

# R-410A

Zeotropic blend (50 % R-32 - 50 % R-125)

Molecular weight (g/mol) .....	72.59
Melting point (°C) .....	N/A
Boiling point (at 1.013 bar) .....	-51.45
Temperature glide at 1.013 bar (K) .....	0.08
Critical temperature (°C) .....	71.3
Critical pressure (bar absolute) .....	49.01
Specific heat (liquid) at + 25°C (kJ/kg.K) .....	1.708
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K) .....	0.823
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar .....	1.176
Viscosity (liquid) at + 25°C in Centipoise (10 <sup>-3</sup> Pa.s) .....	0.118
Surface tension at + 25°C in dyne per centimetre (10 <sup>-3</sup> N/m) .....	5.32
Classification NF-EN 378 .....	A1
GWP (IPCC 4) .....	2088

## 🔍 Main applications

R-410A is a "near azeotropic" HFC blend. It is mainly used in air conditioning and industrial refrigeration applications.

## 🔍 Commercial specifications

Composition: (50 % R-32 - 50 % R-125) (+0.5 % -1.5 % / +1.5 % -0.5 %).

Purity: ≥ 99.5 % weight.

Water content: ≤ 10 ppm weight.

Chloride ion test: negative.

Acidity (HCl): ≤ 1 ppm weight.

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

High boiling residue: ≤ 0.01 % volume.

## 🔍 Oils

Use a polyol ester (POE) oil.

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

## 🔍 Regulation

The use of HFCs are restricted by the European Union Regulation n° 517/2014.

Recovery of halogenated refrigerants is compulsory as defined by the European regulation n° 517/2014.

(For their use, pay attention to the regulation of your country).

