

R-32

DIFLUOROMETHANE - CH₂F₂

Molecular weight (g/mol)	52.02
Melting point (°C)	-136.81
Boiling point (at 1.013 bar)	-51.66
Temperature glide at 1.013 bar (K)	0
Critical temperature (°C)	78.1
Critical pressure (bar absolute)	57.82
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.937
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.848
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.252
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.114
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	6.79
Classification NF-EN 378	A2L
GWP (IPCC 4)	675

🔍 Main applications

R-32 is a low GWP "hydrofluorocarbon" (HFC). It is an A2L Refrigerant meaning it is mildly flammable. It is used in small split Air Conditioning systems where the charge size complies with the requirements of EN378. It is not a retrofit option for other AC systems running on other refrigerants. It is also used as a component in both HFC and HFO blends.

🔍 Commercial specifications

Purity: ≥ 99.5 % weight.
 Water content: ≤ 10 ppm weight.
 Non-condensables (gas phase): ≤ 1.5 % volume.
 Acidity (HCl): ≤ 1 ppm weight.
 Chloride ion test: negative
 High boiling residue: ≤ 0.01 % volume.

🔍 Oils

Use a polyol ester (POE) oil suitable for R-32. Standard POE is not miscible. 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-32 are governed by EU Regulation n° 517/2014.
 The recovery of R-32 is mandatory under EU Regulation n° 517/2014.
 (Refer to the regulations enforced in each country).

Thermodynamic properties of R-32 - 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)	
0.038	-100	0.747	1.339	38.826	0.271	-100.0	7.222	0.138	468.306	2.751	429.480
0.059	-95	0.754	1.327	46.624	0.315	-95.0	4.798	0.208	471.481	2.700	424.858
0.089	-90	0.761	1.314	54.418	0.359	-90.0	3.272	0.306	474.614	2.653	420.196
0.130	-85	0.769	1.301	62.214	0.401	-85.0	2.286	0.438	477.697	2.609	415.483
0.187	-80	0.776	1.288	70.016	0.442	-80.0	1.632	0.613	480.723	2.568	410.707
0.262	-75	0.784	1.275	77.828	0.481	-75.0	1.188	0.842	483.684	2.530	405.856
0.361	-70	0.792	1.262	85.656	0.520	-70.0	0.881	1.135	486.573	2.494	400.917
0.488	-65	0.801	1.249	93.504	0.558	-65.0	0.664	1.507	489.384	2.460	395.880
0.650	-60	0.809	1.236	101.376	0.596	-60.0	0.508	1.969	492.109	2.429	390.732
0.852	-55	0.818	1.222	109.279	0.632	-55.0	0.394	2.538	494.741	2.399	385.462
1.013	-51.66	0.824	1.213	114.584	0.656	-51.66	0.335	2.987	496.447	2.380	381.863
1.101	-50	0.828	1.208	117.218	0.668	-50.0	0.309	3.232	497.275	2.371	380.057
1.406	-45	0.837	1.194	125.198	0.704	-45.0	0.246	4.067	499.703	2.345	374.504
1.774	-40	0.847	1.180	133.226	0.738	-40.0	0.197	5.065	502.017	2.320	368.792
2.214	-35	0.858	1.166	141.307	0.772	-35.0	0.160	6.248	504.211	2.296	362.904
2.734	-30	0.869	1.151	149.448	0.806	-30.0	0.131	7.639	506.274	2.273	356.827
