

R-507A

Azeotropic blend (50 % R-125 - 50 % R-143a)

Molecular weight (g/mol)	98.86
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-46.75
Temperature glide at 1.013 bar (K)	0
Critical temperature (°C)	70.6
Critical pressure (bar absolute)	37.05
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.539
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.872
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.117
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)	4.33
Classification NF-EN 378	A1
GWP (IPCC 4)	3985

🔍 Main applications

R-507A is an "near azeotropic" HFC blend. It is typically used in industrial refrigeration applications including those with flooded evaporators, such as ice skating rinks.

🔍 Commercial specifications

Composition: (50 % R-125 - 50 % R-143a) (+1.5% - 0.5% / +0.5% - 1.5%).
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-507A - 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)	
0.030	-100	0.677	1.477	74.406	0.432	-99.95	4.909	0.204	303.932	1.758	229.526
0.046	-95	0.684	1.462	80.476	0.467	-94.96	3.244	0.308	306.875	1.738	226.399
0.069	-90	0.691	1.447	86.512	0.500	-89.97	2.204	0.454	309.846	1.720	223.334
0.102	-85	0.698	1.432	92.531	0.533	-84.98	1.535	0.651	312.840	1.704	220.309
0.147	-80	0.706	1.417	98.545	0.564	-79.99	1.094	0.914	315.854	1.689	217.309
0.206	-75	0.713	1.402	104.565	0.595	-74.99	0.796	1.256	318.881	1.677	214.316
0.284	-70	0.721	1.387	110.600	0.625	-70.0	0.590	1.695	321.918	1.665	211.318
0.384	-65	0.729	1.372	116.658	0.654	-65.0	0.445	2.248	324.959	1.655	208.301
0.511	-60	0.737	1.357	122.745	0.683	-60.0	0.341	2.936	327.998	1.646	205.254
0.669	-55	0.745	1.342	128.866	0.712	-55.0	0.264	3.782	331.031	1.638	202.165
0.864	-50	0.754	1.327	135.029	0.740	-50.0	0.208	4.808	334.051	1.631	199.022
1.013	-46.75	0.759	1.317	139.062	0.757	-46.75	0.179	5.585	336.006	1.627	196.943
1.101	-45	0.763	1.311	141.236	0.767	-45.0	0.166	6.041	337.051	1.625	195.815
1.387	-40	0.772	1.296	147.495	0.794	-40.0	0.133	7.510	340.027	1.620	192.533
1.727	-35	0.782	1.280	153.808	0.821	-35.0	0.108	9.246	342.972	1.615	189.163
2.129	-30	0.792	1.263	160.182	0.847	-29.99	0.089	11.283	345.878	1.611	185.696
2.599	-25	0.802	1.246	166.621	0.873	-24.99	0.073	13.659	348.740	1.607	182.119
3.145	-20	0.813	1.229	173.131	0.899	-19.99	0.061	16.415	351.550	1.604	178.419
3.775	-15	0.825	1.212	179.717	0.924	-14.99	0.051	19.598	354.299	1.601	174.582
4.495	-10	0.838	1.194	186.386	0.950	-9.98	0.043	23.261	356.979	1.598	170.593
5.316	-5	0.851	1.175	193.144	0.975	-4.98	0.036	27.462	359.579	1.596	166.435
6.244	0	0.865	1.156	200.000	1.000	0.02	0.031	32.273	362.086	1.593	162.086
7.289	5	0.880	1.136	206.963	1.025	5.02	0.026	37.774	364.484	1.591	157.522
8.460	10	0.896	1.116	214.043	1.050	10.03	0.023	44.061	366.757	1.589	152.714
9.766	15	0.914	1.094	221.254	1.075	15.03	0.020	51.252	368.883	1.587	147.630
11.218	20	0.933	1.072	228.610	1.099	20.03	0.017	59.490	370.838	1.585	142.228
12.826	25	0.954	1.048	236.130	1.124	25.03	0.015	68.954	372.592	1.582	136.462