## Thermodynamic properties of R-410A - Saturated state

Absolute pressure P (bar)	LIQUID					VAPOUR					Latent heat Lv (kJ/kg)
	Bubble point t' (°C)	Volume v' (dm <sup>3</sup> /kg)	Density ρ' (kg/dm <sup>3</sup> )	Enthalpy h' (kJ/kg)	Entropy s' (kJ/kg.K)	Dew point t" (°C)	Volume v" (m <sup>3</sup> /kg)	Density ρ" (kg/m <sup>3</sup> )	Enthalpy h" (kJ/kg)	Entropy s" (kJ/kg.K)	
0.037	-100	0.669	1.495	60.715	0.370	-99.89	5.315	0.188	371.819	2.167	311.104
0.058	-95	0.676	1.480	67.452	0.409	-94.9	3.518	0.284	374.776	2.133	307.324
0.087	-90	0.682	1.466	74.178	0.446	-89.9	2.392	0.418	377.721	2.103	303.543
0.128	-85	0.689	1.451	80.900	0.482	-84.91	1.666	0.600	380.646	2.075	299.746
0.184	-80	0.696	1.436	87.625	0.517	-79.91	1.187	0.842	383.546	2.049	295.921
0.258	-75	0.703	1.422	94.358	0.552	-74.92	0.863	1.159	386.414	2.025	292.056
0.356	-70	0.711	1.407	101.105	0.585	-69.92	0.639	1.566	389.243	2.003	288.138
0.482	-65	0.719	1.392	107.870	0.618	-64.92	0.481	2.079	392.027	1.983	284.157
0.642	-60	0.727	1.376	114.658	0.650	-59.92	0.368	2.720	394.761	1.964	280.103
0.843	-55	0.735	1.361	121.475	0.682	-54.92	0.285	3.510	397.439	1.947	275.965
1.013	-51.45	0.741	1.350	126.337	0.704	-51.37	0.240	4.173	399.305	1.935	272.968
1.090	-50	0.743	1.345	128.325	0.713	-49.92	0.224	4.471	400.056	1.930	271.732
1.391	-45	0.752	1.329	135.213	0.743	-44.92	0.178	5.629	402.606	1.915	267.393
1.755	-40	0.762	1.313	142.146	0.773	-39.92	0.143	7.013	405.083	1.901	262.937
2.189	-35	0.771	1.297	149.128	0.803	-34.92	0.116	8.653	407.480	1.887	258.352
2.703	-30	0.781	1.280	156.166	0.832	-29.91	0.094	10.583	409.791	1.875	253.625
3.305	-25	0.792	1.263	163.267	0.861	-24.91	0.078	12.841	412.008	1.863	248.741
4.007	-20	0.803	1.245	170.438	0.889	-19.91	0.065	15.467	414.122	1.851	243.684
4.816	-15	0.815	1.227	177.687	0.917	-14.91	0.054	18.507	416.124	1.840	238.437
5.746	-10	0.827	1.209	185.024	0.945	-9.9	0.045	22.015	418.003	1.830	232.979
6.805	-5	0.841	1.190	192.458	0.973	-4.9	0.038	26.049	419.746	1.820	227.288
8.007	0	0.855	1.170	200.000	1.000	0.1	0.033	30.679	421.337	1.810	221.337
9.362	5	0.870	1.150	207.664	1.027	5.11	0.028	35.984	422.758	1.801	215.094
10.884	10	0.886	1.128	215.464	1.055	10.11	0.024	42.061	423.985	1.791	208.521
12.584	15	0.904	1.106	223.417	1.082	15.11	0.020	49.024	424.991	1.781	201.574
14.476	20	0.923	1.083	231.542	1.109	20.12	0.018	57.013	425.742	1.772	194.200
16.574	25	0.945	1.059	239.863	1.137	25.12	0.015	66.205	426.199	1.762	186.336
18.993	30	0.968	1.033	248.409	1.165	30.12	0.013	76.825	426.312	1.751	177.903
21.449	35	0.995	1.005	257.216	1.193	35.12	0.011	89.169	426.018	1.740	168.803
24.256	40	1.025	0.975	266.335	1.221	40.12	0.010	103.645	425.235	1.728	158.900
27.335	45	1.061	0.943	275.839	1.250	45.12	0.008	120.837	423.842	1.715	148.003
30.706	50	1.103	0.907	285.847	1.280	50.11	0.007	141.641	421.658	1.700	135.811
34.391	55	1.155	0.865	296.567	1.312	55.1	0.006	167.562	418.381	1.683	121.814
38.418	60	1.226	0.815	308.414	1.346	60.09	0.005	201.485	413.436	1.661	105.023
42.824	65	1.336	0.748	322.432	1.386	65.07	0.004	250.452	405.451	1.632	83.018
47.653	70	1.612	0.620	344.096	1.448	70.04	0.003	347.672	388.198	1.576	44.102

