

R-450A (Solstice® N13)

Zeotropic blend (42 % R-134a - 58 % R-1234ze)

Molecular weight (g/mol)	108.67
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-23.36
Temperature glide at 1.013 bar (K)	0.61
Critical temperature (°C)	105.6
Critical pressure (bar absolute)	39.13
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.403
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.873
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.109
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.195
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	8.65
Classification NF-EN 378	A1
GWP (IPCC 4)	605

🔹 Main applications

R-450A is a "near azeotropic" blend containing an HFO refrigerant, designed to replace R-134a in commercial and industrial refrigerators, as well as air conditioning and chillers.

With its atmospheric pressure temperature glide of less than 1k, it can be used in direct expansion or flooded evaporator systems.

🔹 Commercial specifications

Composition: (58 % R-1234ze – 42 % R-134a) (±2 % / ±2 %).

Purity: ≥ 99.5 % weight.

Water content: ≤ 10 ppm weight.

Chlorine ion test (silver nitrate test): negative.

Total Acidity (HCL): ≤ 1 ppm weight.

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

🔹 Oils

Use a polyol ester (POE) oil.

Consult **Climalife** regarding the viscosity of the oil selected for your system and the most suitable for your application.

🔹 Regulation

The use and implementation of R-450A are governed by the European Regulation N° 517/2014.

The recovery of R-450A is mandatory under the European Regulation N° 517/2014.

(Refer to regulations enforced in each country).

Thermodynamic properties of R-450A - Saturated state

Absolute pressure P (bar)	LIQUID					VAPOUR					Latent heat Lv (kJ/kg)
	Bubble point t' (°C)	Volume v' (dm ³ /kg)	Density ρ' (kg/dm ³)	Enthalpy h' (kJ/kg)	Entropy s' (kJ/kg.K)	Dew point t" (°C)	Volume v" (dm ³ /kg)	Density ρ" (kg/dm ³)	Enthalpy h" (kJ/kg)	Entropy s" (kJ/kg.K)	
0.070	-70	0.687	1.455	111.484	0.627	-69.46	2.206	0.453	342.206	1.761	230.722
0.100	-65	0.693	1.442	117.578	0.657	-64.45	1.581	0.632	345.547	1.751	227.969
0.140	-60	0.700	1.429	123.698	0.686	-59.45	1.155	0.866	348.912	1.741	225.214
0.192	-55	0.706	1.416	129.844	0.714	-54.44	0.858	1.165	352.295	1.733	222.451
0.260	-50	0.713	1.403	136.021	0.742	-49.43	0.648	1.543	355.691	1.726	219.671