3.346	-25	0.880	1.136	157.656	0.839	-25.0	0.108	9.266	508.199	2.252	350.542
4.058	-20	0.892	1.121	165.940	0.872	-20.0	0.090	11.157	509.972	2.231	344.033
4.881	-15	0.905	1.105	174.306	0.904	-15.0	0.075	13.346	511.584	2.211	337.278
5.826	-10	0.918	1.089	182.765	0.937	-10.0	0.063	15.870	513.020	2.192	330.255
6.906	-5	0.933	1.072	191.326	0.968	-5.0	0.053	18.769	514.264	2.173	322.938
8.131	0	0.948	1.055	200.000	1.000	0.0	0.045	22.091	515.299	2.154	315.299
9.514	5	0.964	1.038	208.801	1.031	5.0	0.039	25.891	516.106	2.136	307.305
11.069	10	0.981	1.020	217.742	1.063	10.0	0.033	30.232	516.660	2.118	298.917
12.808	15	0.999	1.001	226.842	1.094	15.0	0.028	35.190	516.934	2.101	290.092
14.746	20	1.019	0.981	236.121	1.125	20.0	0.024	40.856	516.897	2.083	280.777
16.896	25	1.041	0.961	245.602	1.157	25.0	0.021	47.339	516.510	2.065	270.908
19.275	30	1.064	0.940	255.317	1.188	30.0	0.018	54.776	515.725	2.047	260.408
21.898	35	1.090	0.917	265.303	1.220	35.0	0.016	63.343	514.482	2.028	249.179
24.783	40	1.120	0.893	275.611	1.252	40.0	0.014	73.268	512.706	2.009	237.094
27.948	45	1.153	0.867	286.308	1.285	45.0	0.012	84.859	510.294	1.989	223.986
31.412	50	1.192	0.839	297.486	1.318	50.0	0.010	98.550	507.104	1.967	209.618
35.199	55	1.237	0.808	309.286	1.353	55.0	0.009	114.989	502.930	1.943	193.644
39.332	60	1.293	0.773	321.927	1.390	60.0	0.007	135.213	497.441	1.917	175.514
43.843	65	1.366	0.732	335.800	1.429	65.0	0.006	161.092	490.054	1.885	154.254
48.768	70	1.469	0.681	351.734	1.474	70.0	0.005	196.688	479.518	1.846	127.784
54.168	75	1.650	0.606	372.391	1.531	75.0	0.004	255.587	461.723	1.788	89.333

Thermodynamic properties of R-32 - (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	0.038	7222.039	7435.607	7648.525	7860.933	8072.931	8284.592	8495.974	8707.124	8918.079	9128.868	9339.517	9550.046	9760.472	9970.809	10181.070	10391.263	10601.399	10811.483	11021.522	11231.522	11441.487
-95	0.059	4797.698	4936.671	5075.093	5213.084	5350.728	5488.089	5625.215	5762.143	5898.905	6035.525	6172.026	6308.422	6444.730	6580.961	6717.124	6853.230	6989.284	7125.293	7261.263	7397.198	7533.101
-90	0.089	3272.109	3365.182	3457.783	3550.016	3641.956	3733.654	3825.152	3916.482	4007.669	4098.735	4189.697	4280.570	4371.365	4462.093	4552.766	4643.381	4733.954	4824.488	4914.986	5005.453	5095.893
-85	0.130	2285.584	2349.590	2413.187	2476.470	2539.501	2602.326	2664.979	2727.487	2789.873	2852.154	2914.345	2976.458	3038.504	3100.491	3162.426	3224.316	3286.167	3347.982	3409.766	3471.522	3533.253
-80	0.187	1631.561	1676.665	1721.414	1765.892	1810.153	1854.236	1898.171	1941.981	1985.685	2029.297	2072.832	2116.298	2159.705	2203.060	2246.370	2289.640	2332.875	2376.078	2419.253	2462.403	2505.531
-75	0.262	1187.965	1220.474	1252.674	1284.632	1316.412	1348.033	1379.526	1410.910	1442.202	1473.414	1504.557	1535.641	1566.673	1597.658	1628.604	1659.514	1690.392	1721.247	1752.067	1782.870	1813.653