## Thermodynamic properties of R-410A - (superheated vapour) - Volume (dm<sup>3</sup>/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	0.037	5366.424	5525.028	5683.165	5840.941	5998.425	6155.672	6312.721	6469.604	6626.348	6782.973	6939.497	7095.934	7252.296	7408.593	7564.834	7721.026	7877.174	8033.285	8189.362	8345.410	8501.431
-95	0.057	3546.900	3649.604	3751.906	3853.899	3955.644	4057.187	4158.562	4259.796	4360.910	4461.922	4562.847	4663.696	4764.481	4865.209	4965.887	5066.523	5167.120	5267.684	5368.219	5468.727	5569.212
-90	0.086	2408.988	2477.510	2545.681	2613.587	2681.280	2748.799	2816.175	2883.429	2950.581	3017.644	3084.632	3151.554	3218.420	3285.236	3352.008	3418.743	3485.444	3552.115	3618.760	3685.381	3751.982
-85	0.127	1676.973	1723.961	1770.641	1817.091	1863.356	1909.473	1955.465	2001.352	2047.150	2092.872	2138.527	2184.126	2229.674	2275.180	2320.646	2366.080	2411.483	2456.860	2502.213	2547.546	2592.859
-80	0.183	1193.791	1226.836	1259.611	1292.184	1324.597	1356.880	1389.054	1421.138	1453.143	1485.088	1516.966	1548.797	1580.585	1612.334	1644.049	1675.735	1707.393	1739.028	1770.642	1802.237	1833.815
-75	0.257	867.267	891.055	914.604	937.975	961.206	984.323	1007.346	1030.290	1053.165	1075.982	1098.748	1121.470	1144.153	1166.801	1189.420	1212.012	1234.580	1257.126	1279.654	1302.165	1324.660
-70	0.354	641.797	659.294	676.579	693.706	710.710	727.615	744.436	761.187	777.879	794.518	811.113	827.668	844.189	860.679	877.143	893.582	910.000	926.399	942.781	959.147	975.499
-65	0.480	483.002	496.131	509.071	521.871	534.562	547.164	559.694	572.161	584.576	596.944	609.272	621.566	633.828	646.063	658.274	670.464	682.634	694.787	706.924	719.048	731.158
-60	0.640	369.111	379.146	389.012	398.754	408.398	417.964	427.465	436.910	446.309	455.666	464.988	474.278	483.540	492.778	501.995	511.191	520.370	529.534	538.683	547.820	556.945
-55	0.839	286.046	293.849	301.501	309.040	316.493	323.876	331.201	338.477	345.710	352.906	360.071	367.207	374.318	381.406	388.475	395.527	402.562	409.583	416.592	423.588	430.574
-51.37	1.013	239.625	246.191	252.616	258.938	265.180	271.357	277.481	283.559	289.597	295.602	301.576	307.525	313.450	319.354	325.240	331.110	336.965	342.806	348.635	354.453	360.261
-50	1.086	224.520	230.685	236.713	242.641	248.492	254.279	260.014	265.705	271.357	276.977	282.567	288.132	293.674	299.197	304.701	310.189	315.662	321.123	326.571	332.009	337.437
-45	1.386	178.291	183.234	188.054	192.784	197.444	202.046	206.602	211.117	215.598	220.049	224.474	228.875	233.256	237.618	241.964	246.295	250.613	254.919	259.214	263.499	267.774
-40	1.749	143.093	147.111	151.019	154.844	158.607	162.317	165.985	169.616	173.216	176.788	180.336	183.864	187.372	190.863	194.340	197.803	201.253	204.693	208.122	211.544	214.954
-35	2.181	115.961	119.271	122.480	125.614	128.691	131.720	134.710	137.667	140.595	143.498	146.379	149.241	152.085	154.914	157.729	160.531	163.322	166.103	168.874	171.637	174.392
-30	2.693	94.808	97.566	100.234	102.833	105.379	107.882	110.349	112.785	115.195	117.582	119.949	122.297	124.630	126.948	129.253	131.547	133.830	136.103	138.368	140.625	142.875