0.345	-45	0.720	1.389	142.230	0.770	-44.42	0.497	2.013	359.095	1.719	216.865
0.452	-40	0.727	1.375	148.474	0.797	-39.41	0.386	2.591	362.502	1.714	214.028
0.585	-35	0.734	1.362	154.755	0.823	-34.41	0.304	3.295	365.904	1.709	211.149
0.746	-30	0.742	1.348	161.077	0.850	-29.4	0.241	4.141	369.298	1.705	208.222
0.941	-25	0.750	1.334	167.440	0.876	-24.39	0.194	5.152	372.678	1.702	205.238
1.013	-23.36	0.752	1.329	169.532	0.884	-22.75	0.181	5.521	373.780	1.701	204.248
1.174	-20	0.758	1.319	173.850	0.901	-19.38	0.158	6.347	376.039	1.699	202.189
1.451	-15	0.766	1.305	180.307	0.926	-14.38	0.129	7.751	379.374	1.696	199.076
1.776	-10	0.775	1.290	186.816	0.951	-9.37	0.107	9.389	382.680	1.695	195.864
2.155	-5	0.784	1.275	193.379	0.976	-4.37	0.089	11.289	385.949	1.693	192.570
2.594	0	0.794	1.260	200.000	1.000	0.64	0.074	13.480	389.176	1.692	189.176
3.098	5	0.804	1.244	206.683	1.024	5.64	0.063	15.997	392.355	1.691	185.672
3.675	10	0.814	1.228	213.432	1.048	10.64	0.053	18.876	395.479	1.690	182.047
4.329	15	0.825	1.212	220.253	1.072	15.64	0.045	22.159	398.541	1.690	178.289
5.069	20	0.837	1.195	227.149	1.095	20.64	0.039	25.890	401.533	1.689	174.384
5.900	25	0.849	1.177	234.129	1.119	25.64	0.033	30.123	404.446	1.689	170.317
6.831	30	0.863	1.159	241.198	1.142	30.64	0.029	34.917	407.270	1.689	166.072
7.867	35	0.877	1.141	248.364	1.165	35.64	0.025	40.342	409.992	1.689	161.628
9.017	40	0.892	1.122	255.637	1.188	40.63	0.022	46.480	412.599	1.689	156.961
10.289	45	0.908	1.102	263.027	1.211	45.62	0.019	53.429	415.073	1.689	152.046
11.691	50	0.925	1.081	270.547	1.234	50.61	0.016	61.306	417.395	1.688	146.849
13.231	55	0.945	1.059	278.211	1.257	55.6	0.014	70.259	419.540	1.688	141.329
14.918	60	0.966	1.035	286.038	1.280	60.59	0.012	80.472	421.478	1.687	135.439
16.761	65	0.990	1.010	294.055	1.304	65.57	0.011	92.186	423.169	1.685	129.115
18.772	70	1.017	0.984	302.292	1.327	70.55	0.009	105.721	424.564	1.683	122.272
20.959	75	1.047	0.955	310.795	1.351	75.52	0.008	121.526	425.591	1.681	114.796
23.336	80	1.084	0.923	319.631	1.376	80.49	0.007	140.259	426.147	1.677	106.516
25.916	85	1.127	0.887	328.903	1.401	85.45	0.006	162.957	426.071	1.672	97.168
28.715	90	1.183	0.845	338.790	1.428	90.41	0.005	191.425	425.087	1.665	86.297
31.752	95	1.260	0.794	349.662	1.456	95.35	0.004	229.365	422.639	1.654	72.977
35.054	100	1.385	0.722	362.570	1.490	100.26	0.003	287.322	417.177	1.636	54.607

