

R-455A (Solstice® L40X)

Zeotropic blend (3 % R-744 - 21.5 % R-32 - 75.5 % R-1234yf)

Molecular weight (g/mol)	87.45
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-52.03
Temperature glide at 1.013 bar (K)	12.85
Critical temperature (°C)	87.5
Critical pressure (bar absolute)	48.22
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.567
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.890
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.131
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.127
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	6.99
Classification NF-EN 378	A2L
GWP (IPCC 4)	148

🔍 Main applications

R-455A is a mildly flammable, "non azeotropic" blend designed to serve as an alternative for low, medium and high temperature applications in new systems and has a GWP <150.

Its thermodynamic performance allows it to be used as a replacement for R-22 and R-404A in low and medium temperature refrigeration.

🔍 Commercial specifications

Composition: 75.5 % R-1234yf – 21.5 % R-32 – 3 % R-744 (±2.0 %).

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 application and the most suitable for your application.

🔍 Regulation

The use and implementation of R-455A are governed by the European Regulation N° 517/2014.

The recovery of R-455A is mandatory under the European Regulation N° 517/2014.

(Refer to regulations enforced in each country).

Thermodynamic properties of R-455A - 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" (m ³ /kg)	Density ρ" (kg/m ³)	Enthalpy h" (kJ/kg)	Entropy s" (kJ/kg.K)	
0.052	-100	0.708	1.413	68.885	0.407	-86.89	3.378	0.296	338.815	1.897	269.930
0.077	-95	0.714	1.401	75.370	0.444	-81.9	2.338	0.428	341.977	1.877	266.607
0.112	-90	0.720	1.389	81.767	0.480	-76.9	1.655	0.604	345.155	1.859	263.388
0.158	-85	0.726	1.377	88.106	0.514	-71.92	1.196	0.836	348.342	1.842	260.236
0.219	-80	0.733	1.364	94.411	0.547	-66.93	0.881	1.135	351.535	1.827	257.124
0.299	-75	0.740	1.351	100.701	0.579	-61.96	0.660	1.515	354.728	1.813	254.027
0.400	-70	0.747	1.338	106.993	0.610	-56.99	0.502	1.990	357.916	1.801	250.923
0.528	-65	0.755	1.325	113.298	0.641	-52.02	0.388	2.577	361.093	1.790	247.796
0.686	-60	0.762	1.312	119.627	0.671	-47.07	0.304	3.292	364.256	1.780	244.629