14.600	30	0.978	1.023	243.840	1.149	30.03	0.013	79.875	374.109	1.579	130.269
16.553	35	1.005	0.995	251.769	1.175	35.04	0.011	92.561	375.341	1.576	123.571
18.696	40	1.035	0.966	259.962	1.200	40.04	0.009	107.433	376.223	1.572	116.261
21.044	45	1.071	0.934	268.478	1.227	45.04	0.008	125.104	376.662	1.567	108.185
23.612	50	1.114	0.898	277.409	1.254	50.03	0.007	146.524	376.513	1.560	99.104
26.419	55	1.168	0.856	286.910	1.282	55.03	0.006	173.313	375.531	1.552	88.621
29.486	60	1.241	0.806	297.281	1.312	60.03	0.005	208.680	373.236	1.540	75.956
32.847	65	1.353	0.739	309.297	1.347	65.02	0.004	261.006	368.403	1.521	59.106
36.562	70	1.668	0.600	328.324	1.401	70.01	0.003	385.806	353.378	1.474	25.053

Thermodynamic properties of R-507A - (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	0.029	4929.311	5074.758	5219.852	5364.645	5509.187	5653.517	5797.672	5941.678	6085.560	6229.337	6373.025	6516.637	6660.184	6803.676	6947.120	7090.522	7233.888	7377.222	7520.528	7663.810	7807.070
-95	0.046	3253.596	3347.504	3441.138	3534.536	3627.733	3720.760	3813.643	3906.403	3999.060	4091.629	4184.123	4276.552	4368.926	4461.252	4553.536	4645.784	4738.001	4830.189	4922.353	5014.495	5106.617
-90	0.069	2208.517	2270.998	2333.264	2395.341	2457.257	2519.033	2580.691	2642.247	2703.716	2765.111	2826.441	2887.717	2948.945	3010.132	3071.282	3132.400	3193.491	3254.557	3315.601	3376.625	3437.632
-85	0.102	1537.506	1580.233	1622.788	1665.192	1707.462	1749.618	1791.676	1833.648	1875.547	1917.382	1959.163	2000.896	2042.588	2084.243	2125.867	2167.463	2209.034	2250.583	2292.113	2333.625	2375.122
-80	0.146	1095.131	1125.931	1154.916	1184.614	1214.202	1243.695	1273.105	1302.443	1331.719	1360.940	1390.113	1419.244	1448.342	1477.407	1506.443	1535.455	1564.445	1593.414	1622.369	1651.306	1680.229
-75	0.206	796.376	817.879	839.266	860.549	881.741	902.852	923.892	944.871	965.796	986.675	1007.512	1028.313	1049.082	1069.824	1090.540	1111.235	1131.910	1152.567	1173.209	1193.837	1214.452
-70	0.284	590.121	605.886	621.553	637.133	652.634	668.067	683.439	698.759	714.031	729.263	744.459	759.623	774.759	789.870	804.960	820.029	835.081	850.117	865.139	880.148	895.146
-65	0.384	444.824	456.614	468.319	479.949	491.512	503.015	514.466	525.871	537.235	548.563	559.860	571.128	582.371	593.593	604.794	615.978	627.146	638.300	649.441	660.570	671.688
-60	0.511	340.556	349.537	358.443	367.284	376.066	384.796	393.480	402.124	410.732	419.308	427.856	436.379	444.880	453.360	461.823	470.270	478.703	487.123	495.530	503.927	512.315
-55	0.669	264.445	271.404	278.297	285.132	291.915	298.652	305.349	312.010	318.639	325.239	331.814	338.367	344.900	351.415	357.913	364.397	370.868	377.328	383.776	390.215	396.645
-50	0.864	208.007	213.487	218.907	224.275	229.597	234.878	240.122	245.335	250.518	255.677	260.812	265.928	271.025	276.106	281.172	286.225	291.266	296.296	301.316	306.328	311.331
-46.75	1.013	179.058	183.787	188.460	193.084	197.664	202.207	206.715	211.194	215.645	220.073	224.480	228.867	233.237	237.592	241.933	246.262	250.579	254.886	259.184	263.473	267.754