-70	0.361	880.723	904.649	928.303	951.750	975.033	998.181	1021.218	1044.160	1067.021	1089.812	1112.542	1135.220	1157.851	1180.442	1202.997	1225.520	1248.015	1270.485	1292.932	1315.359	1337.767
-65	0.488	663.783	681.735	699.448	716.978	734.365	751.634	768.805	785.892	802.908	819.862	836.763	853.617	870.430	887.206	903.951	920.667	937.357	954.025	970.673	987.302	1003.914
-60	0.650	507.860	521.574	535.075	548.417	561.631	574.741	587.765	600.714	613.601	626.433	639.217	651.959	664.665	677.338	689.983	702.601	715.197	727.772	740.329	752.869	765.394
-55	0.852	393.941	404.593	415.056	425.378	435.586	445.703	455.742	465.716	475.633	485.502	495.328	505.117	514.873	524.599	534.300	543.977	553.633	563.271	572.892	582.497	592.089
-51.66	1.013	334.760	343.834	352.734	361.503	370.168	378.747	387.254	395.701	404.096	412.445	420.755	429.029	437.273	445.490	453.682	461.853	470.004	478.137	486.255	494.358	502.448
-50	1.101	309.440	317.842	326.077	334.186	342.194	350.119	357.976	365.774	373.522	381.226	388.892	396.524	404.126	411.702	419.254	426.785	434.297	441.792	449.272	456.737	464.190
-45	1.406	245.874	252.599	259.174	265.635	272.007	278.305	284.541	290.724	296.862	302.960	309.024	315.058	321.064	327.046	333.007	338.949	344.873	350.782	356.676	362.557	368.427
-40	1.774	197.430	202.885	208.206	213.424	218.562	223.633	228.648	233.616	238.543	243.433	248.293	253.124	257.932	262.717	267.482	272.230	276.961	281.679	286.383	291.076	295.757
-35	2.214	160.061	164.542	168.903	173.171	177.366	181.500	185.584	189.624	193.627	197.598	201.539	205.456	209.349	213.223	217.079	220.918	224.742	228.554	232.353	236.141	239.919
-30	2.734	130.908	134.634	138.250	141.783	145.248	148.658	152.022	155.347	158.637	161.897	165.131	168.342	171.531	174.703	177.857	180.997	184.123	187.236	190.339	193.431	196.514
-25	3.346	107.925	111.059	114.091	117.047	119.942	122.786	125.588	128.353	131.086	133.792	136.474	139.134	141.775	144.399	147.007	149.602	152.183	154.754	157.314	159.864	162.405
-20	4.058	89.628	92.291	94.862	97.362	99.805	102.202	104.559	106.883	109.177	111.446	113.692	115.919	118.127	120.320	122.498	124.663	126.816	128.958	131.091	133.215	135.330
-15	4.881	74.927	77.214	79.415	81.551	83.634	85.673	87.676	89.648	91.592	93.512	95.412	97.293	99.157	101.006	102.842	104.665	106.478	108.280	110.073	111.858	113.635
-10	5.826	63.013	64.996	66.900	68.741	70.534	72.286	74.003	75.691	77.354	78.994	80.615	82.218	83.805	85.379	86.940	88.489	90.028	91.557	93.078	94.591	96.096
-5	6.906	53.280	55.016	56.677	58.280	59.837	61.355	62.840	64.298	65.732	67.145	68.540	69.918	71.281	72.631	73.969	75.296	76.613	77.922	79.222	80.514	81.800
0	8.131	45.267	46.802	48.264	49.672	51.035	52.361	53.657	54.927	56.174	57.401	58.610	59.804	60.984	62.151	63.307	64.453	65.589	66.717	67.837	68.950	70.056