0.879	-55	0.770	1.298	125.991	0.700	-42.12	0.241	4.156	367.399	1.771	241.408
1.013	-52.03	0.775	1.290	129.790	0.717	-39.18	0.211	4.747	369.254	1.766	239.464
1.113	-50	0.779	1.284	132.396	0.729	-37.17	0.193	5.187	370.516	1.763	238.120
1.394	-45	0.787	1.270	138.849	0.758	-32.24	0.156	6.409	373.603	1.755	234.754
1.727	-40	0.796	1.256	145.357	0.786	-27.31	0.127	7.844	376.653	1.748	231.297
2.118	-35	0.806	1.241	151.925	0.813	-22.4	0.105	9.518	379.662	1.742	227.737
2.574	-30	0.816	1.226	158.558	0.841	-17.49	0.087	11.458	382.621	1.737	224.064
3.101	-25	0.826	1.211	165.261	0.868	-12.6	0.073	13.694	385.525	1.732	220.264
3.706	-20	0.837	1.195	172.039	0.895	-7.71	0.062	16.259	388.366	1.727	216.327
4.397	-15	0.848	1.179	178.897	0.921	-2.84	0.052	19.187	391.135	1.723	212.239
5.179	-10	0.860	1.163	185.839	0.948	2.02	0.044	22.517	393.823	1.719	207.984
6.061	-5	0.873	1.146	192.872	0.974	6.86	0.038	26.295	396.421	1.715	203.549
7.049	0	0.886	1.129	200.000	1.000	11.68	0.033	30.567	398.915	1.712	198.915
8.151	5	0.900	1.111	207.230	1.026	16.49	0.028	35.391	401.294	1.708	194.064
9.375	10	0.915	1.093	214.568	1.052	21.27	0.024	40.829	403.543	1.705	188.975
10.728	15	0.931	1.074	222.023	1.077	26.03	0.021	46.957	405.647	1.702	183.624
12.216	20	0.949	1.054	229.602	1.103	30.77	0.019	53.860	407.586	1.698	177.984
13.849	25	0.968	1.033	237.318	1.128	35.48	0.016	61.644	409.340	1.695	172.022
15.633	30	0.988	1.012	245.184	1.154	40.16	0.014	70.433	410.883	1.691	165.699
17.577	35	1.011	0.989	253.218	1.180	44.81	0.012	80.385	412.182	1.687	158.964
19.686	40	1.036	0.966	261.445	1.205	49.42	0.011	91.696	413.199	1.683	151.754
21.970	45	1.064	0.940	269.895	1.231	53.98	0.010	104.620	413.885	1.677	143.990
24.434	50	1.095	0.913	278.609	1.258	58.5	0.008	119.497	414.173	1.672	135.564
27.085	55	1.132	0.883	287.642	1.285	62.95	0.007	136.801	413.977	1.665	126.335
29.928	60	1.176	0.851	297.073	1.312	67.33	0.006	157.221	413.169	1.657	116.096
32.968	65	1.229	0.814	307.024	1.341	71.61	0.005	181.836	411.555	1.647	104.531
36.204	70	1.297	0.771	317.708	1.371	75.76	0.005	212.499	408.813	1.634	91.105
39.624	75	1.380	0.719	329.551	1.404	79.72	0.004	252.887	404.317	1.617	74.767
43.178	80	1.539	0.650	343.672	1.443	83.32	0.003	312.476	396.521	1.592	52.848