-45	1.101	165.545	169.926	174.252	178.530	182.767	186.967	191.134	195.272	199.385	203.474	207.542	211.592	215.626	219.644	223.650	227.643	231.625	235.597	239.560	243.515	247.462
-40	1.387	133.168	136.719	140.221	143.678	147.098	150.483	153.839	157.169	160.475	163.760	167.026	170.275	173.509	176.730	179.938	183.135	186.322	189.499	192.668	195.829	198.984
-35	1.727	108.170	111.088	113.959	116.790	119.585	122.350	125.087	127.800	130.491	133.163	135.818	138.457	141.082	143.695	146.296	148.887	151.466	154.041	156.600	159.163	161.714
-30	2.128	88.647	91.075	93.458	95.804	98.117	100.402	102.661	104.897	107.114	109.313	111.496	113.664	115.820	117.963	120.097	122.220	124.335	126.441	128.541	130.633	132.720
-25	2.598	73.233	75.278	77.280	79.247	81.182	83.092	84.977	86.842	88.688	90.517	92.332	94.133	95.922	97.700	99.468	101.227	102.978	104.723	106.458	108.188	109.913
-20	3.144	60.942	62.683	64.384	66.051	67.689	69.302	70.892	72.463	74.017	75.554	77.078	78.590	80.090	81.579	83.059	84.531	85.999	87.453	88.903	90.348	91.787
-15	3.773	51.048	52.548	54.008	55.436	56.836	58.212	59.567	60.904	62.224	63.529	64.821	66.102	67.371	68.631	69.882	71.125	72.361	73.590	74.813	76.031	77.243
-10	4.493	43.014	44.319	45.586	46.821	48.030	49.215	50.381	51.529	52.661	53.779	54.885	55.980	57.064	58.139	59.206	60.265	61.317	62.363	63.403	64.438	65.468
-5	5.312	36.436	37.583	38.693	39.772	40.825	41.856	42.868	43.863	44.842	45.809	46.763	47.707	48.641	49.566	50.483	51.393	52.296	53.194	54.085	54.972	55.854
0	6.240	31.007	32.026	33.008	33.959	34.886	35.790	36.676	37.545	38.400	39.242	40.072	40.893	41.703	42.506	43.301	44.089	44.870	45.646	46.417	47.182	47.943
5	7.284	26.493	27.408	28.285	29.132	29.954	30.754	31.536	32.302	33.054	33.793	34.521	35.239	35.948	36.650	37.344	38.031	38.712	39.388	40.058	40.724	41.386
10	8.453	22.714	23.543	24.334	25.095	25.830	26.544	27.240	27.920	28.586	29.240	29.883	30.517	31.142	31.759	32.369	32.973	33.570	34.163	34.751	35.334	35.913
15	9.758	19.528	20.288	21.009	21.698	22.361	23.003	23.627	24.235	24.830	25.412	25.984	26.547	27.101	27.648	28.188	28.722	29.250	29.773	30.291	30.805	31.315
20	11.209	16.825	17.530	18.192	18.822	19.425	20.007	20.570	21.118	21.652	22.175	22.688	23.190	23.684	24.172	24.653	25.127	25.597	26.061	26.521	26.977	27.428
25	12.815	14.516	15.177	15.792	16.373	16.926	17.457	17.969	18.466	18.949	19.421	19.882	20.334	20.779	21.216	21.647	22.071	22.491	22.906	23.316	23.722	24.125
30	14.587	12.532	13.160	13.737	14.277	14.788	15.276	15.745	16.198	16.638	17.066	17.484	17.893	18.295	18.689	19.077	19.459	19.836	20.209	20.577	20.941	21.301
35	16.538	10.815	11.420	11.967	12.473	12.949	13.400	13.833	14.249	14.651	15.043	15.424	15.796	16.160	16.518	16.869	17.215	17.555	17.891	18.223	18.551	18.876
40	18.680	9.318	9.910	10.435	10.914	11.360	11.781	12.182	12.566	12.937	13.296	13.645	13.985	14.318	14.643	14.963	15.278	15.586	15.891	16.191	16.488	16.782
45	21.027	8.002	8.593	9.102	9.559	9.981	10.376	10.750	11.107	11.450	11.781	12.102	12.415	12.720	13.018	13.310	13.597	13.878	14.156	14.429	14.699	14.965