5	9.514	38.624	39.992	41.291	42.537	43.741	44.910	46.049	47.164	48.256	49.330	50.387	51.429	52.457	53.474	54.480	55.476	56.464	57.443	58.415	59.380	60.339
10	11.069	33.077	34.309	35.473	36.585	37.657	38.694	39.704	40.689	41.654	42.600	43.530	44.446	45.349	46.241	47.123	47.995	48.859	49.715	50.564	51.406	52.243
15	12.808	28.417	29.535	30.587	31.588	32.549	33.478	34.378	35.256	36.113	36.953	37.777	38.587	39.386	40.173	40.951	41.720	42.480	43.233	43.980	44.720	45.454
20	14.746	24.476	25.502	26.460	27.368	28.237	29.073	29.882	30.669	31.436	32.186	32.921	33.643	34.353	35.052	35.743	36.424	37.098	37.764	38.425	39.079	39.727
25	16.896	21.124	22.074	22.954	23.784	24.575	25.333	26.065	26.775	27.465	28.140	28.799	29.446	30.081	30.706	31.323	31.930	32.531	33.124	33.711	34.292	34.869
30	19.275	18.256	19.143	19.960	20.724	21.449	22.141	22.808	23.452	24.078	24.687	25.282	25.865	26.437	26.999	27.551	28.096	28.634	29.165	29.690	30.210	30.724
35	21.898	15.787	16.625	17.389	18.098	18.767	19.404	20.014	20.603	21.173	21.727	22.267	22.794	23.312	23.819	24.318	24.809	25.293	25.771	26.242	26.709	27.170
40	24.783	13.649	14.561	15.371	16.085	16.765	17.405	17.987	18.548	19.070	19.572	19.969	20.449	20.919	21.382	21.837	22.284	22.724	23.157	23.582	24.000	24.418
45	27.948	11.784	12.562	13.248	13.874	14.456	15.003	15.524	16.023	16.504	16.969	17.420	17.860	18.289	18.709	19.121	19.525	19.923	20.314	20.701	21.082	21.458
50	31.412	10.147	10.913	11.578	12.168	12.716	13.229	13.714	14.177	14.622	15.051	15.466	15.870	16.264	16.648	17.025	17.397	17.757	18.114	18.467	18.812	19.154
55	35.199	8.697	9.466	10.109	10.679	11.198	11.681	12.135	12.567	12.980	13.377	13.761	14.134	14.496	14.849	15.195	15.533	15.866	16.192	16.513	16.830	17.142
60	39.332	7.396	8.188	8.823	9.373	9.868	10.325	10.752	11.156	11.542	11.911	12.267	12.612	12.947	13.273	13.591	13.902	14.207	14.507	14.801	15.091	15.377
65	43.843	6.208	7.054	7.688	8.223	8.699	9.133	9.536	9.916	10.277	10.621	10.953	11.273	11.583	11.885	12.179	12.466	12.747	13.023	13.294	13.560	13.822
70	48.768	5.084	6.041	6.683	7.208	7.666	8.080	8.463	8.821	9.159	9.482	9.791	10.089	10.377	10.657	10.929	11.195	11.455	11.709	11.959	12.204	12.445
75	54.168	3.913	5.129	5.788	6.305	6.748	7.145	7.508	7.846	8.165	8.467	8.756	9.034	9.303	9.563	9.816	10.062	10.302	10.537	10.768	10.994	11.216

Thermodynamic properties of R-32 - (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	0.038	468.306	471.821	475.341	478.869	482.408	485.962	489.532	493.121	496.729	500.359	504.012	507.688	511.390	515.118	518.874	522.658	526.471	530.314	534.189	538.095	542.034
-95	0.059	471.481	475.046	478.610	482.179	485.758	489.350	492.957	496.581	500.224	503.889	507.576	511.287	515.023	518.786	522.576	526.395	530.243	534.122	538.033	541.976	545.952
