	241.940	247.174	252.373	257.541	262.683	267.806	272.897	277.975	283.036	288.082	293.114	298.134	303.141	308.139	313.126	318.105	323.075	328.037
-26.08	1.013	190.229	194.783	199.277	203.723	208.130	212.504	216.848	221.168	225.466	229.744	234.004	238.248	242.478	246.694	250.899	255.093	259.276	263.451	267.617	271.775	275.926
-25	1.064	181.623	185.976	190.270	194.518	198.727	202.903	207.050	211.173	215.275	219.356	223.421	227.469	231.504	235.526	239.535	243.534	247.523	251.503	255.475	259.439	263.396
-20	1.327	147.395	150.955	154.460	157.922	161.348	164.744	168.113	171.459	174.785	178.093	181.385	184.662	187.926	191.178	194.419	197.649	200.871	204.084	207.289	210.487	213.678
-15	1.639	120.671	123.617	126.513	129.367	132.189	134.981	137.750	140.496	143.224	145.935	148.631	151.313	153.983	156.641	159.289	161.928	164.558	167.180	169.794	172.402	175.004
-10	2.006	99.590	102.057	104.475	106.856	109.204	111.526	113.825	116.104	118.365	120.611	122.842	125.060	127.266	129.462	131.648	133.826	135.995	138.156	140.311	142.459	144.601
-5	2.433	82.801	84.888	86.930	88.936	90.911	92.862	94.791	96.701	98.594	100.472	102.337	104.190	106.031	107.863	109.685	111.499	113.305	115.104	116.897	118.683	120.464
0	2.928	69.309	71.093	72.835	74.542	76.220	77.875	79.509	81.125	82.725	84.311	85.884	87.446	88.997	90.539	92.072	93.597	95.115	96.626	98.131	99.630	101.123
5	3.497	58.374	59.915	61.415	62.881	64.321	65.737	67.135	68.514	69.879	71.230	72.569	73.897	75.216	76.525	77.826	79.119	80.405	81.685	82.959	84.228	85.491
10	4.146	49.442	50.785	52.089	53.360	54.606	55.830	57.034	58.223	59.397	60.558	61.707	62.846	63.975	65.096	66.209	67.315	68.414	69.507	70.594	71.676	72.753
15	4.884	42.090	43.272	44.415	45.528	46.615	47.681	48.728	49.760	50.778	51.784	52.778	53.763	54.738	55.705	56.664	57.617	58.563	59.503	60.438	61.368	62.294
20	5.717	35.997	37.046	38.057	39.038	39.995	40.931	41.849	42.752	43.642	44.520	45.388	46.244	47.092	47.933	48.766	49.593	50.413	51.228	52.038	52.843	53.643
25	6.654	30.912	31.852	32.754	33.626	34.475	35.303	36.114	36.911	37.694	38.465	39.227	39.978	40.722	41.458	42.186	42.909	43.625	44.336	45.042	45.744	46.441
30	7.702	26.642	27.491	28.302	29.084	29.843	30.582	31.303	32.012	32.705	33.388	34.061	34.724	35.380	36.028	36.670	37.305	37.935	38.559	39.179	39.794	40.405
35	8.870	23.033	23.807	24.543	25.250	25.933	26.596	27.243	27.875	28.495	29.104	29.702	30.292	30.875	31.449	32.018	32.580	33.137	33.688	34.235	34.778	35.317
40	10.166	19.966	20.678	21.351	21.994	22.614	23.214	23.797	24.366	24.923	25.469	26.005	26.533	27.055	27.569	28.072	28.572	29.068	29.558	30.044	30.525	31.003
45	11.599	17.344	18.005	18.625	19.216	19.782	20.328	20.858	21.373	21.877	22.369	22.852	23.327	23.794	24.254	24.707	25.155	25.598	26.037	26.470	26.900	27.326
50	13.179	15.089	15.709	16.286	16.832	17.353	17.853	18.337	18.807	19.265	19.712	20.150	20.579	21.000	21.415	21.824	22.227	22.626	23.019	23.409	23.794	24.176