Thermodynamic properties of R-455A - (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	0.016	10032.078	10324.427	10616.514	10908.384	11200.069	11491.599	11782.994	12074.273	12365.453	12656.545	12947.562	13238.511	13529.403	13820.242	14111.037	14401.791	14692.509	14983.195	15273.853	15564.486	15855.096
-95	0.026	6474.050	6658.086	6841.899	7025.524	7208.992	7392.325	7575.541	7758.657	7941.686	8124.638	8307.524	8490.351	8673.127	8855.857	9038.547	9221.201	9403.823	9586.416	9768.985	9951.530	10134.056
-90	0.040	4299.315	4418.749	4537.990	4657.069	4776.012	4894.837	5013.562	5132.198	5250.759	5369.252	5487.687	5606.069	5724.407	5842.703	5960.964	6079.193	6197.394	6315.569	6433.722	6551.854	6669.968
-85	0.061	2930.417	3010.123	3089.661	3169.059	3248.338	3327.515	3406.603	3485.615	3564.559	3643.444	3722.277	3801.065	3879.812	3958.523	4037.202	4115.852	4194.477	4273.080	4351.661	4430.225	4508.772
-80	0.089	2045.290	2099.870	2154.303	2208.613	2262.819	2316.936	2370.974	2424.946	2478.857	2532.717	2586.530	2640.303	2694.040	2747.745	2801.421	2855.072	2908.700	2962.307	3015.896	3069.468	3123.025
-75	0.128	1458.725	1496.978	1535.122	1573.158	1611.101	1648.966	1686.763	1724.499	1762.183	1799.814	1837.418	1874.978	1912.507	1950.006	1987.480	2024.931	2062.362	2099.774	2137.169	2174.549	2211.915
-70	0.180	1061.086	1088.520	1115.840	1143.064	1170.207	1197.281	1224.293	1251.253	1278.166	1305.037	1331.872	1358.675	1385.449	1412.197	1438.921	1465.626	1492.311	1518.980	1545.634	1572.274	1598.902
-65	0.248	785.897	805.967	825.935	845.818	865.629	885.378	905.073	924.720	944.326	963.895	983.432	1002.939	1022.420	1041.878	1061.316	1080.734	1100.136	1119.522	1138.895	1158.255	1177.604
-60	0.336	591.760	606.722	621.594	636.390	651.121	665.798	680.426	695.011	709.559	724.075	738.560	753.020	767.456	781.871	796.267	810.647	825.011	839.361	853.699	868.025	882.340
-55	0.448	452.360	463.713	474.984	486.188	497.334	508.431	519.484	530.499	541.480	552.431	563.357	574.258	585.138	595.999	606.843	617.672	628.486	639.288	650.079	660.859	671.629
-50	0.588	350.616	359.372	368.055	376.677	385.248	393.774	402.260	410.712	419.134	427.529	435.900	444.250	452.580	460.893	469.190	477.473	485.744	494.003	502.251	510.489	518.719
-45	0.762	275.223	282.080	288.872	295.609	302.299	308.949	315.563	322.146	328.701	335.232	341.742	348.231	354.703	361.160	367.602	374.031	380.448	386.854	393.251	399.639	406.019
-40	0.974	218.566	224.015	229.403	234.742	240.038	245.298	250.525	255.724	260.898	266.050	271.181	276.295	281.393	286.476	291.546	296.604	301.651	306.689	311.717	316.737	321.750
-39.18	1.013	210.670	215.923	221.118	226.263	231.367	236.434	241.470	246.477	251.460	256.421	261.363	266.286	271.194	276.088	280.968	285.837	290.695	295.544	300.383	305.215	310.039
-35	1.231	175.432	179.819	184.152	188.439	192.688	196.903	201.088	205.248	209.385	213.501	217.599	221.681	225.747	229.801	233.842	237.872	241.893	245.904	249.907	253.902	257.890
-30	1.538	142.191	145.768	149.296	152.782	156.233	159.653	163.046	166.415	169.763	173.092	176.404	179.701	182.984	186.256	189.515	192.765	196.005	199.237	202.461	205.678	208.889
-25	1.903	116.282	119.235	122.141	125.010	127.845	130.652	133.434	136.194	138.935	141.658	144.366	147.060	149.741	152.410	155.069	157.719	160.359	162.992	165.618	168.237	170.850