-90	0.089	474.614	478.235	481.849	485.465	489.088	492.721	496.368	500.032	503.713	507.415	511.139	514.887	518.660	522.460	526.287	530.142	534.028	537.944	541.891	545.873	549.887
-85	0.130	477.697	481.381	485.052	488.720	492.392	496.071	499.762	503.468	507.191	510.933	514.699	518.485	522.297	526.135	530.001	533.896	537.821	541.776	545.764	549.784	553.838
-80	0.187	480.723	484.478	488.212	491.938	495.663	499.392	503.132	506.884	510.651	514.438	518.245	522.075	525.929	529.809	533.716	537.652	541.618	545.614	549.643	553.704	557.799
-75	0.262	483.684	487.519	491.323	495.112	498.895	502.680	506.472	510.274	514.091	517.924	521.777	525.652	529.551	533.475	537.426	541.405	545.414	549.454	553.526	557.630	561.768
-70	0.361	486.573	490.495	494.396	498.234	502.082	505.927	509.776	513.632	517.502	521.386	525.289	529.212	533.158	537.129	541.126	545.152	549.206	553.291	557.408	561.557	565.740
-65	0.488	489.384	493.401	497.366	501.300	505.217	509.127	513.038	516.953	520.879	524.818	528.773	532.748	536.745	540.766	544.812	548.886	552.988	557.121	561.284	565.481	569.710
-60	0.650	492.109	496.230	500.286	504.302	508.294	512.275	516.251	520.230	524.216	528.213	532.225	536.255	540.306	544.379	548.477	552.602	556.756	560.937	565.151	569.396	573.674
-55	0.852	494.741	498.975	503.128	507.232	511.306	515.362	519.410	523.456	527.507	531.566	535.639	539.727	543.835	547.964	552.117	556.296	560.502	564.736	569.001	573.298	577.626
-51.66	1.013	496.447	500.760	504.983	509.150	513.281	517.390	521.488	525.582	529.679	533.782	537.897	542.027	546.175	550.343	554.534	558.750	562.993	567.264	571.565	575.897	580.261
-50	1.101	497.275	501.628	505.887	510.086	514.246	518.383	522.507	526.626	530.745	534.871	539.008	543.159	547.327	551.515	555.726	559.961	564.222	568.512	572.831	577.181	581.562
-45	1.406	499.703	504.184	508.555	512.855	517.108	521.331	525.536	529.732	533.925	538.122	542.327	546.543	550.775	555.026	559.297	563.592	567.912	572.259	576.634	581.040	585.476
-40	1.774	502.017	506.634	511.124	515.532	519.884	524.200	528.491	532.769	537.041	541.312	545.589	549.875	554.174	558.491	562.826	567.183	571.565	575.972	580.406	584.870	589.364
-35	2.214	504.211	508.971	513.588	518.111	522.569	526.982	531.365	535.730	540.084	544.435	548.788	553.148	557.518	561.904	566.307	570.730	575.175	579.645	584.141	588.666	593.219
-30	2.734	506.274	511.187	515.939	520.583	525.153	529.670	534.151	538.608	543.050	547.485	551.918	556.356	560.801	565.259	569.733	574.225	578.738	583.273	587.834	592.421	597.037
-25	3.346	508.199	513.272	518.168	522.941	527.630	532.258	536.842	541.397	545.932	550.455	554.973	559.492	564.017	568.552	573.099	577.663	582.247	586.851	591.479	596.132	600.812
-20	4.058	509.972	515.218	520.265	525.177	529.992	534.737	539.431	544.089	548.722	553.339	557.947	562.552	567.160	571.775	576.400	581.042	585.697	590.373	595.071	599.793	604.540
