

R-407A

Zeotropic blend (20 % R-32, 40 % R-125, 40 % R-134a)

Molecular weight (g/mol)	90.11
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-45.01
Temperature glide at 1.013 bar (K)	6.41
Critical temperature (°C)	82.26
Critical pressure (bar absolute)	45.15
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.520
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.829
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.138
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.151
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	6.38
Classification NF-EN 378	A1
GWP (IPCC 4)	2107

🔍 Main applications

R-407A is a “non azeotropic” HFC blend. It can be used in medium and low temperature commercial refrigeration applications where R-22 or R-404A may have traditionally been used. It can be replaced by R-448A.

🔍 Commercial specifications

Composition: (20 % R-32 - 40 % R-125 - 40 % R-134a) (±2 % / ±2 % / ±2 %).

Purity: ≥ 99.5 % weight.

Water content: ≤ 10 ppm weight.

Chloride ion test: negative.

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

Acidity (HCl): ≤ 1 ppm weight.

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 and implementation of R-407A are governed by EU Regulation n° 517/2014.

The recovery of R-407A is mandatory under EU Regulation n° 517/2014.

(Refer to regulations enforced in each country).

Thermodynamic properties of R-407A - 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)	
0.025	-100	0.637	1.570	70.383	0.413	-92.68	6.568	0.152	343.257	1.960	272.874
0.040	-95	0.643	1.555	76.728	0.449	-87.76	4.308	0.232	346.193	1.935	269.465
0.060	-90	0.649	1.540	83.043	0.484	-82.84	2.904	0.344	349.144	1.912	266.101
0.089	-85	0.656	1.525	89.340	0.518	-77.92	2.008	0.498	352.107	1.891	262.767
0.129	-80	0.662	1.510	95.628	0.551	-73.0	1.420	0.704	355.075	1.873	259.448
0.182	-75	0.669	1.495	101.915	0.583	-68.09	1.025	0.976	358.044	1.856	256.128
0.253	-70	0.676	1.480	108.210	0.614	-63.17	0.754	1.326	361.007	1.840	252.797
0.344	-65	0.683	1.465	114.518	0.645	-58.25	0.564	1.772	363.960	1.826	249.442
0.461	-60	0.690	1.450	120.845	0.675	-53.33	0.429	2.330	366.896	1.813	246.051