-20	2.332	95.875	98.339	100.761	103.147	105.503	107.832	110.139	112.425	114.692	116.944	119.181	121.406	123.617	125.819	128.010	130.193	132.368	134.535	136.696	138.850	140.999
-15	2.832	79.642	81.720	83.760	85.766	87.743	89.696	91.628	93.540	95.436	97.317	99.183	101.038	102.882	104.715	106.540	108.356	110.164	111.966	113.761	115.550	117.334
-10	3.412	66.608	68.380	70.114	71.818	73.494	75.148	76.782	78.397	79.997	81.582	83.155	84.718	86.267	87.809	89.342	90.867	92.385	93.896	95.401	96.901	98.395
-5	4.079	56.052	57.577	59.067	60.527	61.962	63.376	64.770	66.147	67.509	68.858	70.195	71.521	72.837	74.145	75.444	76.735	78.020	79.299	80.572	81.840	83.103
0	4.842	47.433	48.758	50.049	51.313	52.552	53.771	54.971	56.156	57.326	58.483	59.629	60.765	61.891	63.009	64.119	65.222	66.319	67.410	68.495	69.576	70.651
5	5.710	40.340	41.502	42.632	43.735	44.815	45.875	46.917	47.944	48.957	49.958	50.948	51.929	52.900	53.864	54.820	55.769	56.713	57.653	58.589	59.521	60.443
10	6.692	34.461	35.490	36.487	37.458	38.406	39.335	40.248	41.145	42.029	42.902	43.764	44.617	45.461	46.298	47.127	47.950	48.768	49.579	50.386	51.188	51.986
15	7.798	29.555	30.474	31.361	32.223	33.063	33.884	34.688	35.478	36.256	37.022	37.778	38.525	39.264	39.995	40.720	41.438	42.151	42.859	43.562	44.260	44.955
20	9.037	25.433	26.261	27.058	27.829	28.578	29.309	30.023	30.724	31.412	32.090	32.758	33.415	34.067	34.711	35.349	35.980	36.606	37.227	37.843	38.455	39.063
25	10.422	21.948	22.701	23.422	24.118	24.791	25.446	26.086	26.712	27.325	27.928	28.522	29.106	29.684	30.254	30.818	31.376	31.929	32.477	33.021	33.560	34.096
30	11.964	18.984	19.675	20.333	20.965	21.575	22.167	22.743	23.306	23.856	24.396	24.927	25.449	25.964	26.472	26.974	27.471	27.962	28.448	28.931	29.409	29.883
35	13.675	16.447	17.088	17.694	18.273	18.829	19.367	19.890	20.398	20.895	21.382	21.859	22.329	22.791	23.246	23.695	24.139	24.578	25.012	25.442	25.868	26.291
40	15.568	14.264	14.863	15.426	15.964	16.472	16.964	17.441	17.904	18.355	18.797	19.229	19.652	20.069	20.479	20.883	21.282	21.676	22.066	22.451	22.833	23.211
45	17.660	12.373	12.940	13.467	13.964	14.438	14.892	15.329	15.753	16.166	16.568	16.960	17.345	17.723	18.094	18.460	18.820	19.176	19.527	19.874	20.217	20.557
50	19.966	10.725	11.268	11.767	12.233	12.674	13.095	13.500	13.890	14.268	14.637	14.996	15.347	15.691	16.029	16.361	16.688	17.010	17.328	17.642	17.952	18.259
55	22.506	9.279	9.806	10.282	10.723	11.137	11.530	11.906	12.268	12.617	12.956	13.286	13.608	13.923	14.231	14.534	14.832	15.125	15.414	15.699	15.980	16.259
60	25.303	7.999	8.519	8.979	9.400	9.791	10.161	10.512	10.848	11.172	11.486	11.790	12.086	12.376	12.659	12.936	13.208	13.476	13.740	13.999	14.256	14.509
65	28.386	6.855	7.378	7.828	8.233	8.606	8.955	9.285	9.600	9.902	10.193	10.475	10.749	11.015	11.276	11.531	11.781	12.026	12.267	12.505	12.739	12.970
70	31.793	5.817	6.356	6.803	7.197	7.555	7.887	8.199	8.495	8.777	9.048	9.310	9.564	9.811	10.052	10.286	10.516	10.742	10.963	11.181	11.396	11.607
75	35.585	4.850	5.429	5.881	6.268	6.614	6.931	7.227	7.506	7.771	8.025	8.269	8.505	8.734	8.957	9.174	9.386	9.594	9.798	9.998	10.195	10.388
80	39.881	3.900	4.564	5.030	5.415	5.753	6.058	6.340	6.604	6.854	7.092	7.320	7.540	7.753	7.959	8.160	8.356	8.548	8.735	8.919	9.100	9.278