55	14.915	13.140	13.726	14.268	14.776	15.259	15.721	16.166	16.597	17.016	17.424	17.822	18.212	18.595	18.971	19.342	19.706	20.066	20.421	20.772	21.120	21.463
60	16.818	11.444	12.006	12.519	12.996	13.447	13.876	14.287	14.685	15.070	15.444	15.809	16.165	16.515	16.857	17.194	17.526	17.852	18.174	18.493	18.807	19.118
65	18.898	9.960	10.506	10.966	11.447	11.871	12.272	12.655	13.023	13.379	13.724	14.059	14.387	14.707	15.021	15.329	15.631	15.929	16.222	16.512	16.798	17.080
70	21.168	8.653	9.190	9.663	10.094	10.495	10.872	11.230	11.573	11.904	12.223	12.534	12.836	13.130	13.419	13.701	13.979	14.251	14.520	14.784	15.045	15.302
75	23.641	7.491	8.030	8.492	8.907	9.288	9.645	9.982	10.304	10.612	10.909	11.197	11.477	11.750	12.016	12.276	12.531	12.782	13.028	13.270	13.509	13.745
80	26.332	6.448	7.001	7.459	7.861	8.227	8.566	8.885	9.187	9.477	9.754	10.023	10.283	10.535	10.782	11.023	11.257	11.489	11.716	11.939	12.159	12.375
85	29.258	5.499	6.084	6.543	6.937	7.290	7.614	7.917	8.203	8.475	8.735	8.986	9.228	9.464	9.693	9.916	10.134	10.348	10.558	10.764	10.966	11.165
90	32.442	4.613	5.261	5.728	6.117	6.460	6.771	7.060	7.330	7.587	7.832	8.067	8.294	8.514	8.727	8.935	9.138	9.336	9.530	9.720	9.908	10.092
95	35.912	3.743	4.518	5.001	5.387	5.721	6.021	6.297	6.554	6.797	7.028	7.249	7.462	7.667	7.866	8.060	8.249	8.433	8.613	8.790	8.963	9.134
100	39.724	2.681	3.841	4.345	4.731	5.057	5.347	5.611	5.856	6.086	6.304	6.512	6.712	6.905	7.091	7.272	7.448	7.619	7.787	7.951	8.112	8.270

## Thermodynamic properties of R-134a - (superheated vapour) - Enthalpy (kJ/kg)

Sat. Temp. °C	Sat. Pressure bar	Superheat (°C)																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
-100	0.006	336.852	339.842	342.882	345.971	349.110	352.301	355.541	358.832	362.174	365.565	369.006	372.496	376.035	379.623	383.259	386.943	390.675	394.453	398.279	402.151	406.070
-95	0.009	339.784	342.834	345.930	349.076	352.271	355.515	358.809	362.153	365.546	368.989	372.480	376.021	379.610	383.247	386.931	390.664	394.443	398.269	402.142	406.061	410.026
-90	0.015	342.759	345.868	349.023	352.225	355.475	358.773	362.121	365.517	368.962	372.455	375.996	379.585	383.222	386.913	390.647	394.427	398.254	402.128	406.048	410.013	414.024
-85	0.024	345.774	348.943	352.155	355.414	358.719	362.072	365.473	368.922	372.420	375.965	379.558	383.198	386.886	390.621	394.403	398.232	402.107	406.028	409.994	414.006	418.064
-80	0.037	348.826	352.054	355.325	358.641	362.002	365.410	368.865	372.367	375.916	379.512	383.156	386.847	390.584	394.366	398.195	402.070	405.987	409.947	413.960	418.039	422.142
-75	0.055	351.909	355.199	358.529	361.902	365.319	368.782	372.291	375.846	379.448	383.096	386.791	390.532	394.319	398.153	402.032	405.957	409.927	413.943	418.003	422.108	426.258
-70	0.080	355.021	358.372	361.762	365.193	368.668	372.186	375.750	379.358	383.013	386.713	390.459	394.251	398.089	401.971	405.900	409.873	413.891	417.954	422.062	426.213	430.409
-65	0.114	358.157	361.570	365.021	368.511	372.043	375.618	379.236	382.900	386.607	390.360	394.158	398.001	401.889	405.822	409.799	413.821	417.888	421.998	426.153	430.351	434.594