-25	3.294	78.138	80.464	82.707	84.887	87.018	89.109	91.167	93.197	95.202	97.186	99.151	101.100	103.033	104.953	106.862	108.759	110.647	112.525	114.396	116.259	118.115
-20	3.993	64.870	66.854	68.760	70.608	72.411	74.177	75.912	77.620	79.306	80.972	82.621	84.254	85.873	87.480	89.075	90.660	92.236	93.804	95.364	96.917	98.464
-15	4.800	54.212	55.921	57.558	59.141	60.681	62.187	63.664	65.119	66.548	67.961	69.357	70.739	72.108	73.465	74.811	76.148	77.477	78.797	80.111	81.417	82.718
-10	5.727	45.574	47.062	48.481	49.850	51.180	52.476	53.746	54.992	56.219	57.428	58.621	59.801	60.968	62.125	63.271	64.409	65.538	66.660	67.776	68.885	69.988
-5	6.783	38.517	39.824	41.067	42.262	43.420	44.546	45.648	46.727	47.787	48.830	49.859	50.875	51.879	52.873	53.857	54.833	55.801	56.763	57.717	58.666	59.610
0	7.981	32.705	33.865	34.964	36.017	37.034	38.021	38.984	39.926	40.850	41.758	42.653	43.534	44.405	45.266	46.118	46.961	47.798	48.628	49.451	50.269	51.082
5	9.332	27.884	28.923	29.904	30.839	31.741	32.613	33.462	34.291	35.103	35.899	36.683	37.454	38.214	38.966	39.708	40.443	41.171	41.893	42.608	43.319	44.024
10	10.848	23.856	24.797	25.679	26.518	27.324	28.101	28.856	29.591	30.309	31.013	31.703	32.383	33.052	33.712	34.364	35.008	35.646	36.278	36.904	37.525	38.142
15	12.543	20.469	21.329	22.130	22.889	23.614	24.312	24.988	25.644	26.284	26.910	27.524	28.126	28.719	29.303	29.879	30.448	31.011	31.567	32.119	32.665	33.203
20	14.430	17.601	18.396	19.131	19.823	20.481	21.112	21.721	22.312	22.886	23.446	23.995	24.533	25.061	25.581	26.093	26.598	27.098	27.591	28.080	28.563	29.043
25	16.522	15.158	15.900	16.581	17.217	17.819	18.394	18.947	19.481	20.000	20.505	20.998	21.481	21.955	22.420	22.878	23.330	23.775	24.216	24.651	25.081	25.507
30	18.835	13.063	13.765	14.401	14.991	15.546	16.073	16.578	17.065	17.536	17.994	18.440	18.876	19.304	19.723	20.135	20.540	20.940	21.334	21.724	22.109	22.490
35	21.385	11.255	11.928	12.528	13.080	13.595	14.082	14.546	14.992	15.423	15.840	16.246	16.642	17.029	17.408	17.781	18.147	18.507	18.863	19.213	19.560	19.902
40	24.187	9.683	10.338	10.911	11.431	11.912	12.365	12.794	13.205	13.601	13.983	14.354	14.715	15.068	15.413	15.751	16.083	16.410	16.732	17.049	17.362	17.671
45	27.261	8.305	8.955	9.507	10.001	10.454	10.878	11.277	11.658	12.023	12.375	12.716	13.047	13.370	13.685	13.994	14.296	14.593	14.886	15.174	15.457	15.738
50	30.628	7.085	7.743	8.283	8.757	9.186	9.584	9.958	10.312	10.651	10.977	11.291	11.596	11.892	12.182	12.464	12.741	13.012	13.279	13.542	13.800	14.055
55	34.313	5.989	6.676	7.210	7.688	8.078	8.454	8.805	9.137	9.452	9.755	10.046	10.328	10.601	10.867	11.127	11.381	11.630	11.874	12.115	12.351	12.584
60	38.344	4.980	5.730	6.266	6.712	7.105	7.463	7.794	8.105	8.400	8.682	8.953	9.214	9.467	9.713	9.953	10.187	10.416	10.640	10.861	11.077	11.290
65	42.760	4.007	4.885	5.431	5.869	6.248	6.589	6.903	7.196	7.473	7.736	7.989	8.232	8.467	8.694	8.916	9.132	9.343	9.550	9.753	9.952	10.147
70	47.617	2.887	4.129	4.689	5.121	5.487	5.814	6.112	6.389	6.649	6.896	7.132	7.358	7.576	7.788	7.993	8.193	8.388	8.579	8.766	8.949	9.129