Thermodynamic properties of R-455A - (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	0.016	330.642	333.821	337.050	340.328	343.657	347.036	350.466	353.946	357.477	361.057	364.688	368.369	372.099	375.878	379.707	383.585	387.511	391.486	395.509	399.579	403.697
-95	0.026	333.736	336.973	340.259	343.594	346.979	350.414	353.898	357.432	361.016	364.650	368.334	372.066	375.848	379.679	383.558	387.486	391.462	395.487	399.558	403.678	407.844
-90	0.040	336.861	340.157	343.502	346.895	350.337	353.827	357.367	360.956	364.595	368.282	372.018	375.803	379.637	383.519	387.450	391.428	395.454	399.528	403.649	407.817	412.031
-85	0.061	340.011	343.369	346.774	350.226	353.726	357.274	360.870	364.515	368.208	371.950	375.739	379.577	383.463	387.397	391.379	395.408	399.484	403.607	407.777	411.994	416.257
-80	0.089	343.182	346.604	350.071	353.584	357.144	360.750	364.404	368.105	371.854	375.650	379.494	383.385	387.324	391.310	395.343	399.423	403.549	407.722	411.942	416.207	420.518
-75	0.128	346.370	349.858	353.389	356.965	360.585	364.252	367.964	371.723	375.528	379.380	383.278	387.224	391.215	395.254	399.339	403.470	407.647	411.871	416.139	420.454	424.814
-70	0.180	349.569	353.126	356.724	360.364	364.047	367.774	371.546	375.364	379.227	383.135	387.089	391.089	395.135	399.227	403.364	407.547	411.775	416.049	420.368	424.731	429.140
-65	0.248	352.775	356.404	360.070	363.776	367.524	371.314	375.148	379.025	382.946	386.912	390.923	394.978	399.079	403.224	407.414	411.650	415.929	420.254	424.623	429.036	433.494
-60	0.336	355.984	359.686	363.423	367.198	371.012	374.867	378.763	382.701	386.683	390.707	394.775	398.887	403.043	407.243	411.487	415.775	420.107	424.483	428.903	433.366	437.873
-55	0.448	359.189	362.968	366.779	370.624	374.507	378.427	382.388	386.389	390.432	394.516	398.643	402.812	407.024	411.280	415.578	419.919	424.304	428.732	433.203	437.717	442.273
-50	0.588	362.386	366.245	370.132	374.050	378.003	381.992	386.019	390.084	394.189	398.335	402.521	406.749	411.019	415.330	419.683	424.079	428.517	432.998	437.520	442.085	446.692
-45	0.762	365.570	369.512	373.478	377.472	381.497	385.556	389.651	393.782	397.951	402.159	406.406	410.694	415.022	419.390	423.800	428.251	432.743	437.276	441.851	446.467	451.125
-40	0.974	368.736	372.765	376.812	380.884	384.984	389.115	393.279	397.478	401.712	405.984	410.294	414.642	419.029	423.456	427.923	432.430	436.977	441.564	446.192	450.860	455.569
-39.18	1.013	369.254	373.297	377.358	381.443	385.555	389.698	393.874	398.084	402.330	406.612	410.932	415.290	419.688	424.124	428.600	433.116	437.672	442.269	446.905	451.582	456.300
-35	1.231	371.879	375.997	380.129	384.281	388.458	392.663	396.899	401.167	405.469	409.807	414.180	418.590	423.038	427.524	432.049	436.612	441.215	445.857	450.539	455.260	460.021
-30	1.538	374.994	379.204	383.423	387.659	391.916	396.197	400.507	404.846	409.217	413.621	418.060	422.533	427.043	431.590	436.174	440.795	445.455	450.152	454.889	459.664	464.477
-25	1.903	378.074	382.380	386.690	391.012	395.351	399.711	404.097	408.509	412.951	417.424	419.929	426.468	431.041	435.649	440.293	444.974	449.691	454.445	459.237	464.066	468.933
-20	2.332	381.113	385.520	389.924	394.335	398.759	403.201	407.664	412.152	416.667	421.210	425.784	430.389	435.027	439.698	444.404	449.144	453.920	458.732	463.581	468.465	473.386
-15	2.832	384.105	388.616	393.118	397.621	402.134	406.660	411.204	415.770	420.359	424.975	429.619	434.292	438.996	443.732	448.501	453.303	458.139	463.010	467.915	472.856	477.832