-60	0.159	361.310	364.788	368.300	371.851	375.441	379.073	382.748	386.466	390.228	394.034	397.884	401.779	405.718	409.701	413.728	417.799	421.914	426.072	430.275	434.520	438.809
-55	0.218	364.477	368.021	371.596	375.208	378.858	382.549	386.280	390.054	393.871	397.731	401.634	405.581	409.571	413.605	417.682	421.803	425.967	430.174	434.424	438.717	443.052
-50	0.295	367.652	371.263	374.904	378.578	382.290	386.039	389.829	393.660	397.533	401.447	405.404	409.404	413.447	417.532	421.660	425.830	430.044	434.300	438.598	442.939	447.322
-45	0.391	370.829	374.510	378.218	381.957	385.731	389.541	393.391	397.280	401.209	405.180	409.191	413.245	417.340	421.478	425.657	429.878	434.142	438.447	442.794	447.183	451.614
-40	0.512	374.003	377.757	381.534	385.339	389.177	393.050	396.960	400.909	404.896	408.924	412.991	417.100	421.249	425.439	429.671	433.944	438.258	442.613	447.010	451.447	455.926
-35	0.661	377.168	380.997	384.846	388.720	392.624	396.562	400.534	404.543	408.590	412.676	416.800	420.965	425.169	429.413	433.698	438.023	442.388	446.794	451.241	455.728	460.256
-30	0.844	380.319	384.227	388.150	392.095	396.068	400.071	404.108	408.180	412.287	416.432	420.615	424.836	429.097	433.396	437.735	442.113	446.531	450.988	455.486	460.023	464.600
-26.08	1.013	382.775	386.748	390.731	394.734	398.762	402.819	406.907	411.029	415.186	419.379	423.608	427.875	432.180	436.523	440.905	445.325	449.785	454.284	458.821	463.399	468.015
-25	1.064	383.449	387.440	391.440	395.459	399.503	403.575	407.677	411.813	415.983	420.189	424.432	428.712	433.029	437.384	441.778	446.210	450.681	455.191	459.741	464.329	468.956
-20	1.327	386.554	390.631	394.712	398.808	402.925	407.067	411.238	415.440	419.675	423.943	428.247	432.586	436.962	441.375	445.825	450.312	454.837	459.401	464.003	468.643	473.321
-15	1.639	389.628	393.795	397.961	402.136	406.329	410.545	414.786	419.056	423.357	427.690	432.056	436.457	440.893	445.364	449.871	454.415	458.996	463.614	468.269	472.962	477.692
-10	2.006	392.665	396.927	401.181	405.440	409.712	414.003	418.317	422.658	427.027	431.426	435.857	440.320	444.817	449.349	453.915	458.516	463.154	467.827	472.537	477.283	482.066
-5	2.433	395.659	400.021	404.367	408.713	413.067	417.437	421.827	426.240	430.680	435.147	439.645	444.173	448.733	453.326	457.952	462.612	467.307	472.037	476.803	481.604	486.441
0	2.928	398.603	403.071	407.514	411.951	416.391	420.843	425.312	429.800	434.313	438.851	443.416	448.011	452.636	457.292	461.980	466.700	471.455	476.242	481.065	485.921	490.813
5	3.497	401.492	406.071	410.617	415.149	419.679	424.217	428.767	433.334	437.921	442.532	447.168	451.831	456.523	461.244	465.995	470.778	475.592	480.439	485.319	490.233	495.181
10	4.146	404.318	409.015	413.669	418.302	422.926	427.553	432.188	436.836	441.502	446.188	450.897	455.631	460.391	465.178	469.995	474.841	479.717	484.625	489.565	494.536	499.541
15	4.884	407.073	411.896	416.665	421.403	426.127	430.847	435.570	440.303	445.051	449.815	454.599	459.406	464.236	469.093	473.976	478.887	483.827	488.797	493.797	498.829	503.892