Thermodynamic properties of R-450A - (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
-70	0.067	2289.876	2347.540	2405.091	2462.550	2519.933	2577.250	2634.512	2691.725	2748.896	2806.029	2863.129	2920.199	2977.242	3034.260	3091.257	3148.233	3205.191	3262.132	3319.058	3375.970	3432.869
-65	0.096	1638.124	1678.647	1719.074	1759.422	1799.703	1839.928	1880.104	1920.237	1960.331	2000.392	2040.423	2080.427	2120.407	2160.364	2200.301	2240.219	2280.121	2320.008	2359.880	2399.740	2439.587
-60	0.135	1194.602	1223.688	1252.691	1281.625	1310.501	1339.326	1368.108	1396.852	1425.561	1454.240	1482.892	1511.519	1540.123	1568.708	1597.274	1625.823	1654.356	1682.876	1711.382	1739.877	1768.360
-55	0.186	886.626	907.917	929.136	950.293	971.400	992.461	1013.483	1034.471	1055.427	1076.356	1097.261	1118.142	1139.003	1159.846	1180.672	1201.482	1222.278	1243.060	1263.831	1284.591	1305.340
-50	0.251	668.746	684.621	700.431	716.186	731.895	747.564	763.197	778.798	794.372	809.920	825.446	840.951	856.437	871.906	887.359	902.798	918.224	933.638	949.041	964.433	979.816
-45	0.334	511.925	523.965	535.947	547.880	559.771	571.625	583.447	595.240	607.008	618.752	630.475	642.180	653.867	665.538	677.195	688.838	700.469	712.089	723.699	735.299	746.890
-40	0.439	397.236	406.516	415.744	424.926	434.070	443.180	452.261	461.315	470.346	479.355	488.345	497.318	506.274	515.216	524.144	533.060	541.964	550.858	559.743	568.618	577.486
-35	0.567	312.110	319.371	326.584	333.756	340.892	347.997	355.075	362.128	369.160	376.172	383.166	390.143	397.106	404.055	410.992	417.917	424.831	431.736	438.632	445.519	452.399
-30	0.725	248.051	253.814	259.532	265.212	270.859	276.477	282.070	287.641	293.191	298.722	304.237	309.737	315.223	320.696	326.157	331.608	337.049	342.480	347.904	353.319	358.727
-25	0.915	199.227	203.862	208.456	213.013	217.541	222.041	226.518	230.973	235.410	239.829	244.233	248.623	253.000	257.365	261.718	266.062	270.397	274.723	279.041	283.352	287.656
-22.75	1.013	181.120	185.341	189.521	193.666	197.782	201.872	205.939	209.985	214.013	218.024	222.020	226.002	229.972	233.930	237.878	241.815	245.744	249.665	253.577	257.483	261.382
-20	1.144	161.568	165.344	169.080	172.783	176.457	180.107	183.733	187.341	190.930	194.503	198.062	201.607	205.140	208.662	212.174	215.676	219.170	222.656	226.134	229.605	233.070
-15	1.414	132.198	135.310	138.386	141.429	144.446	147.439	150.411	153.365	156.302	159.223	162.131	165.026	167.910	170.784	173.647	176.502	179.349	182.188	185.020	187.845	190.665
-10	1.733	109.053	111.648	114.208	116.737	119.242	121.723	124.185	126.630	129.058	131.472	133.874	136.263	138.641	141.010	143.369	145.721	148.064	150.400	152.730	155.053	157.371
-5	2.104	90.637	92.824	94.977	97.102	99.202	101.281	103.341	105.385	107.413	109.428	111.431	113.422	115.403	117.375	119.338	121.293	123.240	125.181	127.116	129.045	130.968
0	2.535	75.850	77.712	79.542	81.344	83.123	84.882	86.623	88.348	90.058	91.755	93.441	95.116	96.782	98.438	100.086	101.727	103.360	104.987	106.609	108.224	109.835