0.608	-55	0.697	1.435	127.196	0.705	-48.41	0.331	3.020	369.810	1.802	242.614
0.790	-50	0.705	1.419	133.575	0.733	-43.5	0.259	3.864	372.697	1.791	239.122
1.013	-45.01	0.713	1.403	139.972	0.762	-38.6	0.205	4.881	375.543	1.781	235.571
1.014	-45	0.713	1.403	139.988	0.762	-38.59	0.205	4.884	375.550	1.781	235.562
1.284	-40	0.721	1.387	146.440	0.790	-33.67	0.164	6.106	378.365	1.772	231.925
1.608	-35	0.729	1.371	152.933	0.817	-28.76	0.132	7.556	381.135	1.764	228.201
1.993	-30	0.738	1.355	159.474	0.844	-23.86	0.108	9.264	383.853	1.756	224.380
2.446	-25	0.747	1.338	166.067	0.871	-18.95	0.089	11.263	386.515	1.749	220.448
2.974	-20	0.757	1.321	172.716	0.897	-14.05	0.074	13.589	389.113	1.743	216.397
3.586	-15	0.767	1.304	179.428	0.923	-9.15	0.061	16.278	391.639	1.737	212.211
4.290	-10	0.778	1.286	186.208	0.949	-4.26	0.052	19.376	394.087	1.731	207.879
5.094	-5	0.789	1.268	193.063	0.975	0.63	0.044	22.930	396.447	1.726	203.384
6.007	0	0.801	1.249	200.000	1.000	5.52	0.037	26.994	398.710	1.721	198.710
7.038	5	0.813	1.230	207.026	1.025	10.4	0.032	31.629	400.862	1.716	193.836
8.196	10	0.827	1.210	214.151	1.050	15.27	0.027	36.907	402.891	1.711	188.740
9.491	15	0.841	1.189	221.385	1.075	20.14	0.023	42.912	404.780	1.706	183.396
10.932	20	0.857	1.168	228.738	1.100	24.99	0.020	49.740	406.510	1.702	177.772
12.531	25	0.873	1.145	236.227	1.125	29.84	0.017	57.510	408.058	1.697	171.832
14.296	30	0.892	1.122	243.865	1.150	34.68	0.015	66.367	409.398	1.692	165.533
16.238	35	0.912	1.097	251.673	1.175	39.5	0.013	76.488	410.497	1.687	158.824
18.370	40	0.934	1.071	259.676	1.200	44.31	0.011	88.104	411.315	1.681	151.639
20.701	45	0.959	1.043	267.905	1.225	49.1	0.010	101.518	411.800	1.675	143.895
23.244	50	0.988	1.013	276.403	1.251	53.87	0.009	117.141	411.879	1.668	135.476
26.011	55	1.021	0.980	285.233	1.277	58.61	0.007	135.566	411.453	1.660	126.220
29.017	60	1.060	0.943	294.490	1.304	63.32	0.006	157.691	410.368	1.650	115.878
32.274	65	1.110	0.901	304.339	1.333	67.98	0.005	185.003	408.373	1.639	104.034
35.796	70	1.175	0.851	315.092	1.363	72.57	0.005	220.296	405.004	1.624	89.912
39.590	75	1.274	0.785	327.495	1.398	77.04	0.004	270.118	399.192	1.603	71.698