## Thermodynamic properties of R-410A - (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	0.037	371.753	374.957	378.185	381.439	384.721	388.032	391.373	394.746	398.150	401.588	405.058	408.562	412.101	415.674	419.283	422.927	426.607	430.323	434.075	437.865	441.691
-95	0.057	374.715	377.975	381.254	384.556	387.885	391.241	394.626	398.042	401.489	404.968	408.480	412.025	415.604	419.218	422.867	426.550	430.270	434.026	437.818	441.647	445.513
-90	0.086	377.864	380.984	384.318	387.673	391.051	394.455	397.887	401.348	404.839	408.361	411.916	415.504	419.125	422.780	426.470	430.195	433.955	437.752	441.585	445.454	449.361
-85	0.127	380.593	383.979	387.373	390.783	394.214	397.669	401.150	404.658	408.196	411.764	415.363	418.994	422.659	426.357	430.089	433.857	437.659	441.498	445.372	449.283	453.231
-80	0.183	383.496	386.953	390.412	393.882	397.369	400.878	404.410	407.968	411.555	415.170	418.816	422.493	426.203	429.945	433.722	437.533	441.379	445.260	449.177	453.131	457.121
-75	0.257	386.366	389.901	393.429	396.963	400.510	404.076	407.663	411.274	414.911	418.576	422.271	425.996	429.752	433.541	437.363	441.219	445.109	449.035	452.996	456.993	461.026
-70	0.354	389.197	392.816	396.419	400.021	403.632	407.258	410.903	414.569	418.260	421.978	425.723	429.498	433.303	437.140	441.009	444.912	448.848	452.819	456.826	460.867	464.945
-65	0.480	391.983	395.692	399.375	403.051	406.730	410.420	414.125	417.850	421.597	425.369	429.168	432.995	436.851	440.737	444.656	448.607	452.591	456.609	460.662	464.749	468.872
-60	0.640	394.718	398.525	402.293	406.046	409.797	413.555	417.324	421.111	424.918	428.747	432.601	436.482	440.391	444.330	448.299	452.300	456.333	460.400	464.500	468.635	472.805
-55	0.839	397.398	401.307	405.167	409.002	412.829	416.658	420.496	424.347	428.216	432.105	436.018	439.955	443.919	447.912	451.934	455.986	460.071	464.187	468.337	472.521	476.739
-51.37	1.013	399.305	403.294	407.222	411.120	415.005	418.889	422.778	426.678	430.594	434.529	438.485	442.465	446.471	450.504	454.566	458.657	462.780	466.934	471.120	475.340	479.594
-50	1.086	400.015	404.034	407.990	411.912	415.820	419.724	423.634	427.553	431.487	435.439	439.413	443.409	447.431	451.479	455.556	459.663	463.800	467.968	472.169	476.402	480.670
-45	1.386	402.566	406.700	410.758	414.772	418.765	422.749	426.733	430.724	434.726	438.744	442.781	446.839	450.921	455.028	459.162	463.324	467.515	471.737	475.991	480.276	484.594
-40	1.749	405.043	409.299	413.464	417.576	421.658	425.725	429.788	433.854	437.929	442.016	446.119	450.241	454.385	458.553	462.746	466.966	471.214	475.491	479.798	484.137	488.507
-35	2.181	407.441	411.825	416.103	420.317	424.493	428.649	432.795	436.939	441.089	445.248	449.421	453.610	457.819	462.050	466.304	470.584	474.890	479.225	483.588	487.982	492.406
-30	2.693	409.753	414.271	418.668	422.990	427.266	431.514	435.747	439.974	444.202	448.437	452.682	456.941	461.218	465.514	469.832	474.174	478.541	482.934	487.356	491.806	496.286
-25	3.294	411.970	416.630	421.153	425.588	429.969	434.314	438.639	442.953	447.263	451.576	455.897	460.229	464.576	468.941	473.325	477.731	482.161	486.616	491.097	495.606	500.142
-20	3.993	414.085	418.895	423.550	428.106	432.596	437.044	441.465	445.870	450.267	454.662	459.062	463.471	467.891	472.326	476.780	481.252	485.747	490.265	494.808	499.377	503.973