50	23.593	6.833	7.437	7.937	8.378	8.779	9.152	9.502	9.836	10.155	10.462	10.759	11.047	11.328	11.602	11.870	12.133	12.391	12.644	12.894	13.140	13.383
55	26.399	5.777	6.415	6.914	7.343	7.727	8.081	8.411	8.724	9.022	9.308	9.584	9.851	10.110	10.363	10.610	10.851	11.088	11.321	11.550	11.775	11.997
60	29.467	4.798	5.507	6.012	6.432	6.803	7.140	7.453	7.747	8.022	8.294	8.551	8.799	9.039	9.273	9.501	9.724	9.943	10.157	10.367	10.574	10.778
65	32.829	3.836	4.692	5.212	5.627	5.986	6.309	6.606	6.884	7.147	7.397	7.637	7.868	8.092	8.309	8.520	8.726	8.928	9.126	9.319	9.510	9.697
70	36.553	2.597	3.953	4.494	4.906	5.255	5.565	5.848	6.111	6.359	6.593	6.818	7.034	7.242	7.443	7.640	7.831	8.017	8.200	8.379	8.554	8.727

Thermodynamic properties of R-507A - (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	0.029	303.904	307.016	310.175	313.381	316.635	319.938	323.291	326.692	330.143	333.644	337.194	340.794	344.443	348.141	351.889	355.685	359.530	363.423	367.364	371.352	375.389
-95	0.046	306.854	310.031	313.253	316.521	319.836	323.199	326.610	330.069	333.576	337.132	340.737	344.391	348.093	351.844	355.643	359.491	363.386	367.329	371.320	375.358	379.443
-90	0.069	309.830	313.073	316.360	319.692	323.069	326.492	329.962	333.479	337.043	340.656	344.316	348.024	351.779	355.583	359.435	363.334	367.280	371.274	375.314	379.402	383.536
-85	0.102	312.829	316.140	319.493	322.889	326.329	329.814	333.344	336.920	340.542	344.211	347.927	351.690	355.499	359.356	363.260	367.211	371.209	375.253	379.344	383.481	387.664
-80	0.146	315.846	319.226	322.646	326.108	329.613	333.160	336.751	340.387	344.068	347.795	351.567	355.385	359.250	363.161	367.118	371.121	375.170	379.265	383.406	387.593	391.825
-75	0.206	318.876	322.327	325.817	329.346	332.916	336.527	340.181	343.878	347.618	351.403	355.233	359.107	363.027	366.992	371.003	375.059	379.160	383.306	387.498	391.735	396.016
-70	0.284	321.915	325.439	328.999	332.597	336.234	339.911	343.628	347.387	351.188	355.032	358.920	362.852	366.828	370.848	374.913	379.022	383.176	387.374	391.617	395.904	400.235
-65	0.384	324.958	328.556	332.189	335.858	339.563	343.307	347.089	350.911	354.774	358.679	362.626	366.615	370.648	374.724	378.843	383.007	387.213	391.464	395.758	400.096	404.477
-60	0.511	327.998	331.674	335.382	339.123	342.899	346.710	350.559	354.446	358.372	362.338	366.345	370.394	374.484	378.617	382.792	387.010	391.270	395.574	399.920	404.309	408.741
-55	0.669	331.031	334.788	338.573	342.389	346.236	350.118	354.034	357.987	361.978	366.007	370.075	374.184	378.333	382.523	386.754	391.028	395.342	399.699	404.098	408.539	413.022
-50	0.864	334.051	337.891	341.756	345.649	349.571	353.524	357.510	361.531	365.587	369.680	373.811	377.981	382.190	386.438	390.727	395.056	399.426	403.838	408.290	412.783	417.317
-46.75	1.013	336.006	339.902	343.821	347.765	351.737	355.738	359.770	363.836	367.936	372.071	376.244	380.454	384.702	388.989	393.316	397.682	402.089	406.536	411.023	415.550	420.118
-45	1.101	337.051	340.978	344.927	348.899	352.897	356.924	360.982	365.072	369.196	373.354	377.549	381.781	386.051	390.359	394.706	399.093	403.519	407.985	412.491	417.037	421.623