Thermodynamic properties of R-407A - (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	0.012	13015.077	13394.418	13773.287	14151.786	14529.993	14907.965	15285.746	15663.370	16040.862	16418.245	16795.535	17172.745	17549.888	17926.971	18304.004	18680.992	19057.941	19434.856	19811.740	20188.598	20565.431
-95	0.020	8092.689	8322.776	8552.487	8781.901	9011.079	9240.064	9468.891	9697.587	9926.172	10154.664	10383.077	10611.421	10839.707	11067.942	11296.132	11524.283	11752.400	11980.486	12208.545	12436.580	12664.594
-90	0.032	5199.403	5343.868	5488.027	5631.945	5775.667	5919.231	6062.662	6205.982	6349.208	6492.356	6635.434	6778.454	6921.422	7064.346	7207.231	7350.081	7492.904	7635.694	7778.463	7921.210	8063.937
-85	0.050	3441.013	3534.629	3627.994	3721.159	3814.162	3907.030	3999.787	4092.450	4185.032	4277.546	4370.001	4462.405	4554.763	4647.083	4739.368	4831.622	4923.849	5016.052	5108.234	5200.396	5292.544
-80	0.076	2339.336	2401.785	2464.024	2526.095	2588.029	2649.849	2711.575	2773.219	2834.795	2896.311	2957.775	3019.194	3080.574	3141.919	3203.234	3264.521	3325.785	3387.026	3448.248	3509.453	3570.642
-75	0.111	1629.674	1672.458	1715.063	1757.526	1799.872	1842.121	1884.287	1926.384	1968.421	2010.406	2052.345	2094.240	2136.110	2177.945	2219.752	2261.534	2303.295	2345.037	2386.761	2428.469	2470.163
-70	0.160	1160.774	1190.815	1220.703	1250.468	1280.132	1309.712	1339.221	1368.669	1398.064	1427.414	1456.723	1485.998	1515.242	1544.458	1573.650	1602.820	1631.970	1661.103	1690.220	1719.322	1748.412
-65	0.224	843.661	865.239	886.684	908.023	929.274	950.451	971.566	992.628	1013.643	1034.618	1055.557	1076.465	1097.346	1118.202	1139.035	1159.850	1180.646	1201.427	1222.193	1242.946	1263.687
-60	0.309	624.568	640.398	656.111	671.730	687.272	702.749	718.172	733.547	748.881	764.180	779.446	794.685	809.899	825.090	840.262	855.416	870.554	885.677	900.787	915.886	930.973
-55	0.418	470.194	482.037	493.775	505.430	517.018	528.548	540.029	551.468	562.870	574.241	585.582	596.899	608.193	619.468	630.724	641.964	653.189	664.401	675.601	686.791	697.970
-50	0.557	359.437	368.458	377.387	386.242	395.036	403.779	412.479	421.141	429.769	438.369	446.943	455.494	464.025	472.538	481.035	489.516	497.985	506.441	514.886	523.321	531.747
-45	0.731	278.634	285.625	292.532	299.373	306.159	312.899	319.600	326.266	332.903	339.514	346.102	352.668	359.217	365.748	372.265	378.768	385.259	391.739	398.209	404.669	411.121
-40	0.945	218.770	224.273	229.701	235.068	240.386	245.663	250.904	256.114	261.297	266.456	271.594	276.713	281.815	286.902	291.975	297.036	302.086	307.125	312.154	317.176	322.189
-38.6	1.013	204.864	210.025	215.111	220.139	225.119	230.059	234.964	239.838	244.687	249.512	254.316	259.102	263.872	268.627	273.368	278.097	282.815	287.523	292.222	296.912	301.595
-35	1.206	173.780	178.177	182.506	186.779	191.008	195.198	199.356	203.486	207.591	211.675	215.739	219.786	223.817	227.834	231.838	235.831	239.814	243.787	247.751	251.708	255.657
-30	1.521	139.520	143.082	146.581	150.030	153.438	156.812	160.155	163.473	166.768	170.042	173.299	176.540	179.767	182.981	186.183	189.374	192.556	195.729	198.893	202.051	205.201