20	5.717	409.748	414.706	419.597	424.448	429.276	434.094	438.910	443.732	448.563	453.409	458.271	463.153	468.056	472.984	477.935	482.913	487.919	492.952	498.015	503.107	508.230
25	6.654	412.334	417.337	422.549	427.429	432.267	437.288	442.202	447.116	452.036	456.965	461.909	466.869	471.848	476.848	481.870	486.917	491.990	497.089	502.215	507.370	512.554
30	7.702	414.819	420.080	425.242	430.339	435.395	440.425	445.442	450.452	455.464	460.481	465.509	470.550	475.607	480.682	485.778	490.896	496.037	501.203	506.395	511.614	516.860
35	8.870	417.189	422.624	427.938	433.172	438.353	443.499	448.623	453.735	458.834	463.952	469.067	474.192	479.330	484.484	489.655	494.846	500.059	505.294	510.553	515.837	521.148
40	10.166	419.429	425.055	430.536	435.918	441.233	446.502	451.740	456.960	462.169	467.374	472.581	477.793	483.015	488.249	493.499	498.765	504.051	509.357	514.686	520.037	525.414
45	11.599	421.519	427.361	433.025	438.568	444.027	449.428	454.788	460.121	465.437	470.743	476.045	481.343	486.658	491.976	497.306	502.650	508.012	513.391	518.791	524.212	529.655
50	13.179	423.437	429.524	435.391	441.111	446.727	452.270	457.760	463.213	468.641	474.053	479.455	484.854	490.254	495.660	501.073	506.499	511.938	517.393	522.866	528.358	533.871
55	14.915	425.153	431.523	437.620	443.536	449.323	455.019	460.648	466.230	471.777	477.300	482.808	488.306	493.801	499.297	504.798	510.307	515.827	521.360	526.907	532.476	538.067
60	16.818	426.630	433.333	439.624	445.828	451.804	457.666	463.446	469.165	474.838	480.479	486.098	491.701	497.295	502.886	508.477	514.073	519.676	525.290	530.916	536.557	542.215
65	18.898	427.818	434.925	441.591	447.972	454.157	460.202	466.144	472.010	477.819	483.585	489.320	495.033	500.731	506.421	512.106	517.792	523.482	529.179	534.886	540.605	546.338
70	21.168	428.650	436.260	443.286	449.950	456.370	462.616	468.735	474.759	480.713	486.612	492.474	498.299	504.106	509.899	515.682	521.462	527.242	533.025	538.815	544.615	550.426
75	23.641	429.030	437.289	444.790	451.724	458.426	464.895	471.207	477.404	483.512	489.553	495.543	501.493	507.415	513.315	519.201	525.078	530.951	536.824	542.707	548.585	554.475
80	26.332	428.814	437.580	445.948	453.324	460.309	467.026	473.551	479.934	486.209	492.401	498.530	504.610	510.652	516.665	522.658	528.637	534.608	540.573	546.539	552.507	558.482
85	29.258	427.760	436.162	443.827	451.677	459.199	466.955	474.575	482.340	489.755	495.149	501.426	507.684	513.911	519.943	526.048	532.134	538.205	544.267	550.325	556.382	562.442
90	32.442	425.416	433.817	441.366	448.574	455.747	463.475	471.801	484.608	491.257	497.785	504.220	510.580	516.883	523.141	529.364	535.560	541.736	547.899	554.053	560.202	566.351
95	35.912	420.670	436.771	447.475	456.518	464.705	472.365	479.670	486.719	493.579	500.294	506.897	513.411	519.856	526.245	532.591	538.904	545.191	551.458	557.712	563.958	570.198
100	39.724	407.683	434.809	447.059	456.906	465.628	473.688	481.312	488.629	495.718	502.636	509.420	516.099	522.695	529.225	535.702	542.138	548.541	554.919	561.278	567.623	573.960