5	3.030	63.875	65.476	67.046	68.590	70.111	71.613	73.097	74.566	76.022	77.464	78.896	80.318	81.730	83.134	84.529	85.918	87.300	88.676	90.046	91.411	92.771
10	3.596	54.099	55.489	56.849	58.183	59.496	60.789	62.066	63.328	64.577	65.814	67.041	68.257	69.465	70.664	71.856	73.041	74.219	75.392	76.559	77.722	78.879
15	4.240	46.059	47.277	48.465	49.628	50.771	51.894	53.002	54.095	55.176	56.245	57.303	58.353	59.393	60.426	61.452	62.471	63.484	64.491	65.493	66.490	67.483
20	4.968	39.399	40.475	41.523	42.546	43.548	44.532	45.500	46.455	47.397	48.328	49.249	50.161	51.064	51.960	52.849	53.732	54.609	55.480	56.346	57.208	58.066
25	5.788	33.844	34.804	35.735	36.642	37.529	38.397	39.250	40.090	40.918	41.734	42.541	43.339	44.129	44.912	45.688	46.458	47.222	47.981	48.736	49.485	50.231
30	6.705	29.182	30.046	30.880	31.691	32.481	33.253	34.011	34.755	35.487	36.208	36.920	37.623	38.319	39.007	39.689	40.365	41.035	41.701	42.362	43.018	43.671
35	7.729	25.245	26.029	26.783	27.513	28.222	28.914	29.591	30.255	30.907	31.549	32.181	32.805	33.421	34.030	34.633	35.230	35.822	36.409	36.992	37.570	38.144
40	8.865	21.900	22.618	23.305	23.968	24.610	25.234	25.843	26.439	27.024	27.598	28.163	28.720	29.269	29.812	30.348	30.879	31.404	31.925	32.441	32.954	33.462
45	10.124	19.043	19.706	20.338	20.944	21.529	22.096	22.648	23.186	23.714	24.231	24.739	25.238	25.731	26.217	26.697	27.171	27.640	28.105	28.565	29.021	29.474
50	11.511	16.588	17.207	17.792	18.351	18.888	19.406	19.909	20.399	20.878	21.346	21.805	22.257	22.703	23.138	23.569	23.996	24.417	24.833	25.246	25.655	26.060
55	13.038	14.468	15.051	15.598	16.117	16.613	17.090	17.552	18.000	18.437	18.863	19.281	19.690	20.093	20.489	20.879	21.263	21.643	22.019	22.390	22.758	23.122
60	14.712	12.626	13.182	13.698	14.183	14.645	15.087	15.513	15.925	16.326	16.717	17.098	17.472	17.838	18.198	18.553	18.902	19.246	19.586	19.922	20.255	20.584
65	16.543	11.553	12.044	12.502	12.934	13.346	13.742	14.124	14.493	14.853	15.203	15.546	15.881	16.210	16.533	16.852	17.165	17.474	17.780	18.081	18.380	18.679
70	18.543	9.603	10.127	10.598	11.034	11.442	11.828	12.198	12.553	12.896	13.228	13.553	13.867	14.175	14.477	14.773	15.064	15.351	15.633	15.912	16.187	16.459
75	20.722	8.351	8.871	9.329	9.747	10.134	10.499	10.846	11.178	11.497	11.806	12.106	12.397	12.682	12.960	13.232	13.500	13.763	14.022	14.277	14.529	14.779
80	23.093	7.233	7.759	8.210	8.614	8.984	9.331	9.658	9.970	10.269	10.557	10.835	11.106	11.370	11.627	11.879	12.125	12.368	12.606	12.840	13.071	13.299
85	25.673	6.223	6.770	7.219	7.612	7.969	8.300	8.610	8.904	9.185	9.455	9.715	9.967	10.212	10.451	10.684	10.913	11.137	11.356	11.572	11.785	11.995
90	28.477	5.296	5.883	6.337	6.724	7.070	7.387	7.683	7.961	8.226	8.480	8.723	8.959	9.187	9.410	9.626	9.838	10.046	10.249	10.449	10.645	10.839
95	31.531	4.420	5.083	5.549	5.933	6.270	6.575	6.858	7.122	7.373	7.612	7.841	8.062	8.275	8.483	8.684	8.881	9.074	9.263	9.448	9.630	9.809
100	34.871	3.530	4.355	4.840	5.223	5.553	5.848	6.119	6.371	6.609	6.834	7.050	7.257	7.457	7.651	7.839	8.023	8.202	8.378	8.550	8.718	8.884