-25	1.898	113.107	116.031	118.897	121.717	124.498	127.248	129.970	132.669	135.346	138.005	140.648	143.276	145.890	148.492	151.084	153.665	156.238	158.802	161.359	163.908	166.452
-20	2.343	92.510	94.940	97.316	99.650	101.948	104.216	106.459	108.680	110.881	113.065	115.234	117.388	119.531	121.662	123.783	125.895	127.999	130.094	132.183	134.265	136.341
-15	2.866	76.278	78.321	80.314	82.266	84.186	86.078	87.947	89.795	91.624	93.438	95.237	97.023	98.798	100.562	102.317	104.063	105.801	107.532	109.256	110.974	112.686
-10	3.474	63.357	65.094	66.783	68.435	70.056	71.652	73.224	74.778	76.315	77.836	79.344	80.842	82.325	83.800	85.266	86.724	88.174	89.618	91.055	92.486	93.913
-5	4.177	52.976	54.468	55.915	57.327	58.710	60.069	61.406	62.725	64.028	65.317	66.593	67.857	69.112	70.356	71.593	72.822	74.043	75.258	76.468	77.671	78.870
0	4.983	44.562	45.857	47.110	48.328	49.520	50.687	51.835	52.966	54.081	55.182	56.272	57.351	58.419	59.480	60.532	61.576	62.614	63.646	64.672	65.693	66.709
5	5.904	37.686	38.822	39.916	40.978	42.014	43.027	44.021	44.998	45.961	46.911	47.849	48.777	49.696	50.606	51.508	52.404	53.293	54.176	55.054	55.927	56.796
10	6.948	32.024	33.029	33.995	34.928	35.837	36.723	37.591	38.444	39.282	40.107	40.922	41.727	42.522	43.310	44.091	44.864	45.632	46.394	47.151	47.903	48.651
15	8.128	27.327	28.225	29.084	29.913	30.716	31.499	32.263	33.012	33.747	34.471	35.183	35.887	36.581	37.268	37.948	38.621	39.289	39.951	40.608	41.261	41.909
20	9.452	23.402	24.223	24.985	25.726	26.443	27.139	27.817	28.480	29.130	29.769	30.397	31.016	31.626	32.229	32.826	33.416	34.000	34.580	35.154	35.723	36.291
25	10.934	20.101	20.840	21.540	22.209	22.853	23.477	24.084	24.675	25.254	25.821	26.379	26.927	27.467	28.001	28.527	29.048	29.563	30.073	30.579	31.080	31.578
30	12.586	17.306	17.987	18.627	19.236	19.820	20.383	20.930	21.461	21.980	22.487	22.985	23.474	23.956	24.430	24.898	25.360	25.816	26.268	26.716	27.160	27.599
35	14.420	14.925	15.558	16.149	16.708	17.242	17.754	18.250	18.730	19.198	19.655	20.103	20.542	20.973	21.397	21.815	22.228	22.635	23.038	23.436	23.831	24.222
40	16.451	12.883	13.480	14.030	14.547	15.038	15.508	15.960	16.398	16.823	17.237	17.641	18.037	18.426	18.808	19.183	19.554	19.919	20.280	20.636	20.989	21.338
45	18.693	11.121	11.689	12.208	12.690	13.145	13.579	13.994	14.395	14.783	15.160	15.528	15.887	16.239	16.585	16.924	17.258	17.587	17.912	18.233	18.550	18.864
50	21.165	9.589	10.139	10.632	11.086	11.511	11.913	12.298	12.667	13.023	13.368	13.705	14.032	14.353	14.667	14.975	15.278	15.576	15.870	16.160	16.446	16.729
55	23.884	8.247	8.787	9.261	9.693	10.093	10.469	10.826	11.168	11.497	11.815	12.124	12.424	12.717	13.004	13.285	13.561	13.832	14.099	14.362	14.621	14.878
60	26.873	7.059	7.601	8.063	8.476	8.855	9.209	9.543	9.862	10.167	10.461	10.746	11.023	11.292	11.555	11.812	12.064	12.312	12.556	12.795	13.031	13.264
65	30.160	5.994	6.552	7.008	7.408	7.770	8.105	8.419	8.717	9.002	9.275	9.539	9.795	10.043	10.285	10.522	10.753	10.980	11.203	11.422	11.638	11.850
70	33.784	5.019	5.618	6.073	6.463	6.812	7.131	7.428	7.708	7.974	8.229	8.475	8.712	8.942	9.165	9.383	9.596	9.805	10.009	10.210	10.408	10.602
75	37.806	4.089	4.766	5.234	5.620	5.957	6.262	6.545	6.809	7.059	7.298	7.526	7.747	7.962	8.177	8.369	8.565	8.757	8.946	9.130	9.312	9.490