## Thermodynamic properties of R-134a - (superheated vapour) - Entropy (kJ/kg.K)

Sat. Temp. °C	Sat. Pressure bar	Superheat (°C)																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
-100	0.006	1.946	1.963	1.979	1.996	2.013	2.029	2.045	2.061	2.077	2.093	2.108	2.124	2.139	2.154	2.169	2.184	2.199	2.214	2.229	2.243	2.258
-95	0.009	1.920	1.937	1.954	1.970	1.987	2.003	2.019	2.035	2.050	2.066	2.081	2.097	2.112	2.127	2.142	2.157	2.172	2.186	2.201	2.216	2.230
-90	0.015	1.897	1.914	1.931	1.947	1.963	1.979	1.995	2.011	2.026	2.042	2.057	2.072	2.088	2.103	2.117	2.132	2.147	2.162	2.176	2.190	2.205
-85	0.024	1.877	1.893	1.910	1.926	1.942	1.958	1.974	1.989	2.005	2.020	2.035	2.051	2.066	2.080	2.095	2.110	2.124	2.139	2.153	2.168	2.182
-80	0.037	1.858	1.875	1.891	1.907	1.923	1.939	1.954	1.970	1.985	2.001	2.016	2.031	2.046	2.060	2.075	2.090	2.104	2.119	2.133	2.147	2.161
-75	0.055	1.841	1.858	1.874	1.890	1.906	1.922	1.937	1.952	1.968	1.983	1.998	2.013	2.028	2.042	2.057	2.072	2.086	2.100	2.114	2.129	2.143
-70	0.080	1.826	1.843	1.859	1.875	1.890	1.906	1.921	1.937	1.952	1.967	1.982	1.997	2.012	2.026	2.041	2.055	2.069	2.084	2.098	2.112	2.126
-65	0.114	1.813	1.829	1.845	1.861	1.877	1.892	1.908	1.923	1.938	1.953	1.968	1.982	1.997	2.012	2.026	2.040	2.055	2.069	2.083	2.097	2.111
-60	0.159	1.801	1.817	1.833	1.849	1.864	1.880	1.895	1.910	1.925	1.940	1.955	1.969	1.984	1.998	2.013	2.027	2.041	2.055	2.069	2.083	2.097
-55	0.218	1.790	1.806	1.822	1.838	1.853	1.869	1.884	1.899	1.914	1.929	1.943	1.958	1.972	1.987	2.001	2.015	2.029	2.043	2.057	2.071	2.085
-50	0.295	1.781	1.797	1.812	1.828	1.843	1.859	1.874	1.889	1.904	1.918	1.933	1.947	1.962	1.976	1.990	2.004	2.019	2.032	2.046	2.060	2.074
-45	0.391	1.772	1.788	1.804	1.819	1.835	1.850	1.865	1.880	1.895	1.909	1.924	1.938	1.953	1.967	1.981	1.995	2.009	2.023	2.037	2.050	2.064
-40	0.512	1.764	1.780	1.796	1.811	1.827	1.842	1.857	1.872	1.887	1.901	1.916	1.930	1.944	1.958	1.973	1.987	2.000	2.014	2.028	2.042	2.055
-35	0.661	1.758	1.773	1.789	1.805	1.820	1.835	1.850	1.865	1.879	1.894	1.908	1.923	1.937	1.951	1.965	1.979	1.993	2.007	2.020	2.034	2.047
-30	0.844	1.751	1.767	1.783	1.798	1.814	1.829	1.844	1.858	1.873	1.888	1.902	1.916	1.930	1.945	1.958	1.972	1.986	2.000	2.013	2.027	2.040
-26.08	1.013	1.747	1.763	1.779	1.794	1.809	1.824	1.839	1.854	1.869	1.883	1.898	1.912	1.926	1.940	1.954	1.968	1.981	1.995	2.009	2.022	2.036
-25	1.064	1.746	1.762	1.778	1.793	1.808	1.823	1.838	1.853	1.868	1.882	1.896	1.911	1.925	1.939	1.953	1.967	1.980	1.994	2.007	2.021	2.034
-20	1.327	1.741	1.757	1.773	1.788	1.804	1.819	1.833	1.848	1.863	1.877	1.891	1.906	1.920	1.934	1.948	1.961	1.975	1.989	2.002	2.016	2.029
-15	1.639	1.737	1.753	1.769	1.784	1.799	1.814	1.829	1.844	1.859	1.873	1.887	1.901	1.915	1.929	1.943	1.957	1.971	1.984	1.998	2.011	2.024
-10	2.006	1.733	1.749	1.765	1.781	1.796	1.811	1.826	1.840	1.855	1.869	1.884	1.898	1.912	1.926	1.939	1.953	1.967	1.980	1.994	2.007	2.020