-10	3.412	387.042	391.622	396.266	400.866	405.470	410.083	414.711	419.357	424.024	428.714	433.430	438.173	442.946	447.748	452.581	457.445	462.339	467.273	472.238	477.236	482.268
-5	4.079	389.916	394.560	399.362	404.062	408.761	413.465	418.180	422.909	427.655	432.423	437.213	442.028	446.870	451.740	456.639	461.568	466.528	471.520	476.543	481.600	486.689
0	4.842	392.717	397.573	402.396	410.201	416.800	421.604	426.419	431.249	436.095	440.962	445.852	450.765	455.705	460.671	465.666	470.690	475.745	480.829	485.946	491.093	496.276
5	5.710	395.435	400.419	405.362	410.280	415.183	420.081	424.979	429.883	434.798	439.727	444.673	449.639	454.627	459.638	464.674	469.736	474.826	479.944	485.092	490.269	495.476
10	6.692	398.058	403.180	408.250	413.285	418.299	423.300	428.297	433.294	438.298	443.313	448.341	453.386	458.449	463.534	468.642	473.774	478.931	484.115	489.326	494.566	499.834
15	7.998	400.571	405.843	411.049	416.211	421.341	426.451	431.551	436.646	441.743	446.846	451.959	457.086	462.229	467.390	472.571	477.775	483.001	488.250	493.529	498.833	504.163
20	9.037	402.958	408.395	413.749	419.045	424.300	429.526	434.734	439.932	445.126	450.322	455.524	460.735	465.960	471.200	476.457	481.734	487.032	492.353	497.697	503.066	508.460
25	10.422	405.203	410.821	416.336	421.778	427.166	432.515	437.838	443.144	448.440	453.733	459.027	464.328	469.637	474.959	480.295	485.648	491.020	496.412	501.826	507.262	512.722
30	11.964	407.282	413.103	418.796	424.396	429.927	435.408	440.854	446.274	451.678	457.073	462.464	467.857	473.255	478.662	484.080	489.512	494.960	500.426	505.911	511.417	516.944
35	13.675	409.169	415.221	421.112	426.885	432.572	438.195	443.772	449.314	454.832	460.334	465.828	471.317	476.808	482.303	487.806	493.320	498.847	504.389	509.948	515.525	521.122
40	15.568	410.833	417.150	423.262	429.228	435.086	440.863	446.580	452.253	457.893	463.509	469.110	474.701	480.289	485.877	491.469	497.068	502.677	508.298	513.933	519.584	525.252
45	17.660	412.300	418.857	425.224	431.405	437.452	443.398	449.268	455.081	460.850	466.588	472.303	478.002	483.691	489.376	495.061	500.749	506.443	512.146	517.861	523.588	529.330
50	19.966	413.306	420.066	426.966	433.939	439.650	445.782	451.819	457.784	463.694	469.561	475.397	481.210	487.007	492.794	498.575	504.356	510.139	515.928	521.725	527.531	533.350
55	22.506	413.987	421.446	428.544	435.162	441.658	447.997	454.218	460.348	466.409	472.416	478.381	484.315	490.226	496.120	502.004	507.883	513.759	519.637	525.519	531.406	537.306
60	25.303	414.167	422.210	429.640	436.678	443.446	450.018	456.443	462.755	468.980	475.137	481.241	487.305	493.337	499.346	505.337	511.318	517.292	523.263	529.235	535.210	541.191
65	28.386	413.686	422.508	430.661	437.893	444.977	451.814	458.467	464.980	471.385	477.706	483.960	490.163	496.324	502.454	508.561	514.650	520.726	526.796	532.861	538.926	544.994
70	31.793	412.278	422.203	430.827	438.739	446.196	453.338	460.250	466.988	473.593	480.093	486.511	492.864	499.165	505.425	511.654	517.858	524.044	530.217	536.381	542.541	548.699
75	35.585	409.433	421.065	430.592	439.107	447.014	454.515	461.725	468.720	475.549	482.249	488.847	495.365	501.818	508.219	514.580	520.908	527.211	533.494	539.764	546.024	552.278
80	39.881	403.889	418.625	429.454	438.767	447.243	455.182	462.749	470.044	477.133	484.063	490.866	497.570	504.193	510.751	517.258	523.722	530.153	536.558	542.943	549.312	555.670