-40	1.387	340.026	344.045	348.079	352.134	356.211	360.314	364.446	368.607	372.799	377.025	381.285	385.581	389.913	394.282	398.688	403.133	407.616	412.138	416.698	421.298	425.937
-35	1.727	342.970	347.084	351.208	355.348	359.507	363.689	367.896	372.130	376.394	380.689	385.016	389.376	393.771	398.202	402.669	407.173	411.714	416.292	420.909	425.563	430.256
-30	2.128	345.875	350.090	354.308	358.537	362.781	367.044	371.329	375.639	379.975	384.340	388.736	393.163	397.623	402.117	406.646	411.210	417.816	422.466	427.159	431.898	436.681
-25	2.598	348.736	353.056	357.373	361.695	366.027	370.374	374.740	379.127	383.538	387.976	392.442	396.937	401.464	406.022	410.614	415.240	419.900	424.595	429.325	434.091	438.893
-20	3.144	351.544	355.976	360.397	364.815	369.239	373.674	378.123	382.590	387.079	391.592	396.130	400.695	405.290	409.915	414.571	419.259	423.980	428.736	433.524	438.348	443.206
-15	3.773	354.292	358.843	363.372	367.893	372.412	376.938	381.474	386.024	390.593	395.183	399.795	404.433	409.097	413.790	418.512	423.264	428.048	432.864	437.713	442.595	447.510
-10	4.493	356.970	361.647	366.292	370.920	375.540	380.160	384.787	389.424	394.076	398.745	403.434	408.146	412.882	417.644	422.434	427.252	432.100	436.978	441.888	446.829	451.802
-5	5.312	359.569	364.381	369.148	373.889	378.616	383.336	388.057	392.785	397.522	402.274	407.043	411.831	416.641	421.475	426.334	431.219	436.133	441.075	446.046	451.048	456.081
0	6.240	362.075	367.032	371.932	376.794	381.632	386.458	391.279	396.101	400.928	405.765	410.616	415.484	420.370	425.277	430.207	435.162	440.142	445.150	450.185	455.248	460.341
5	7.284	364.473	369.590	374.632	379.624	384.583	389.521	394.446	399.367	404.288	409.214	414.151	419.100	424.064	429.047	434.051	439.076	444.126	449.200	454.303	459.436	464.598
10	8.453	366.745	372.039	377.238	382.372	387.460	392.517	397.553	402.577	407.597	412.616	417.641	422.671	427.721	432.782	437.861	442.960	448.080	453.222	458.389	463.581	468.799
15	9.758	368.871	374.366	379.739	385.027	390.254	395.439	400.593	405.727	410.849	415.966	421.083	426.205	431.335	436.477	441.634	446.808	452.001	457.214	462.449	467.707	472.989
20	11.209	370.826	376.551	382.120	387.578	392.958	398.279	403.559	408.809	414.039	419.266	424.482	429.685	434.903	440.129	445.367	450.618	455.886	461.171	466.477	471.803	477.151
25	12.815	372.581	378.576	384.367	390.015	395.560	401.029	406.443	411.817	417.162	422.488	427.802	433.112	438.421	443.734	449.055	454.387	459.731	465.092	470.469	475.865	481.281
30	14.587	374.099	380.416	386.462	392.323	398.050	403.681	409.239	414.744	420.211	425.650	431.070	436.479	441.884	447.287	452.695	458.109	463.534	468.971	474.423	479.891	485.377
35	16.538	375.333	382.043	388.387	394.487	400.417	406.223	411.937	417.583	423.179	428.737	434.269	439.784	445.287	450.785	456.283	461.783	467.291	472.807	478.333	483.877	489.453
40	18.680	376.218	383.420	390.116	396.491	402.646	408.645	414.528	420.326	426.059	431.745	437.395	443.019	448.627	454.223	459.814	465.404	470.997	476.596	482.203	487.822	493.453