Thermodynamic properties of R-450A - (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
-70	0.067	341.847	345.328	348.855	352.428	356.046	359.711	363.421	367.177	370.977	374.822	378.710	382.644	386.617	390.635	394.695	398.798	402.942	407.129	411.356	415.625	419.935
-65	0.096	345.181	348.720	352.304	355.932	359.604	363.321	367.083	370.889	374.738	378.631	382.568	386.547	390.568	394.632	398.737	402.885	407.074	411.304	415.575	419.887	424.239
-60	0.135	348.538	352.137	355.777	359.461	363.187	366.957	370.771	374.627	378.526	382.468	386.452	390.479	394.547	398.657	402.808	407.000	411.233	415.508	419.827	424.178	428.573
-55	0.186	351.915	355.573	359.271	363.010	366.792	370.615	374.481	378.388	382.337	386.329	390.361	394.435	398.550	402.707	406.904	411.141	415.420	419.738	424.097	428.496	432.935
-50	0.251	355.304	359.023	362.780	366.576	370.413	374.291	378.209	382.168	386.168	390.209	394.291	398.413	402.576	406.779	411.022	415.306	419.629	423.993	428.396	432.839	437.321
-45	0.334	358.702	362.483	366.300	370.154	374.047	377.980	381.951	385.963	390.015	394.106	398.238	402.409	406.620	410.870	415.161	419.490	423.860	428.269	432.717	437.204	441.731
-40	0.439	362.103	365.947	369.825	373.739	377.689	381.678	385.705	389.770	393.874	398.017	402.198	406.419	410.679	414.978	419.316	423.693	428.109	432.563	437.057	441.589	446.160
-35	0.567	365.501	369.411	373.352	377.326	381.336	385.382	389.464	393.584	397.741	401.937	406.170	410.442	414.751	419.099	423.485	427.910	432.373	436.874	441.413	445.991	450.607
-30	0.725	368.891	372.869	376.875	380.912	384.982	389.086	393.226	397.402	401.614	405.863	410.149	414.472	418.832	423.230	427.666	432.139	436.649	441.198	445.784	450.408	455.070
-25	0.915	372.269	376.316	380.389	384.491	388.623	392.788	396.987	401.220	405.489	409.792	414.132	418.508	422.920	427.368	431.854	436.376	440.936	445.532	450.166	454.836	459.544
-22.75	1.013	373.780	377.860	381.964	386.095	390.257	394.450	398.675	402.935	407.229	411.558	415.922	420.322	424.757	429.229	433.738	438.282	442.864	447.482	452.137	456.829	461.558
-20	1.144	375.627	379.748	383.890	388.059	392.256	396.483	400.743	405.035	409.361	413.721	418.115	422.545	427.010	431.511	436.047	440.620	445.229	449.874	454.556	459.274	464.029
-15	1.414	378.962	383.159	387.374	391.611	395.875	400.167	404.489	408.842	413.227	417.645	422.096	426.581	431.100	435.654	440.243	444.867	449.526	454.221	458.952	463.719	468.521
-10	1.733	382.267	386.544	390.834	395.144	399.477	403.836	408.223	412.638	417.084	421.561	426.070	430.612	435.187	439.795	444.437	449.114	453.825	458.570	463.351	468.167	473.018
-5	2.104	385.538	389.898	394.267	398.653	403.058	407.486	411.939	416.420	420.925	425.467	430.035	434.635	439.267	443.931	448.628	453.358	458.122	462.919	467.751	472.617	477.518
0	2.535	388.768	393.216	397.668	402.132	406.612	411.112	415.635	420.183	424.756	429.358	433.988	438.648	443.338	448.059	452.812	457.597	462.414	467.265	472.148	477.065	482.016
5	3.030	391.951	396.492	401.031	405.577	410.136	414.711	419.306	423.923	428.564	433.231	437.924	442.646	447.396	452.176	456.986	461.827	466.700	471.604	476.541	481.510	486.513
10	3.596	395.081	399.720	404.351	408.984	413.625	418.278	422.948	427.638	432.348	437.082	441.841	446.626	451.438	456.278	461.148	466.060	471.026	476.035	481.086	486.179	491.304