-15	4.800	416.088	421.057	425.853	430.535	435.142	439.698	444.220	448.720	453.207	457.689	462.172	466.660	471.157	475.666	480.191	484.733	489.295	493.878	498.485	503.119	507.773
-10	5.727	417.968	423.107	428.052	432.868	437.598	442.268	446.896	451.497	456.080	460.652	465.222	469.792	474.369	478.955	483.554	488.168	492.800	497.451	502.124	506.819	511.539
-5	6.783	419.712	425.033	430.137	435.097	439.957	444.748	449.489	454.195	458.878	463.546	468.206	472.864	477.523	482.190	486.866	491.555	496.259	500.980	505.721	510.483	515.267
0	7.981	421.306	426.823	432.118	437.211	442.111	447.130	451.991	456.809	461.598	466.366	471.120	475.869	480.616	485.365	490.122	494.888	499.667	504.462	509.273	514.104	518.955
5	9.332	422.729	428.461	433.922	439.200	444.349	449.406	454.394	459.332	464.232	469.105	473.960	478.803	483.641	488.478	493.318	498.165	503.022	507.892	512.776	517.677	522.597
10	10.848	423.960	429.930	435.594	441.052	446.364	451.568	456.693	461.756	466.775	471.759	476.719	481.662	486.594	491.522	496.449	501.380	506.318	511.266	516.222	521.197	526.192
15	12.543	424.971	431.209	437.100	442.756	448.244	453.608	458.878	464.077	469.220	474.322	479.392	484.440	489.472	494.494	499.513	504.531	509.555	514.582	519.621	524.671	529.736
20	14.430	425.728	432.276	438.123	444.298	449.890	455.516	460.943	466.286	471.562	476.788	481.974	487.132	492.269	497.391	502.504	507.613	512.723	517.836	522.956	528.085	533.226
25	16.522	426.192	433.103	439.453	445.664	451.558	457.283	462.879	468.375	473.794	479.151	484.461	489.734	494.980	500.206	505.418	510.622	515.823	521.023	526.228	531.438	536.658
30	18.835	426.314	433.662	440.439	446.837	452.967	458.897	464.676	470.338	475.908	481.405	486.845	492.240	497.601	502.936	508.252	513.555	518.850	524.142	529.434	534.729	540.030
35	21.385	426.031	433.914	441.087	447.800	454.192	460.348	466.326	472.166	477.897	483.543	489.121	494.645	500.127	505.576	511.001	516.407	521.801	527.188	532.570	537.954	543.338
40	24.187	425.260	433.815	441.457	448.531	455.217	461.622	467.816	473.849	479.753	485.558	491.282	496.943	502.552	508.122	513.660	519.175	524.672	530.156	535.633	541.107	546.580
45	27.261	423.882	433.310	441.517	449.008	456.024	462.705	469.136	475.377	481.468	487.442	493.322	499.127	504.871	510.567	516.225	518.852	527.457	533.044	538.620	544.187	549.751
50	30.628	421.716	432.323	441.223	449.201	456.593	463.580	470.271	476.738	483.031	489.187	495.233	501.190	507.077	512.906	518.689	524.435	530.152	535.847	541.524	547.190	552.847
55	34.313	418.461	430.757	440.525	449.077	456.899	464.228	471.206	477.919	484.430	490.780	497.003	503.124	509.161	515.131	521.046	526.916	532.750	538.557	544.341	550.108	555.864
60	38.344	413.544	428.484	439.360	448.597	456.911	464.625	471.919	478.902	485.648	492.209	498.622	504.916	511.113	517.231	523.285	529.285	535.243	541.167	547.062	552.936	558.793
65	42.760	405.597	425.338	437.655	447.712	456.592	464.739	472.384	479.663	486.666	493.453	500.070	506.549	512.916	519.191	525.392	531.530	537.618	543.664	549.676	555.660	561.623
70	47.617	388.431	421.121	435.314	446.351	455.885	464.521	472.557	480.162	487.445	494.478	501.314	507.992	514.541	520.985	527.341	533.625	539.850	546.025	552.160	558.261	564.335