45	21.027	376.661	384.500	391.621	398.313	404.723	410.935	417.003	422.964	428.845	434.666	440.440	446.181	451.898	457.597	463.286	468.969	474.650	480.334	486.023	491.720	497.427
50	23.593	376.517	385.224	392.868	399.932	406.631	413.080	419.350	425.489	431.528	437.493	443.400	449.263	455.094	460.901	466.692	472.472	478.246	484.017	489.791	495.569	501.354
55	26.399	375.541	385.511	393.816	401.321	408.350	415.664	422.557	429.888	436.699	442.917	448.265	453.558	458.200	463.300	468.266	473.200	478.100	483.000	487.900	492.800	497.700
60	29.467	373.256	385.252	394.412	402.446	409.856	416.868	423.607	430.149	436.544	442.828	448.025	453.156	457.235	461.275	465.283	469.260	473.216	477.151	481.066	484.961	488.836
65	32.829	368.438	384.299	394.592	403.265	411.115	418.464	425.476	432.248	438.844	445.305	451.663	457.941	464.155	470.320	476.446	482.543	488.618	494.676	500.722	506.762	512.799
70	36.553	353.473	382.413	394.227	403.681	412.048	419.781	427.100	434.128	440.945	447.600	454.132	460.568	466.927	473.226	479.478	485.692	491.878	498.041	504.188	510.323	516.450

Thermodynamic properties of R-507A - (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	0.029	1.758	1.776	1.793	1.810	1.827	1.844	1.861	1.878	1.894	1.910	1.926	1.942	1.958	1.974	1.989	2.005	2.020	2.035	2.050	2.066	2.080
-95	0.046	1.738	1.755	1.773	1.790	1.807	1.824	1.840	1.857	1.873	1.889	1.905	1.921	1.936	1.952	1.967	1.983	1.998	2.013	2.028	2.043	2.058
-90	0.069	1.720	1.737	1.754	1.771	1.788	1.805	1.821	1.838	1.854	1.870	1.886	1.901	1.917	1.933	1.948	1.963	1.978	1.993	2.008	2.023	2.038
-85	0.102	1.704	1.721	1.738	1.755	1.772	1.788	1.805	1.821	1.837	1.853	1.869	1.884	1.900	1.915	1.930	1.946	1.961	1.976	1.990	2.005	2.020
-80	0.146	1.689	1.707	1.724	1.740	1.757	1.774	1.790	1.806	1.822	1.838	1.853	1.869	1.884	1.900	1.915	1.930	1.945	1.960	1.974	1.989	2.004
-75	0.206	1.677	1.694	1.711	1.727	1.744	1.760	1.777	1.793	1.809	1.824	1.840	1.855	1.871	1.886	1.901	1.916	1.931	1.946	1.960	1.975	1.989
-70	0.284	1.665	1.682	1.699	1.716	1.732	1.749	1.765	1.781	1.797	1.812	1.828	1.843	1.858	1.874	1.889	1.903	1.918	1.933	1.948	1.962	1.976
-65	0.384	1.655	1.672	1.689	1.706	1.722	1.738	1.754	1.770	1.786	1.802	1.817	1.832	1.848	1.863	1.878	1.892	1.907	1.922	1.936	1.951	1.965
-60	0.511	1.646	1.663	1.680	1.697	1.713	1.729	1.745	1.761	1.777	1.792	1.808	1.823	1.838	1.853	1.868	1.883	1.897	1.912	1.926	1.941	1.955
-55	0.669	1.638	1.655	1.672	1.689	1.705	1.721	1.737	1.753	1.768	1.784	1.799	1.814	1.829	1.844	1.859	1.874	1.889	1.903	1.917	1.932	1.946
-50	0.864	1.631	1.648	1.665	1.682	1.698	1.714	1.730	1.746	1.761	1.777	1.792	1.807	1.822	1.837	1.852	1.866	1.881	1.895	1.910	1.924	1.938
-46.75	1.013	1.627	1.644	1.661	1.678	1.694	1.710	1.726	1.742	1.757	1.772	1.788	1.803	1.818	1.833	1.847	1.862	1.876	1.891	1.905	1.919	1.933
-45	1.101	1.625	1.642	1.659	1.675	1.692	1.708	1.724	1.739	1.755	1.770	1.786	1.801	1.816	1.830	1.845	1.860	1.874	1.889	1.903	1.917	1.931
-40	1.387	1.620	1.637	1.654	1.670	1.686	1.702	1.718	1.734	1.749	1.765	1.780	1.795	1.810	1.825	1.839	1.854	1.868	1.883	1.897	1.911	1.925