15	4.240	398.150	402.894	407.623	412.347	417.074	421.809	426.557	431.322	436.105	440.909	445.735	450.586	455.462	460.364	465.294	470.252	475.239	480.255	485.302	490.379	495.487
20	4.968	401.152	406.008	410.839	415.660	420.477	425.299	430.129	434.972	439.831	444.707	449.604	454.522	459.464	464.430	469.422	474.441	479.487	484.562	489.665	494.798	499.960
25	5.788	404.076	409.052	413.994	418.917	423.831	428.743	433.659	438.584	443.521	448.473	453.442	458.431	463.441	468.473	473.529	478.611	483.718	488.852	494.013	499.203	504.421
30	6.705	406.913	412.019	417.080	422.113	427.128	432.136	437.143	442.154	447.173	452.203	457.248	462.309	467.390	472.490	477.612	482.758	487.928	493.123	498.344	503.592	508.867
35	7.729	409.651	414.900	420.089	425.239	430.363	435.473	440.575	445.676	450.781	455.894	461.017	466.154	471.307	476.478	481.669	486.881	492.115	497.373	502.655	507.962	513.296
40	8.865	412.276	417.682	422.888	433.529	438.747	443.951	449.147	454.342	459.541	464.746	469.962	475.191	480.435	485.696	490.976	496.276	501.599	506.944	512.313	517.706	
45	10.124	414.772	420.354	425.837	431.253	436.620	441.953	447.264	452.561	457.851	463.140	468.431	473.729	479.036	484.356	489.690	495.041	500.410	505.798	511.208	516.640	522.095
50	11.511	417.119	422.900	428.555	434.122	439.626	445.084	450.510	455.914	461.304	466.687	472.051	477.451	482.841	488.239	493.649	499.073	504.512	509.969	515.445	520.945	526.459
55	13.038	419.292	425.303	431.152	436.887	442.539	448.132	453.681	459.199	464.695	470.178	475.632	481.126	486.601	492.081	497.569	503.068	508.581	514.109	519.653	525.216	530.798
60	14.712	421.262	427.543	433.612	439.534	445.350	451.089	456.770	462.410	468.019	473.608	479.182	484.749	490.315	495.878	501.448	507.026	512.614	518.219	523.852	529.506	535.108
65	16.543	422.991	429.595	435.918	442.051	448.048	453.947	459.772	465.542	471.272	476.972	482.651	488.316	493.974	499.628	505.282	510.941	516.607	522.283	527.970	533.677	539.389
70	18.543	424.428	431.428	438.049	444.422	450.621	456.695	462.676	468.587	474.445	480.265	486.054	491.824	497.579	503.325	509.069	514.812	520.559	526.312	532.075	537.849	543.636
75	20.722	425.503	433.003	439.979	446.628	453.055	459.324	465.475	471.538	477.535	483.481	489.388	495.266	501.124	506.968	512.803	518.634	524.465	530.299	536.139	541.986	547.847
80	23.093	426.117	434.271	441.678	448.650	455.335	461.820	468.159	474.388	480.533	486.614	492.645	498.639	504.605	510.551	516.482	522.405	528.323	534.240	540.161	546.086	552.020
85	25.673	426.110	435.166	443.110	450.462	457.444	464.171	470.716	477.125	483.431	489.656	495.820	501.937	508.017	514.069	520.101	526.118	532.127	538.131	544.135	550.140	556.151
90	28.477	425.212	435.599	444.228	452.037	459.360	466.361	473.134	479.740	486.219	492.600	498.905	505.151	511.351	517.515	523.652	529.769	535.873	541.967	548.056	554.144	560.234
95	31.531	422.880	435.453	444.977	453.338	461.058	468.368	475.395	482.216	488.883	495.431	501.886	508.270	514.597	520.879	527.127	533.348	539.550	545.738	551.916	558.090	564.262
100	34.871	417.608	434.554	445.277	454.312	462.494	470.156	477.466	484.524	491.396	498.124	504.742	511.273	517.734	524.142	530.506	536.837	543.142	549.428	555.700	561.963	568.220