Thermodynamic properties of R-407A - (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	0.012	338.933	341.973	345.054	348.176	351.340	354.546	357.794	361.085	364.418	367.794	371.212	374.672	378.175	381.721	385.308	388.938	392.610	396.324	400.079	403.877	407.716
-95	0.020	341.883	344.976	348.108	351.279	354.492	357.746	361.041	364.379	367.758	371.179	374.642	378.148	381.695	385.284	388.916	392.589	396.304	400.061	403.859	407.700	411.581
-90	0.032	344.857	348.004	351.188	354.411	357.673	360.976	364.319	367.703	371.129	374.596	378.105	381.656	385.248	388.882	392.557	396.274	400.033	403.833	407.675	411.558	415.482
-85	0.050	347.849	351.052	354.290	357.565	360.878	364.231	367.623	371.056	374.529	378.043	381.598	385.194	388.832	392.511	396.231	399.992	403.795	407.639	411.524	415.450	419.417
-80	0.076	350.856	354.117	357.410	360.739	364.105	367.508	370.951	374.433	377.954	381.516	385.118	388.761	392.444	396.168	399.934	403.740	407.587	411.475	415.404	419.373	423.384
-75	0.111	353.871	357.192	360.543	363.928	367.347	370.804	374.297	377.830	381.401	385.011	388.661	392.351	396.081	399.852	403.663	407.514	411.406	415.339	419.312	423.325	427.379
-70	0.160	356.888	360.273	363.684	367.126	370.602	374.112	377.699	381.243	384.865	388.525	392.224	395.962	399.740	403.558	407.415	411.313	415.250	419.228	423.246	427.304	431.402
-65	0.224	359.903	363.354	366.828	370.330	373.863	377.430	381.031	384.668	388.342	392.053	395.803	399.590	403.417	407.282	411.187	415.132	419.115	423.139	427.202	431.305	435.448
-60	0.309	362.910	366.430	369.969	373.534	377.127	380.752	384.409	388.101	391.829	395.593	399.393	403.232	407.108	411.023	414.976	418.968	422.999	427.069	431.178	435.327	439.515
-55	0.418	365.901	369.494	373.103	376.732	380.388	384.073	387.789	391.538	395.320	399.138	402.992	406.882	410.810	414.774	418.777	422.818	426.897	431.014	435.171	439.365	443.599
-50	0.557	368.873	372.543	376.223	379.921	383.642	387.389	391.165	394.973	398.813	402.686	406.594	410.538	414.518	418.534	422.587	426.678	430.806	434.972	439.176	443.418	447.698
-45	0.731	371.819	375.569	379.325	383.094	386.882	390.695	394.534	398.402	402.301	406.232	410.196	414.195	418.228	422.297	426.402	430.544	434.722	438.937	443.190	447.480	451.808
-40	0.945	374.733	378.568	382.402	386.246	390.105	393.985	397.889	401.821	405.781	409.771	413.793	417.849	421.937	426.060	430.219	434.412	438.642	442.908	447.210	451.549	455.925
-38.6	1.013	375.543	379.403	383.260	387.125	391.005	394.904	398.827	402.776	406.754	410.762	414.800	418.872	422.976	427.115	431.288	435.497	439.741	444.021	448.337	452.690	457.080
-35	1.206	377.609	381.534	385.451	389.372	393.305	397.256	401.228	405.224	409.248	413.300	417.382	421.495	425.641	429.820	434.032	438.280	442.562	446.879	451.232	455.621	460.046
-30	1.521	380.442	384.461	388.464	392.467	396.477	400.501	404.544	408.608	412.697	416.813	420.956	425.130	429.334	433.571	437.839	442.142	446.478	450.848	455.253	459.693	464.168
-25	1.898	383.224	387.342	391.437	395.525	399.616	403.717	407.833	411.968	416.125	420.306	424.514	428.749	433.014	437.310	441.636	445.995	450.386	454.810	459.269	463.761	468.287
-20	2.343	385.951	390.173	394.364	398.541	402.717	406.897	411.090	415.298	419.526	423.775	428.049	432.349	436.677	441.033	445.419	449.835	454.283	458.763	463.276	467.821	472.400