-35	1.727	1.615	1.632	1.649	1.665	1.682	1.698	1.714	1.729	1.745	1.760	1.775	1.790	1.805	1.820	1.834	1.849	1.863	1.877	1.892	1.906	1.920
-30	2.128	1.611	1.628	1.645	1.661	1.678	1.694	1.709	1.725	1.740	1.756	1.771	1.786	1.801	1.815	1.830	1.844	1.859	1.873	1.887	1.901	1.915
-25	2.598	1.607	1.624	1.641	1.658	1.674	1.690	1.706	1.722	1.737	1.752	1.767	1.782	1.797	1.812	1.826	1.841	1.855	1.869	1.883	1.897	1.911
-20	3.144	1.604	1.621	1.638	1.655	1.671	1.687	1.703	1.719	1.734	1.749	1.764	1.779	1.794	1.809	1.823	1.838	1.852	1.866	1.880	1.894	1.908
-15	3.773	1.601	1.618	1.635	1.652	1.668	1.684	1.700	1.716	1.731	1.747	1.762	1.777	1.791	1.806	1.821	1.835	1.849	1.863	1.877	1.891	1.905
-10	4.493	1.598	1.616	1.633	1.650	1.666	1.682	1.698	1.714	1.729	1.745	1.760	1.775	1.789	1.804	1.818	1.833	1.847	1.861	1.875	1.889	1.903
-5	5.312	1.596	1.613	1.631	1.648	1.664	1.680	1.696	1.712	1.728	1.743	1.758	1.773	1.788	1.802	1.817	1.831	1.845	1.859	1.873	1.887	1.901
0	6.240	1.593	1.611	1.629	1.646	1.662	1.679	1.695	1.711	1.726	1.741	1.757	1.772	1.786	1.801	1.815	1.830	1.844	1.858	1.872	1.886	1.900
5	7.284	1.591	1.609	1.627	1.644	1.661	1.677	1.694	1.709	1.725	1.740	1.756	1.771	1.785	1.800	1.814	1.829	1.843	1.857	1.871	1.885	1.899
10	8.453	1.589	1.608	1.626	1.643	1.660	1.676	1.693	1.708	1.724	1.740	1.755	1.770	1.785	1.799	1.814	1.828	1.842	1.856	1.870	1.884	1.898
15	9.758	1.587	1.606	1.624	1.642	1.659	1.675	1.692	1.708	1.723	1.739	1.754	1.769	1.784	1.799	1.813	1.828	1.842	1.856	1.870	1.884	1.897
20	11.209	1.585	1.604	1.623	1.640	1.658	1.675	1.691	1.707	1.723	1.739	1.754	1.769	1.784	1.798	1.813	1.827	1.842	1.856	1.870	1.884	1.897
25	12.815	1.582	1.602	1.621	1.639	1.657	1.674	1.690	1.707	1.723	1.738	1.754	1.769	1.784	1.798	1.813	1.827	1.842	1.856	1.870	1.884	1.897
30	14.587	1.579	1.600	1.619	1.638	1.656	1.673	1.690	1.706	1.722	1.738	1.753	1.769	1.784	1.798	1.813	1.827	1.842	1.856	1.870	1.884	1.897
35	16.538	1.576	1.597	1.617	1.637	1.655	1.672	1.689	1.706	1.722	1.738	1.753	1.769	1.784	1.799	1.813	1.828	1.842	1.856	1.870	1.884	1.898
40	18.680	1.572	1.595	1.615	1.635	1.654	1.671	1.689	1.706	1.722	1.738	1.754	1.769	1.784	1.799	1.814	1.828	1.842	1.857	1.871	1.884	1.898
45	21.027	1.567	1.591	1.613	1.633	1.652	1.671	1.688	1.705	1.722	1.738	1.754	1.769	1.784	1.799	1.814	1.829	1.843	1.857	1.871	1.885	1.899
50	23.593	1.560	1.587	1.610	1.631	1.651	1.670	1.687	1.705	1.721	1.738	1.754	1.769	1.785	1.800	1.815	1.829	1.844	1.858	1.872	1.886	1.899
55	26.399	1.552	1.582	1.607	1.629	1.649	1.668	1.687	1.704	1.721	1.738	1.754	1.769	1.785	1.800	1.815	1.830	1.844	1.858	1.873	1.886	1.900
60	29.467	1.540	1.576	1.603	1.626	1.647	1.667	1.686	1.703	1.721	1.737	1.754	1.770	1.785	1.800	1.815	1.830	1.845	1.859	1.873	1.887	1.901
65	32.829	1.521	1.568	1.598	1.623	1.645	1.665	1.684	1.702	1.720	1.737	1.754	1.770	1.785	1.801	1.816	1.831	1.845	1.860	1.874	1.888	1.902
70	36.553	1.474	1.558	1.592	1.618	1.641	1.663	1.682	1.701	1.719	1.736	1.753	1.769	1.785	1.801	1.816	1.831	1.846	1.860	1.874	1.888	1.902