## Thermodynamic properties of R-410A - (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	0.037	2.167	2.186	2.203	2.221	2.238	2.256	2.272	2.288	2.304	2.320	2.336	2.351	2.367	2.382	2.397	2.412	2.427	2.441	2.455	2.470	2.484
-95	0.057	2.134	2.152	2.170	2.187	2.204	2.221	2.237	2.253	2.269	2.285	2.301	2.316	2.331	2.346	2.361	2.376	2.390	2.405	2.419	2.433	2.447
-90	0.086	2.103	2.121	2.139	2.156	2.173	2.189	2.206	2.222	2.237	2.253	2.269	2.284	2.299	2.314	2.328	2.343	2.357	2.372	2.386	2.400	2.414
-85	0.127	2.075	2.093	2.110	2.127	2.144	2.161	2.177	2.193	2.208	2.224	2.239	2.254	2.269	2.284	2.298	2.313	2.327	2.341	2.355	2.369	2.383
-80	0.183	2.050	2.067	2.084	2.101	2.118	2.134	2.150	2.166	2.181	2.197	2.212	2.227	2.242	2.256	2.271	2.285	2.299	2.314	2.327	2.341	2.355
-75	0.257	2.026	2.043	2.061	2.077	2.094	2.110	2.126	2.141	2.157	2.172	2.187	2.202	2.217	2.231	2.246	2.260	2.274	2.288	2.302	2.316	2.329
-70	0.354	2.004	2.021	2.038	2.055	2.072	2.088	2.103	2.119	2.134	2.149	2.164	2.179	2.194	2.208	2.222	2.237	2.251	2.265	2.278	2.292	2.306
-65	0.480	1.983	2.001	2.018	2.035	2.051	2.067	2.083	2.098	2.114	2.129	2.143	2.158	2.173	2.187	2.201	2.215	2.229	2.243	2.257	2.270	2.284
-60	0.640	1.965	1.982	1.999	2.016	2.032	2.048	2.064	2.079	2.094	2.109	2.124	2.139	2.153	2.167	2.182	2.196	2.210	2.223	2.237	2.250	2.264
-55	0.839	1.947	1.965	1.982	1.998	2.015	2.031	2.046	2.062	2.077	2.092	2.106	2.121	2.135	2.150	2.164	2.178	2.191	2.205	2.219	2.232	2.245
-51.37	1.013	1.935	1.953	1.970	1.987	2.003	2.019	2.034	2.050	2.065	2.080	2.094	2.109	2.123	2.137	2.151	2.165	2.179	2.193	2.206	2.220	2.233
-50	1.086	1.931	1.948	1.966	1.982	1.998	2.014	2.030	2.045	2.060	2.075	2.090	2.104	2.119	2.133	2.147	2.161	2.175	2.188	2.202	2.215	2.229
-45	1.386	1.915	1.933	1.950	1.967	1.983	1.999	2.015	2.030	2.045	2.060	2.075	2.089	2.104	2.118	2.132	2.145	2.159	2.173	2.186	2.200	2.213
-40	1.749	1.901	1.919	1.936	1.953	1.969	1.985	2.001	2.016	2.031	2.046	2.061	2.075	2.089	2.104	2.117	2.131	2.145	2.158	2.172	2.185	2.198
-35	2.181	1.888	1.906	1.923	1.940	1.956	1.972	1.988	2.003	2.018	2.033	2.048	2.062	2.076	2.090	2.104	2.118	2.132	2.145	2.159	2.172	2.185
-30	2.693	1.875	1.893	1.911	1.928	1.944	1.960	1.976	1.991	2.006	2.021	2.036	2.050	2.064	2.078	2.092	2.106	2.120	2.133	2.146	2.160	2.173
-25	3.294	1.863	1.882	1.899	1.916	1.933	1.949	1.964	1.980	1.995	2.010	2.024	2.039	2.053	2.067	2.081	2.095	2.108	2.122	2.135	2.148	2.161
-20	3.993	1.852	1.870	1.888	1.905	1.922	1.938	1.954	1.969	1.984	1.999	2.014	2.028	2.043	2.057	2.071	2.084	2.098	2.111	2.125	2.138	2.151