-15	2.866	388.614	392.947	397.239	401.510	405.773	410.038	414.310	418.595	422.896	427.216	431.559	435.925	440.317	444.736	449.183	453.659	458.165	462.702	467.271	471.871	476.504
-10	3.474	391.206	395.656	400.055	404.425	408.781	413.133	417.488	421.852	426.230	430.624	435.038	439.473	443.931	448.415	452.925	457.463	462.029	466.624	471.250	475.907	480.594
-5	4.177	393.720	398.294	402.805	407.279	411.733	416.176	420.619	425.066	429.524	433.994	438.482	442.988	447.516	452.066	456.641	461.242	465.870	470.526	475.211	479.925	484.669
0	4.983	396.146	400.851	405.483	410.067	414.623	419.163	423.697	428.232	432.772	437.323	441.886	446.467	451.066	455.686	460.328	464.994	469.686	474.404	479.149	483.922	488.723
5	5.904	398.474	403.320	408.079	412.780	417.444	422.087	426.717	431.343	435.970	440.604	445.248	449.905	454.578	459.270	463.981	468.715	473.472	478.254	483.061	487.895	492.756
10	6.948	400.691	405.689	410.584	415.410	420.190	424.941	429.672	434.394	439.113	443.833	448.560	453.298	458.048	462.814	467.597	472.401	477.226	482.073	486.944	491.840	496.762
15	8.128	402.782	407.946	412.989	417.949	422.852	427.717	432.557	437.380	442.194	447.006	451.820	456.641	461.471	466.314	471.172	476.048	480.942	485.857	490.794	495.755	500.739
20	9.452	404.729	410.076	415.286	420.366	425.422	430.410	435.364	440.294	445.209	450.117	455.022	459.929	464.843	469.766	474.702	479.652	484.619	489.604	494.604	499.635	504.684
25	10.934	406.512	412.064	417.446	422.711	427.891	433.010	438.086	443.129	448.151	453.160	458.160	463.159	468.160	473.166	478.182	483.209	488.251	493.309	498.384	503.478	508.594
30	12.586	408.106	413.890	419.472	424.911	430.248	435.509	440.715	445.880	451.015	456.129	461.230	466.324	471.416	476.509	481.608	486.715	491.835	496.968	502.116	507.281	512.464
35	14.420	409.480	415.534	421.340	426.974	432.482	437.897	443.243	448.537	453.792	459.018	464.225	469.419	474.606	479.791	484.977	490.168	495.368	500.578	505.801	511.039	516.293
40	16.451	410.596	416.968	423.031	428.882	434.580	440.163	445.660	451.092	456.475	461.821	467.139	472.439	477.725	483.005	488.282	493.561	498.844	504.135	509.436	514.748	520.075
45	18.693	411.407	418.160	424.522	430.619	436.526	442.294	447.955	453.536	459.056	464.528	469.965	475.376	480.768	486.141	491.520	496.889	502.259	507.634	513.015	518.406	523.808
50	21.165	411.848	419.071	425.785	432.162	438.305	444.275	450.116	455.858	461.525	467.133	472.695	478.224	483.727	489.211	494.683	500.147	505.609	511.070	516.536	522.007	527.488
55	23.884	411.828	419.648	426.782	433.485	439.893	446.089	452.127	458.045	463.870	469.623	475.320	480.974	486.594	492.189	497.765	503.329	508.886	514.438	519.991	525.547	531.108
60	26.873	411.210	419.819	427.469	434.554	441.266	447.715	453.971	460.081	466.078	471.987	477.828	483.615	489.359	495.071	500.758	506.427	512.083	517.731	523.374	529.018	534.663
65	30.160	409.772	419.844	427.784	435.326	442.389	449.125	455.623	461.944	468.129	474.208	480.203	486.133	492.010	497.846	503.649	509.429	515.189	520.937	526.672	532.411	538.144
70	33.784	407.107	418.491	427.639	435.737	443.213	450.277	457.049	463.605	469.996	476.260	482.423	488.506	494.525	500.494	506.422	512.318	518.189	524.042	529.882	535.712	541.537
75	37.806	402.298	416.584	426.887	435.683	443.654	451.101	458.185	465.006	471.628	478.096	484.443	490.694	496.868	502.979	509.040	515.062	521.052	527.017	532.963	538.895	544.817