-15	4.881	511.584	517.012	522.222	527.280	532.230	537.099	541.910	546.678	551.415	556.131	560.833	565.529	570.224	574.923	579.630	584.349	589.083	593.834	598.605	603.399	608.216
-10	5.826	513.020	518.644	524.028	529.243	534.336	539.338	544.272	549.156	554.003	558.823	563.625	568.416	573.203	577.991	582.783	587.585	592.399	597.229	602.076	606.944	611.834
-5	6.906	514.264	520.101	525.671	531.054	536.299	541.443	546.509	551.516	556.479	561.409	566.316	571.208	576.092	580.972	585.854	590.743	595.641	600.553	605.479	610.425	615.390
0	8.131	515.299	521.367	527.139	532.702	538.112	543.406	548.611	553.749	558.836	563.883	568.910	573.899	578.883	583.861	588.838	593.817	598.803	603.800	608.819	613.835	618.879
5	9.514	516.106	522.426	528.417	534.175	539.761	545.217	550.572	555.849	561.066	566.236	571.372	576.481	581.573	586.653	591.728	596.802	601.880	606.966	612.062	617.172	622.297
10	11.069	516.660	523.259	529.491	535.461	541.237	546.866	552.381	557.807	563.162	568.463	573.722	578.950	584.153	589.341	594.520	599.693	604.868	610.046	615.232	620.429	625.640
15	12.808	516.934	523.846	530.343	536.544	542.527	548.343	554.029	559.613	565.117	570.558	575.946	581.298	586.620	591.921	597.208	602.486	607.760	613.035	618.311	623.604	628.920
20	14.746	516.897	524.162	530.953	537.409	543.617	549.635	555.506	561.260	566.921	572.508	578.037	583.519	588.966	594.386	599.786	605.174	610.553	615.930	621.308	626.690	632.081
25	16.896	516.510	524.179	531.302	538.039	544.493	550.731	556.810	562.737	568.566	574.311	579.986	585.608	591.186	596.731	602.251	607.752	613.242	618.724	624.200	629.685	635.172
30	19.275	515.725	523.864	531.362	538.414	545.140	551.618	557.903	564.035	570.045	575.956	581.788	587.557	593.274	598.950	604.596	610.217	615.821	621.414	627.001	632.585	638.170
35	21.898	514.482	523.179	531.108	538.513	545.540	552.280	558.799	565.143	571.347	577.437	583.435	589.359	595.223	601.038	606.815	612.563	618.287	623.996	629.693	635.384	641.073
40	24.783	512.706	522.074	530.505	538.312	545.674	552.704	559.478	566.051	572.463	578.744	584.919	591.008	597.027	602.989	608.905	614.784	620.635	626.464	632.277	638.080	643.876
45	27.948	510.294	520.949	529.515	537.782	545.521	552.872	559.925	566.747	573.383	579.869	586.233	592.497	598.680	604.796	610.858	616.876	622.859	628.814	634.748	640.667	646.575
50	31.412	507.104	518.365	528.095	536.893	545.058	552.765	560.126	567.218	574.096	580.862	587.367	593.818	600.175	606.454	612.669	618.833	624.954	631.041	637.101	643.141	649.166
55	35.199	502.930	515.095	526.191	535.611	544.260	552.365	560.064	567.451	574.590	581.532	588.314	594.963	601.504	607.955	614.332	620.648	626.914	633.139	639.331	645.497	651.643
60	39.332	497.441	512.667	525.741	533.894	543.098	551.649	559.721	567.430	574.853	582.040	589.061	595.921	602.657	609.290	615.838	622.314	628.732	635.102	641.431	647.729	654.001