Thermodynamic properties of R-450A - (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
-70	0.067	1.763	1.780	1.796	1.813	1.829	1.846	1.862	1.878	1.893	1.909	1.925	1.940	1.955	1.970	1.985	2.000	2.015	2.030	2.044	2.059	2.073
-65	0.096	1.752	1.769	1.785	1.802	1.818	1.834	1.850	1.866	1.881	1.897	1.912	1.928	1.943	1.958	1.973	1.987	2.002	2.017	2.031	2.045	2.060
-60	0.135	1.742	1.759	1.775	1.792	1.808	1.824	1.840	1.855	1.871	1.886	1.902	1.917	1.932	1.947	1.961	1.976	1.991	2.005	2.020	2.034	2.048
-55	0.186	1.734	1.750	1.767	1.783	1.799	1.815	1.831	1.846	1.862	1.877	1.892	1.907	1.922	1.937	1.952	1.966	1.981	1.995	2.009	2.023	2.037
-50	0.251	1.726	1.743	1.759	1.775	1.791	1.807	1.823	1.838	1.853	1.869	1.884	1.899	1.913	1.928	1.943	1.957	1.972	1.986	2.000	2.014	2.028
-45	0.334	1.720	1.736	1.752	1.768	1.784	1.800	1.816	1.831	1.846	1.861	1.876	1.891	1.906	1.921	1.935	1.949	1.964	1.978	1.992	2.006	2.020
-40	0.439	1.714	1.731	1.747	1.763	1.778	1.794	1.809	1.825	1.840	1.855	1.870	1.885	1.899	1.914	1.928	1.943	1.957	1.971	1.985	1.999	2.013
-35	0.567	1.710	1.726	1.742	1.758	1.773	1.789	1.804	1.819	1.835	1.849	1.864	1.879	1.894	1.908	1.922	1.937	1.951	1.965	1.979	1.993	2.006
-30	0.725	1.705	1.722	1.738	1.753	1.769	1.784	1.800	1.815	1.830	1.845	1.860	1.874	1.889	1.903	1.917	1.932	1.946	1.960	1.973	1.987	2.001
-25	0.915	1.702	1.718	1.734	1.750	1.765	1.781	1.796	1.811	1.826	1.841	1.855	1.870	1.884	1.899	1.913	1.927	1.941	1.955	1.969	1.983	1.996
-22.75	1.013	1.701	1.717	1.733	1.748	1.764	1.779	1.794	1.810	1.824	1.839	1.854	1.868	1.883	1.897	1.911	1.925	1.939	1.953	1.967	1.981	1.994
-20	1.144	1.699	1.715	1.731	1.747	1.762	1.778	1.793	1.808	1.823	1.837	1.852	1.867	1.881	1.895	1.909	1.923	1.937	1.951	1.965	1.979	1.992
-15	1.414	1.697	1.713	1.729	1.744	1.760	1.775	1.790	1.805	1.820	1.835	1.849	1.864	1.878	1.892	1.906	1.920	1.934	1.948	1.962	1.975	1.989
-10	1.733	1.695	1.711	1.727	1.742	1.758	1.773	1.788	1.803	1.818	1.832	1.847	1.861	1.876	1.890	1.904	1.918	1.932	1.945	1.959	1.973	1.986
-5	2.104	1.693	1.709	1.725	1.741	1.756	1.771	1.786	1.801	1.816	1.831	1.845	1.860	1.874	1.888	1.902	1.916	1.930	1.943	1.957	1.970	1.984
0	2.535	1.692	1.708	1.724	1.740	1.755	1.770	1.785	1.800	1.815	1.829	1.844	1.858	1.872	1.886	1.900	1.914	1.928	1.942	1.955	1.969	1.982
5	3.030	1.691	1.707	1.723	1.739	1.754	1.769	1.784	1.799	1.814	1.828	1.843	1.857	1.871	1.885	1.899	1.913	1.927	1.940	1.954	1.967	1.981
10	3.596	1.690	1.707	1.722	1.738	1.754	1.769	1.784	1.799	1.813	1.828	1.842	1.857	1.871	1.885	1.899	1.912	1.926	1.940	1.953	1.966	1.980