Thermodynamic properties of R-407A - (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	0.012	2.002	2.019	2.037	2.053	2.070	2.086	2.103	2.119	2.134	2.150	2.165	2.181	2.196	2.211	2.226	2.241	2.255	2.270	2.284	2.299	2.313
-95	0.020	1.973	1.990	2.007	2.023	2.040	2.056	2.072	2.088	2.103	2.119	2.134	2.150	2.165	2.179	2.194	2.209	2.223	2.238	2.252	2.266	2.280
-90	0.032	1.946	1.963	1.980	1.996	2.012	2.028	2.044	2.060	2.076	2.091	2.106	2.121	2.136	2.151	2.166	2.180	2.195	2.209	2.223	2.237	2.251
-85	0.050	1.922	1.939	1.955	1.972	1.988	2.004	2.019	2.035	2.050	2.065	2.081	2.095	2.110	2.125	2.140	2.154	2.168	2.182	2.197	2.211	2.224
-80	0.076	1.900	1.917	1.933	1.949	1.965	1.981	1.997	2.012	2.027	2.042	2.057	2.072	2.087	2.101	2.116	2.130	2.144	2.159	2.173	2.186	2.200
-75	0.111	1.880	1.897	1.913	1.929	1.945	1.961	1.976	1.991	2.007	2.022	2.036	2.051	2.066	2.080	2.095	2.109	2.123	2.137	2.151	2.165	2.178
-70	0.160	1.862	1.879	1.895	1.911	1.927	1.942	1.957	1.973	1.988	2.003	2.017	2.032	2.046	2.061	2.075	2.089	2.103	2.117	2.131	2.145	2.158
-65	0.224	1.846	1.862	1.878	1.894	1.910	1.925	1.941	1.956	1.971	1.985	2.000	2.015	2.029	2.043	2.058	2.072	2.086	2.099	2.113	2.127	2.140
-60	0.309	1.831	1.847	1.863	1.879	1.895	1.910	1.925	1.940	1.955	1.970	1.985	1.999	2.013	2.028	2.042	2.056	2.069	2.083	2.097	2.110	2.124
-55	0.418	1.818	1.834	1.850	1.866	1.881	1.896	1.911	1.926	1.941	1.956	1.970	1.985	1.999	2.013	2.027	2.041	2.055	2.069	2.082	2.096	2.109
-50	0.557	1.805	1.821	1.837	1.853	1.869	1.884	1.899	1.914	1.929	1.943	1.958	1.972	1.986	2.000	2.014	2.028	2.042	2.055	2.069	2.082	2.096
-45	0.731	1.794	1.810	1.826	1.842	1.857	1.873	1.888	1.902	1.917	1.932	1.946	1.960	1.974	1.988	2.002	2.016	2.030	2.043	2.057	2.070	2.083
-40	0.945	1.784	1.800	1.816	1.832	1.847	1.862	1.877	1.892	1.907	1.921	1.935	1.950	1.964	1.978	1.991	2.005	2.019	2.032	2.046	2.059	2.072
-38.6	1.013	1.781	1.797	1.813	1.829	1.844	1.859	1.874	1.889	1.904	1.918	1.933	1.947	1.961	1.975	1.989	2.002	2.016	2.029	2.043	2.056	2.069
-35	1.206	1.774	1.791	1.807	1.822	1.838	1.853	1.868	1.883	1.897	1.912	1.926	1.940	1.954	1.968	1.982	1.995	2.009	2.022	2.036	2.049	2.062
-30	1.521	1.766	1.782	1.798	1.814	1.829	1.844	1.859	1.874	1.889	1.903	1.917	1.931	1.945	1.959	1.973	1.987	2.000	2.014	2.027	2.040	2.053
-25	1.898	1.758	1.774	1.790	1.806	1.821	1.837	1.852	1.866	1.881	1.895	1.909	1.924	1.938	1.951	1.965	1.979	1.992	2.006	2.019	2.032	2.045
-20	2.343	1.751	1.767	1.783	1.799	1.814	1.830	1.845	1.859	1.874	1.888	1.902	1.916	1.930	1.944	1.958	1.971	1.985	1.998	2.011	2.025	2.038