Thermodynamic properties of R-455A - (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	0.016	1.962	1.980	1.998	2.015	2.033	2.050	2.067	2.084	2.101	2.117	2.134	2.150	2.166	2.182	2.198	2.214	2.230	2.245	2.261	2.276	2.291
-95	0.026	1.935	1.953	1.971	1.988	2.006	2.023	2.040	2.056	2.073	2.089	2.106	2.122	2.138	2.154	2.170	2.185	2.201	2.216	2.232	2.247	2.262
-90	0.040	1.911	1.929	1.946	1.964	1.981	1.998	2.015	2.031	2.048	2.064	2.080	2.096	2.112	2.128	2.144	2.159	2.175	2.190	2.205	2.221	2.236
-85	0.061	1.889	1.907	1.924	1.942	1.959	1.976	1.992	2.009	2.025	2.041	2.057	2.073	2.089	2.105	2.120	2.136	2.151	2.166	2.182	2.197	2.212
-80	0.089	1.870	1.887	1.905	1.922	1.939	1.955	1.972	1.988	2.004	2.021	2.037	2.053	2.068	2.084	2.099	2.115	2.130	2.145	2.160	2.175	2.190
-75	0.128	1.852	1.869	1.887	1.904	1.920	1.937	1.953	1.970	1.986	2.002	2.018	2.033	2.049	2.065	2.080	2.095	2.110	2.125	2.140	2.155	2.170
-70	0.180	1.836	1.853	1.870	1.887	1.904	1.920	1.937	1.953	1.969	1.985	2.001	2.016	2.032	2.047	2.063	2.078	2.093	2.108	2.123	2.137	2.152
-65	0.248	1.821	1.839	1.856	1.872	1.889	1.905	1.922	1.938	1.954	1.970	1.985	2.001	2.016	2.032	2.047	2.062	2.077	2.092	2.107	2.121	2.136
-60	0.336	1.808	1.825	1.842	1.859	1.876	1.892	1.908	1.924	1.940	1.956	1.971	1.987	2.002	2.018	2.033	2.048	2.063	2.077	2.092	2.107	2.121
-55	0.448	1.796	1.814	1.830	1.847	1.864	1.880	1.896	1.912	1.928	1.943	1.959	1.974	1.990	2.005	2.020	2.035	2.050	2.064	2.079	2.093	2.108
-50	0.588	1.786	1.803	1.820	1.836	1.853	1.869	1.885	1.901	1.917	1.932	1.948	1.963	1.978	1.993	2.008	2.023	2.038	2.053	2.067	2.082	2.096
-45	0.762	1.776	1.793	1.810	1.826	1.843	1.859	1.875	1.891	1.907	1.922	1.938	1.953	1.968	1.983	1.998	2.013	2.027	2.042	2.056	2.071	2.085
-40	0.974	1.767	1.784	1.801	1.818	1.834	1.850	1.866	1.882	1.898	1.913	1.928	1.944	1.959	1.974	1.989	2.003	2.018	2.032	2.047	2.061	2.075
-39.18	1.013	1.766	1.783	1.800	1.816	1.833	1.849	1.865	1.881	1.896	1.912	1.927	1.942	1.957	1.972	1.987	2.002	2.016	2.031	2.045	2.060	2.074
-35	1.231	1.759	1.776	1.793	1.810	1.826	1.842	1.858	1.874	1.889	1.905	1.920	1.935	1.950	1.965	1.980	1.995	2.009	2.024	2.038	2.053	2.067
-30	1.538	1.752	1.769	1.786	1.802	1.819	1.835	1.851	1.867	1.882	1.898	1.913	1.928	1.943	1.958	1.973	1.987	2.002	2.016	2.031	2.045	2.059
-25	1.903	1.745	1.763	1.779	1.796	1.812	1.828	1.844	1.860	1.876	1.891	1.906	1.921	1.936	1.951	1.966	1.981	1.995	2.009	2.024	2.038	2.052
-20	2.332	1.740	1.757	1.774	1.790	1.807	1.823	1.839	1.854	1.870	1.885	1.900	1.916	1.930	1.945	1.960	1.974	1.989	2.003	2.017	2.032	2.046
-15	2.832	1.734	1.751	1.768	1.785	1.801	1.818	1.833	1.849	1.865	1.880	1.895	1.910	1.925	1.940	1.955	1.969	1.984	1.998	2.012	2.026	2.040