65	43.843	490.054	507.624	520.670	531.697	541.539	550.591	559.076	567.137	574.868	582.337	589.595	596.681	603.624	610.449	617.177	623.822	630.399	636.920	643.393	649.828	656.231
70	48.768	479.518	502.063	516.887	528.963	539.539	549.155	558.099	566.545	574.610	582.374	589.897	597.222	604.386	611.415	618.332	625.155	631.900	638.579	645.202	651.781	658.321
75	54.168	461.723	495.093	512.260	525.598	537.025	547.279	556.732	565.603	574.032	582.115	589.922	597.505	604.904	612.150	619.269	626.280	633.202	640.048	646.830	653.559	660.243

Thermodynamic properties of R-32 - (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	0.038	2.751	2.772	2.791	2.810	2.829	2.847	2.865	2.882	2.899	2.916	2.932	2.949	2.965	2.981	2.996	3.012	3.027	3.042	3.057	3.071	3.086
-95	0.059	2.700	2.720	2.739	2.758	2.776	2.794	2.812	2.829	2.846	2.862	2.879	2.895	2.911	2.926	2.942	2.957	2.972	2.987	2.997	3.016	3.031
-90	0.089	2.653	2.672	2.691	2.710	2.728	2.746	2.763	2.780	2.797	2.813	2.829	2.845	2.861	2.876	2.891	2.907	2.921	2.936	2.951	2.965	2.979
-85	0.130	2.609	2.628	2.647	2.665	2.683	2.701	2.718	2.734	2.751	2.767	2.783	2.799	2.814	2.830	2.845	2.860	2.875	2.889	2.904	2.918	2.932
-80	0.187	2.568	2.587	2.606	2.624	2.641	2.659	2.676	2.692	2.709	2.725	2.741	2.756	2.772	2.787	2.802	2.817	2.831	2.846	2.860	2.874	2.888
-75	0.262	2.530	2.549	2.567	2.585	2.603	2.620	2.637	2.653	2.669	2.685	2.701	2.716	2.732	2.747	2.762	2.776	2.791	2.805	2.820	2.834	2.848
-70	0.361	2.494	2.513	2.531	2.549	2.567	2.584	2.600	2.617	2.633	2.649	2.664	2.680	2.695	2.710	2.724	2.739	2.754	2.768	2.782	2.796	2.810
-65	0.488	2.460	2.479	2.498	2.516	2.533	2.550	2.567	2.583	2.599	2.615	2.630	2.645	2.660	2.675	2.690	2.704	2.719	2.733	2.747	2.761	2.775
-60	0.650	2.429	2.448	2.466	2.484	2.502	2.518	2.535	2.551	2.567	2.583	2.598	2.613	2.628	2.643	2.658	2.672	2.686	2.700	2.714	2.728	2.742
-55	0.852	2.399	2.419	2.437	2.455	2.472	2.489	2.505	2.521	2.537	2.553	2.568	2.583	2.598	2.613	2.628	2.642	2.656	2.670	2.684	2.698	2.712
-51.66	1.013	2.380	2.400	2.418	2.436	2.453	2.470	2.487	2.503	2.519	2.534	2.549	2.564	2.579	2.594	2.608	2.623	2.637	2.651	2.665	2.679	2.692
-50	1.101	2.371	2.391	2.409	2.427	2.444	2.461	2.478	2.494	2.509	2.525	2.540	2.555	2.570	2.585	2.599	2.614	2.628	2.642	2.656	2.670	2.683
-45	1.406	2.345	2.364	2.383	2.401	2.418	2.435	2.451	2.468	2.483	2.499	2.514	2.529	2.544	2.559	2.573	2.587	2.601	2.615	2.629	2.643	2.657
-40	1.774	2.320	2.340	2.358	2.376	2.394	2.410	2.427	2.443	2.459	2.474	2.490	2.505	2.519	2.534	2.548	2.563	2.577	2.591	2.604	2.618	2.632
-35	2.214	2.296	2.316	2.335	2.353	2.370	2.387	2.404	2.420	2.436	2.451	2.466	2.481	2.496	2.511	2.525	2.539	2.553	2.567	2.581	2.595	2.608
-30	2.734	2.273	2.293	2.312	2.331	2.348	2.365	2.382	2.398	2.414	2.429	2.444	2.459	2.474	2.489	2.503	2.518	2.532	2.546	2.559	2.573	2.587