-15	2.866	1.744	1.761	1.777	1.793	1.808	1.823	1.838	1.853	1.867	1.882	1.896	1.910	1.924	1.938	1.951	1.965	1.978	1.992	2.005	2.018	2.031
-10	3.474	1.738	1.754	1.771	1.787	1.802	1.817	1.832	1.847	1.862	1.876	1.890	1.904	1.918	1.932	1.946	1.959	1.973	1.986	1.999	2.012	2.025
-5	4.177	1.732	1.749	1.765	1.781	1.797	1.812	1.827	1.842	1.856	1.871	1.885	1.899	1.913	1.927	1.940	1.954	1.967	1.980	1.994	2.007	2.020
0	4.983	1.726	1.743	1.760	1.776	1.792	1.807	1.822	1.837	1.852	1.866	1.880	1.894	1.908	1.922	1.936	1.949	1.962	1.976	1.989	2.002	2.015
5	5.904	1.721	1.738	1.755	1.771	1.787	1.802	1.818	1.832	1.847	1.862	1.876	1.890	1.904	1.918	1.931	1.945	1.958	1.971	1.985	1.998	2.011
10	6.948	1.716	1.734	1.751	1.767	1.783	1.798	1.813	1.828	1.843	1.858	1.872	1.886	1.900	1.914	1.927	1.941	1.954	1.968	1.981	1.994	2.007
15	8.128	1.711	1.729	1.746	1.763	1.779	1.794	1.810	1.825	1.839	1.854	1.868	1.882	1.896	1.910	1.924	1.937	1.951	1.964	1.977	1.990	2.003
20	9.452	1.706	1.725	1.742	1.759	1.775	1.791	1.806	1.821	1.836	1.851	1.865	1.879	1.893	1.907	1.921	1.934	1.948	1.961	1.974	1.987	2.000
25	10.934	1.702	1.720	1.738	1.755	1.771	1.787	1.803	1.818	1.833	1.847	1.862	1.876	1.890	1.904	1.918	1.931	1.945	1.958	1.971	1.984	1.997
30	12.586	1.697	1.716	1.734	1.751	1.767	1.784	1.799	1.815	1.830	1.845	1.859	1.873	1.888	1.901	1.915	1.929	1.942	1.956	1.969	1.982	1.995
35	14.420	1.692	1.711	1.729	1.747	1.764	1.780	1.796	1.812	1.827	1.842	1.856	1.871	1.885	1.899	1.913	1.926	1.940	1.953	1.967	1.980	1.993
40	16.451	1.686	1.706	1.725	1.743	1.760	1.777	1.793	1.809	1.824	1.839	1.854	1.868	1.883	1.897	1.911	1.924	1.938	1.951	1.964	1.978	1.991
45	18.693	1.680	1.701	1.721	1.739	1.757	1.774	1.790	1.806	1.821	1.837	1.852	1.866	1.880	1.895	1.909	1.922	1.936	1.949	1.963	1.976	1.989
50	21.165	1.674	1.696	1.716	1.735	1.753	1.770	1.787	1.803	1.819	1.834	1.849	1.864	1.878	1.893	1.907	1.920	1.934	1.947	1.961	1.974	1.987
55	23.884	1.666	1.690	1.711	1.731	1.749	1.767	1.784	1.800	1.816	1.832	1.847	1.862	1.876	1.891	1.905	1.919	1.932	1.946	1.959	1.972	1.985
60	26.873	1.657	1.683	1.705	1.726	1.745	1.763	1.781	1.797	1.813	1.829	1.844	1.859	1.874	1.889	1.903	1.917	1.931	1.944	1.958	1.971	1.984
65	30.160	1.647	1.675	1.699	1.721	1.741	1.759	1.777	1.794	1.810	1.826	1.842	1.857	1.872	1.887	1.901	1.915	1.929	1.943	1.956	1.969	1.982
70	33.784	1.633	1.666	1.692	1.715	1.735	1.755	1.773	1.791	1.807	1.824	1.839	1.855	1.870	1.884	1.899	1.913	1.927	1.941	1.954	1.968	1.981
75	37.806	1.614	1.655	1.684	1.708	1.730	1.750	1.769	1.787	1.804	1.820	1.836	1.852	1.867	1.882	1.897	1.911	1.925	1.939	1.953	1.966	1.979