15	4.240	1.690	1.706	1.722	1.738	1.753	1.769	1.784	1.798	1.813	1.828	1.842	1.856	1.870	1.884	1.898	1.912	1.926	1.939	1.953	1.966	1.979
20	4.968	1.689	1.706	1.722	1.738	1.753	1.768	1.784	1.798	1.813	1.828	1.842	1.856	1.870	1.884	1.898	1.912	1.925	1.939	1.952	1.966	1.979
25	5.788	1.689	1.706	1.722	1.738	1.753	1.769	1.784	1.799	1.813	1.828	1.842	1.857	1.871	1.885	1.898	1.912	1.926	1.939	1.953	1.966	1.979
30	6.705	1.689	1.706	1.722	1.738	1.754	1.769	1.784	1.799	1.814	1.828	1.843	1.857	1.871	1.885	1.899	1.913	1.926	1.940	1.953	1.966	1.979
35	7.729	1.689	1.706	1.722	1.738	1.754	1.770	1.785	1.800	1.814	1.829	1.843	1.858	1.872	1.886	1.900	1.913	1.927	1.940	1.954	1.967	1.980
40	8.865	1.689	1.706	1.723	1.739	1.755	1.770	1.785	1.800	1.815	1.830	1.844	1.859	1.873	1.887	1.900	1.914	1.928	1.941	1.955	1.968	1.981
45	10.124	1.689	1.706	1.723	1.739	1.755	1.771	1.786	1.801	1.816	1.831	1.845	1.860	1.874	1.888	1.902	1.915	1.929	1.942	1.956	1.969	1.982
50	11.511	1.688	1.706	1.723	1.740	1.756	1.772	1.787	1.802	1.817	1.832	1.846	1.861	1.875	1.889	1.903	1.916	1.930	1.944	1.957	1.970	1.983
55	13.038	1.688	1.706	1.723	1.740	1.756	1.772	1.788	1.803	1.818	1.833	1.848	1.862	1.876	1.890	1.904	1.918	1.931	1.945	1.958	1.971	1.985
60	14.712	1.687	1.705	1.723	1.740	1.757	1.773	1.789	1.804	1.819	1.834	1.849	1.863	1.878	1.892	1.906	1.919	1.933	1.946	1.960	1.973	1.986
65	16.543	1.685	1.705	1.723	1.741	1.757	1.774	1.790	1.805	1.821	1.836	1.850	1.865	1.879	1.893	1.907	1.921	1.935	1.948	1.961	1.975	1.988
70	18.543	1.684	1.704	1.723	1.741	1.758	1.774	1.791	1.806	1.822	1.837	1.852	1.866	1.881	1.895	1.909	1.923	1.936	1.950	1.963	1.976	1.990
75	20.722	1.681	1.702	1.722	1.741	1.758	1.775	1.791	1.807	1.823	1.838	1.853	1.868	1.882	1.896	1.910	1.924	1.938	1.952	1.965	1.978	1.991
80	23.093	1.678	1.701	1.721	1.740	1.758	1.775	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	1.993
85	25.673	1.673	1.698	1.720	1.739	1.758	1.776	1.793	1.809	1.825	1.841	1.856	1.871	1.885	1.900	1.914	1.928	1.942	1.955	1.969	1.982	1.995
90	28.477	1.666	1.694	1.717	1.738	1.757	1.776	1.793	1.810	1.826	1.842	1.857	1.872	1.887	1.901	1.915	1.929	1.943	1.957	1.971	1.984	1.997
95	31.531	1.655	1.689	1.715	1.737	1.757	1.775	1.793	1.810	1.827	1.842	1.858	1.873	1.888	1.903	1.917	1.931	1.945	1.959	1.972	1.986	1.999
100	34.871	1.638	1.683	1.711	1.734	1.755	1.775	1.793	1.810	1.827	1.843	1.859	1.874	1.889	1.904	1.918	1.933	1.947	1.960	1.974	1.987	2.001