-5	2.433	1.730	1.746	1.762	1.777	1.793	1.808	1.823	1.837	1.852	1.866	1.880	1.894	1.908	1.922	1.936	1.950	1.963	1.977	1.990	2.004	2.017
0	2.928	1.727	1.743	1.759	1.775	1.790	1.805	1.820	1.835	1.849	1.863	1.878	1.892	1.906	1.920	1.933	1.947	1.961	1.974	1.987	2.001	2.014
5	3.497	1.724	1.741	1.757	1.772	1.788	1.803	1.818	1.832	1.847	1.861	1.875	1.890	1.904	1.917	1.931	1.945	1.958	1.972	1.985	1.998	2.012
10	4.146	1.722	1.739	1.755	1.770	1.786	1.801	1.816	1.830	1.845	1.859	1.874	1.888	1.902	1.916	1.929	1.943	1.956	1.970	1.983	1.996	2.010
15	4.884	1.720	1.737	1.753	1.768	1.784	1.799	1.814	1.829	1.843	1.858	1.872	1.886	1.900	1.914	1.928	1.941	1.955	1.968	1.982	1.995	2.008
20	5.717	1.718	1.735	1.751	1.767	1.782	1.798	1.813	1.828	1.842	1.857	1.871	1.885	1.899	1.913	1.927	1.940	1.954	1.967	1.980	1.994	2.007
25	6.654	1.716	1.733	1.750	1.766	1.781	1.797	1.812	1.827	1.841	1.856	1.870	1.884	1.898	1.912	1.926	1.939	1.953	1.966	1.980	1.993	2.006
30	7.702	1.714	1.732	1.748	1.764	1.780	1.796	1.811	1.826	1.840	1.855	1.869	1.884	1.898	1.911	1.925	1.939	1.952	1.966	1.979	1.992	2.005
35	8.870	1.713	1.730	1.747	1.763	1.779	1.795	1.810	1.825	1.840	1.855	1.869	1.883	1.897	1.911	1.925	1.938	1.952	1.965	1.979	1.992	2.005
40	10.166	1.711	1.729	1.746	1.763	1.779	1.794	1.810	1.825	1.840	1.854	1.869	1.883	1.897	1.911	1.925	1.938	1.952	1.965	1.979	1.992	2.005
45	11.599	1.709	1.727	1.745	1.762	1.778	1.794	1.809	1.824	1.839	1.854	1.869	1.883	1.897	1.911	1.925	1.939	1.952	1.966	1.979	1.992	2.005
50	13.179	1.707	1.726	1.744	1.761	1.777	1.793	1.809	1.824	1.839	1.854	1.869	1.883	1.897	1.911	1.925	1.939	1.952	1.966	1.979	1.992	2.005
55	14.915	1.705	1.724	1.742	1.760	1.777	1.793	1.809	1.824	1.839	1.854	1.869	1.883	1.898	1.912	1.926	1.939	1.953	1.966	1.980	1.993	2.006
60	16.818	1.702	1.722	1.741	1.759	1.776	1.792	1.808	1.824	1.839	1.854	1.869	1.884	1.898	1.912	1.926	1.940	1.953	1.967	1.980	1.994	2.007
65	18.898	1.699	1.720	1.740	1.758	1.775	1.792	1.808	1.824	1.839	1.855	1.869	1.884	1.898	1.913	1.927	1.941	1.954	1.968	1.981	1.994	2.008
70	21.168	1.696	1.718	1.738	1.756	1.774	1.791	1.808	1.824	1.839	1.855	1.870	1.885	1.899	1.913	1.927	1.941	1.955	1.969	1.982	1.995	2.009
75	23.641	1.691	1.715	1.735	1.755	1.773	1.791	1.807	1.824	1.840	1.855	1.870	1.885	1.900	1.914	1.928	1.942	1.956	1.970	1.983	1.996	2.010
80	26.332	1.685	1.711	1.733	1.753	1.772	1.790	1.807	1.823	1.839	1.855	1.870	1.885	1.900	1.915	1.929	1.943	1.957	1.970	1.984	1.997	2.011
85	29.258	1.677	1.706	1.730	1.751	1.770	1.789	1.806	1.823	1.839	1.855	1.871	1.886	1.901	1.915	1.930	1.944	1.958	1.971	1.985	1.999	2.012
90	32.442	1.666	1.700	1.726	1.748	1.768	1.787	1.805	1.823	1.839	1.855	1.871	1.886	1.901	1.916	1.930	1.945	1.959	1.972	1.986	2.000	2.013
95	35.912	1.649	1.693	1.721	1.745	1.766	1.786	1.804	1.822	1.839	1.855	1.871	1.887	1.902	1.917	1.931	1.945	1.960	1.973	1.987	2.001	2.014
100	39.724	1.611	1.683	1.715	1.741	1.763	1.784	1.803	1.821	1.838	1.855	1.871	1.887	1.902	1.917	1.932	1.946	1.960	1.974	1.988	2.002	2.015