-10	3.412	1.729	1.747	1.764	1.780	1.797	1.813	1.829	1.845	1.860	1.875	1.891	1.906	1.920	1.935	1.950	1.964	1.979	1.993	2.007	2.021	2.035
-5	4.079	1.725	1.742	1.759	1.776	1.793	1.809	1.825	1.840	1.856	1.871	1.886	1.901	1.916	1.931	1.946	1.960	1.974	1.989	2.003	2.017	2.031
0	4.842	1.721	1.738	1.755	1.772	1.789	1.805	1.821	1.837	1.852	1.868	1.883	1.898	1.913	1.927	1.942	1.956	1.971	1.985	1.999	2.013	2.027
5	5.710	1.717	1.734	1.752	1.769	1.785	1.802	1.818	1.833	1.849	1.864	1.879	1.894	1.909	1.924	1.939	1.953	1.967	1.982	1.996	2.010	2.023
10	6.692	1.713	1.731	1.748	1.765	1.782	1.798	1.814	1.830	1.846	1.861	1.877	1.892	1.906	1.921	1.936	1.950	1.964	1.979	1.993	2.007	2.020
15	7.998	1.709	1.728	1.745	1.762	1.779	1.796	1.812	1.828	1.843	1.859	1.874	1.889	1.904	1.919	1.933	1.948	1.962	1.976	1.990	2.004	2.018
20	9.037	1.706	1.724	1.742	1.759	1.776	1.793	1.809	1.825	1.841	1.856	1.872	1.887	1.902	1.916	1.931	1.945	1.960	1.974	1.988	2.002	2.016
25	10.422	1.702	1.721	1.739	1.757	1.774	1.790	1.807	1.823	1.839	1.854	1.870	1.885	1.900	1.914	1.929	1.943	1.958	1.972	1.986	2.000	2.014
30	11.964	1.699	1.718	1.736	1.754	1.771	1.788	1.805	1.821	1.837	1.852	1.868	1.883	1.898	1.913	1.927	1.942	1.956	1.970	1.984	1.998	2.012
35	13.675	1.695	1.715	1.733	1.751	1.769	1.786	1.802	1.819	1.835	1.850	1.866	1.881	1.896	1.911	1.926	1.940	1.954	1.969	1.983	1.997	2.010
40	15.568	1.691	1.711	1.730	1.749	1.766	1.784	1.800	1.817	1.833	1.849	1.864	1.879	1.895	1.909	1.924	1.939	1.953	1.967	1.981	1.995	2.009
45	17.660	1.687	1.708	1.727	1.746	1.764	1.781	1.798	1.815	1.831	1.847	1.863	1.878	1.893	1.908	1.923	1.937	1.952	1.966	1.980	1.994	2.008
50	19.966	1.682	1.703	1.724	1.743	1.761	1.779	1.796	1.813	1.829	1.845	1.861	1.876	1.892	1.907	1.922	1.936	1.951	1.965	1.979	1.993	2.007
55	22.506	1.676	1.699	1.720	1.739	1.758	1.776	1.794	1.811	1.827	1.844	1.859	1.875	1.890	1.905	1.920	1.935	1.949	1.964	1.978	1.992	2.006
60	25.303	1.670	1.693	1.715	1.736	1.755	1.773	1.791	1.809	1.825	1.842	1.858	1.873	1.889	1.904	1.919	1.934	1.948	1.963	1.977	1.991	2.005
65	28.386	1.661	1.687	1.710	1.731	1.751	1.770	1.788	1.806	1.823	1.840	1.856	1.872	1.887	1.903	1.918	1.933	1.947	1.962	1.976	1.990	2.004
70	31.793	1.651	1.680	1.704	1.726	1.747	1.767	1.785	1.803	1.821	1.837	1.854	1.870	1.886	1.901	1.916	1.931	1.946	1.960	1.975	1.989	2.003
75	35.585	1.637	1.670	1.697	1.720	1.742	1.762	1.781	1.800	1.817	1.835	1.851	1.868	1.884	1.899	1.914	1.929	1.944	1.959	1.973	1.987	2.001
80	39.881	1.616	1.657	1.687	1.713	1.735	1.757	1.776	1.795	1.814	1.831	1.848	1.865	1.881	1.896	1.912	1.927	1.942	1.957	1.971	1.986	2.000