-15	4.800	1.841	1.860	1.878	1.895	1.912	1.928	1.944	1.959	1.975	1.989	2.004	2.019	2.033	2.047	2.061	2.075	2.088	2.102	2.115	2.128	2.141
-10	5.727	1.830	1.850	1.868	1.885	1.902	1.919	1.934	1.950	1.965	1.980	1.995	2.009	2.024	2.038	2.052	2.065	2.079	2.092	2.106	2.119	2.132
-5	6.783	1.820	1.840	1.858	1.876	1.893	1.910	1.926	1.941	1.957	1.972	1.986	2.001	2.015	2.029	2.043	2.057	2.071	2.084	2.097	2.111	2.124
0	7.981	1.810	1.830	1.849	1.867	1.884	1.901	1.917	1.933	1.948	1.963	1.978	1.993	2.007	2.021	2.035	2.049	2.063	2.076	2.090	2.103	2.116
5	9.332	1.801	1.821	1.840	1.858	1.876	1.893	1.909	1.925	1.940	1.956	1.971	1.985	2.000	2.014	2.028	2.042	2.055	2.069	2.082	2.095	2.108
10	10.848	1.791	1.812	1.832	1.850	1.868	1.885	1.901	1.917	1.933	1.948	1.963	1.978	1.992	2.007	2.021	2.035	2.048	2.062	2.075	2.088	2.102
15	12.543	1.782	1.803	1.823	1.842	1.860	1.877	1.894	1.910	1.926	1.941	1.956	1.971	1.986	2.000	2.014	2.028	2.042	2.055	2.069	2.082	2.095
20	14.430	1.772	1.794	1.815	1.834	1.852	1.870	1.887	1.903	1.919	1.934	1.950	1.965	1.979	1.994	2.008	2.022	2.036	2.049	2.063	2.076	2.089
25	16.522	1.762	1.785	1.806	1.826	1.844	1.862	1.879	1.896	1.912	1.928	1.943	1.958	1.973	1.988	2.002	2.016	2.030	2.043	2.057	2.070	2.083
30	18.835	1.752	1.776	1.797	1.818	1.837	1.855	1.872	1.889	1.906	1.922	1.937	1.952	1.967	1.982	1.996	2.010	2.024	2.038	2.051	2.065	2.078
35	21.385	1.740	1.766	1.789	1.810	1.829	1.848	1.866	1.883	1.899	1.915	1.931	1.946	1.961	1.976	1.991	2.005	2.019	2.033	2.046	2.060	2.073
40	24.187	1.729	1.756	1.780	1.801	1.821	1.841	1.859	1.878	1.893	1.909	1.925	1.941	1.956	1.971	1.985	2.000	2.014	2.027	2.041	2.055	2.068
45	27.261	1.715	1.745	1.770	1.793	1.814	1.833	1.852	1.870	1.887	1.903	1.919	1.935	1.950	1.965	1.980	1.994	2.009	2.023	2.036	2.050	2.063
50	30.628	1.701	1.733	1.760	1.784	1.806	1.826	1.845	1.863	1.881	1.897	1.914	1.930	1.945	1.960	1.975	1.990	2.004	2.018	2.032	2.045	2.059
55	34.313	1.683	1.721	1.750	1.775	1.797	1.818	1.838	1.857	1.874	1.891	1.908	1.924	1.940	1.955	1.970	1.985	1.999	2.013	2.027	2.041	2.054
60	38.344	1.662	1.706	1.738	1.765	1.789	1.810	1.831	1.850	1.868	1.885	1.902	1.919	1.934	1.950	1.965	1.980	1.994	2.009	2.023	2.036	2.050
65	42.760	1.632	1.690	1.726	1.755	1.780	1.802	1.823	1.843	1.861	1.879	1.896	1.913	1.929	1.945	1.960	1.975	1.990	2.004	2.018	2.032	2.046
70	47.617	1.577	1.672	1.712	1.743	1.770	1.793	1.815	1.835	1.854	1.873	1.890	1.907	1.923	1.939	1.955	1.970	1.985	1.999	2.013	2.027	2.041