-25	3.346	2.252	2.272	2.291	2.310	2.327	2.344	2.361	2.377	2.393	2.409	2.424	2.439	2.454	2.468	2.483	2.497	2.511	2.525	2.539	2.552	2.566
-20	4.058	2.231	2.251	2.271	2.289	2.307	2.324	2.341	2.357	2.373	2.389	2.404	2.419	2.434	2.449	2.463	2.477	2.492	2.505	2.519	2.533	2.546
-15	4.881	2.211	2.232	2.251	2.270	2.288	2.305	2.322	2.339	2.355	2.370	2.386	2.401	2.416	2.430	2.445	2.459	2.473	2.487	2.501	2.515	2.528
-10	5.826	2.192	2.213	2.233	2.252	2.270	2.287	2.304	2.321	2.337	2.353	2.368	2.383	2.398	2.413	2.427	2.442	2.456	2.470	2.484	2.497	2.511
-5	6.906	2.173	2.194	2.214	2.234	2.252	2.270	2.287	2.304	2.320	2.336	2.351	2.366	2.381	2.396	2.411	2.425	2.439	2.453	2.467	2.481	2.494
0	8.131	2.154	2.174	2.197	2.216	2.235	2.253	2.270	2.287	2.303	2.319	2.335	2.350	2.365	2.380	2.395	2.409	2.424	2.438	2.451	2.465	2.479
5	9.514	2.136	2.159	2.180	2.200	2.218	2.237	2.254	2.271	2.288	2.304	2.320	2.335	2.350	2.365	2.380	2.394	2.409	2.423	2.437	2.450	2.464
10	11.069	2.118	2.142	2.163	2.183	2.202	2.221	2.239	2.256	2.272	2.289	2.305	2.320	2.335	2.350	2.365	2.380	2.394	2.408	2.422	2.436	2.450
15	12.808	2.101	2.125	2.147	2.167	2.187	2.205	2.223	2.241	2.258	2.274	2.290	2.306	2.321	2.337	2.351	2.366	2.380	2.395	2.409	2.423	2.436
20	14.746	2.083	2.108	2.130	2.151	2.171	2.190	2.209	2.226	2.242	2.260	2.276	2.292	2.308	2.323	2.338	2.353	2.367	2.382	2.396	2.410	2.423
25	16.896	2.065	2.091	2.114	2.136	2.156	2.176	2.194	2.212	2.230	2.246	2.263	2.279	2.295	2.310	2.325	2.340	2.355	2.369	2.383	2.397	2.411
30	19.275	2.047	2.074	2.098	2.120	2.141	2.161	2.180	2.198	2.216	2.233	2.250	2.266	2.282	2.297	2.313	2.328	2.342	2.357	2.371	2.385	2.399
35	21.898	2.028	2.056	2.082	2.105	2.126	2.147	2.166	2.185	2.203	2.220	2.237	2.253	2.269	2.285	2.300	2.315	2.330	2.345	2.359	2.374	2.388
40	24.783	2.009	2.039	2.065	2.089	2.111	2.132	2.152	2.171	2.189	2.207	2.224	2.241	2.257	2.273	2.289	2.304	2.319	2.334	2.348	2.362	2.376
45	27.948	1.989	2.021	2.048	2.073	2.096	2.118	2.138	2.158	2.176	2.194	2.212	2.229	2.245	2.261	2.277	2.292	2.308	2.322	2.337	2.351	2.366
50	31.412	1.967	2.002	2.031	2.057	2.081	2.103	2.124	2.144	2.164	2.182	2.200	2.217	2.233	2.250	2.266	2.281	2.296	2.311	2.326	2.341	2.355
55	35.199	1.943	1.982	2.013	2.041	2.066	2.089	2.111	2.131	2.151	2.169	2.187	2.205	2.222	2.238	2.254	2.270	2.286	2.301	2.316	2.330	2.345
60	39.332	1.917	1.960	1.994	2.024	2.050	2.074	2.097	2.118	2.138	2.157	2.175	2.193	2.210	2.227	2.243	2.259	2.275	2.290	2.305	2.320	2.335
65	43.843	1.885	1.937	1.975	2.006	2.034	2.059	2.082	2.104	2.125	2.144	2.163	2.181	2.199	2.216	2.232	2.249	2.264	2.280	2.295	2.310	2.325
70	48.768	1.846	1.912	1.954	1.988	2.017	2.044	2.068	2.090	2.111	2.132	2.151	2.169	2.187	2.205	2.221	2.238	2.254	2.270	2.285	2.300	2.315
75	54.168	1.788	1.883	1.932	1.969	2.000	2.027	2.053	2.076	2.098	2.118	2.138	2.157	2.175	2.193	2.210	2.227	2.243	2.259	2.275	2.290	2.305