

U. S. DEPARTMENT OF COMMERCE

DANIEL C. ROPER, Secretary

NATIONAL BUREAU OF STANDARDS

LYMAN J. BRIGGS, Director

CIRCULAR OF THE NATIONAL BUREAU OF STANDARDS C416

GALLONAGE TABLES
FOR HORIZONTAL CYLINDRICAL TANKS
WITH FLAT ENDS

[Issued October 29, 1937]



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1937

PREFACE

This Circular is designed to meet a considerable demand for tables giving the volume of liquid in filled or partly filled horizontal cylindrical tanks.

The tables herein are arranged so that the volume in any given case can be readily calculated if inside length, diameter, and depth of liquid in the tank are known.

The tables give the volume (in gallons) for a cross section 1 inch in length for tanks of various diameters when filled to various depths (diameters and depths being expressed in inches).

LYMAN J. BRIGGS, *Director*.

GALLONAGE TABLES FOR HORIZONTAL CYLINDRICAL TANKS WITH FLAT ENDS

By Elmer L. Pepper

ABSTRACT

A knowledge of the volume contained in completely and partially filled horizontal cylindrical tanks is of importance wherever liquid is stored and especially in the petroleum oil industry.

The tables, as prepared by the National Bureau of Standards, show the volume, in gallons, of a section 1 inch in length, for tanks of various diameters filled to various depths. The total volume of liquid in a tank filled to a given depth can be obtained by multiplying the tabulated volume per inch in length, for a given diameter of tank and depth of liquid, by the length of the tank, in inches. For example, a tank 120 inches long, 48 inches in diameter (inside measurements), filled to a depth of 18 inches, contains 2.683×120 , or 322 gallons.

Table 1 gives coefficients for calculating the areas of segments of a circle of diameter D having the height h . The area equals the product of the coefficient listed in the table by the square of the diameter.

Table 2 shows the volume of liquid, in gallons, in a section 1 inch in length for horizontal cylindrical tanks of various diameters when filled to various depths. The total volume of liquid in a tank filled to a given depth can be obtained by multiplying the tabulated volume per inch in length, for a given diameter of tank and depth of liquid, by the length of the tank in inches.

By the use of table 1, which gives coefficients for calculating the areas of circular segments, a new table of volume in gallons for various depths may be computed for a tank of any diameter not included in table 2. For example, let it be desired to compute a table for a tank of diameter D equal to 18 inches, and of length L equal to 45 inches. The work may be tabulated as follows:

h	h/D	Coefficient interpo- lated from table 1	Volume in gallons ($\frac{\text{coef} \times D^2 L}{231}$)	Differences
<i>Inches</i>				
1.....	0. 055556	0. 017166	1. 083	1. 083
2.....	. 111111	. 047703	3. 011	1. 928
3.....	. 166667	. 086042	5. 431	2. 420
4.....	. 222222	. 129958	8. 203	2. 772
5.....	. 277778	. 178027	11. 237	3. 034
6.....	. 333333	. 229172	14. 465	3. 228
7.....	. 388889	. 282510	17. 831	3. 366
8.....	. 444444	. 337258	21. 287	3. 456
9.....	. 500000	. 392699	24. 786	3. 499
10.....			28. 285	3. 499
11.....			31. 741	3. 456
12.....			35. 107	3. 366
13.....			38. 335	3. 228
14.....			41. 369	3. 034
15.....			44. 141	2. 772
16.....			46. 561	2. 420
17.....			48. 489	1. 928
18.....			49. 572	1. 083

The second half of the table is completed by successively adding the differences in the first half of the table in reverse order.

TABLE 1.—Coefficients for calculating areas of circular segments

[Area=coefficient $\times D^2$]

h/D	Coefficient	h/D	Coefficient	h/D	Coefficient	h/D	Coefficient	h/D	Coefficient
0.001	0.000042	0.051	0.015119	0.101	0.041477	0.151	0.074590	0.201	0.112625
.002	.000119	.052	.015561	.102	.042081	.152	.075307	.202	.113427
.003	.000219	.053	.016008	.103	.042687	.153	.076026	.203	.114231
.004	.000337	.054	.016458	.104	.043296	.154	.076747	.204	.115036
.005	.000471	.055	.016912	.105	.043908	.155	.077470	.205	.115842
.006	.000619	.056	.017369	.106	.044523	.156	.078194	.206	.116651
.007	.000779	.057	.017831	.107	.045140	.157	.078921	.207	.117460
.008	.000952	.058	.018297	.108	.045759	.158	.079650	.208	.118271
.009	.001135	.059	.018766	.109	.046381	.159	.080380	.209	.119084
.010	.001329	.060	.019239	.110	.047006	.160	.081112	.210	.119898
.011	.001533	.061	.019716	.111	.047633	.161	.081847	.211	.120713
.012	.001746	.062	.020197	.112	.048262	.162	.082582	.212	.121530
.013	.001969	.063	.020681	.113	.048894	.163	.083320	.213	.122348
.014	.002199	.064	.021168	.114	.049529	.164	.084060	.214	.123167
.015	.002438	.065	.021660	.115	.050165	.165	.084801	.215	.123988
.016	.002685	.066	.022155	.116	.050805	.166	.085545	.216	.124811
.017	.002940	.067	.022653	.117	.051446	.167	.086290	.217	.125634
.018	.003202	.068	.023155	.118	.052090	.168	.087037	.218	.126459
.019	.003472	.069	.023660	.119	.052737	.169	.087785	.219	.127286
.020	.003749	.070	.024168	.120	.053385	.170	.088536	.220	.128114
.021	.004032	.071	.024680	.121	.054037	.171	.089288	.221	.128943
.022	.004322	.072	.025196	.122	.054690	.172	.090042	.222	.129773
.023	.004619	.073	.025714	.123	.055346	.173	.090797	.223	.130605
.024	.004922	.074	.026236	.124	.056004	.174	.091555	.224	.131438
.025	.005231	.075	.026761	.125	.056664	.175	.092314	.225	.132273
.026	.005546	.076	.027290	.126	.057327	.176	.093074	.226	.133109
.027	.005867	.077	.027821	.127	.057991	.177	.093837	.227	.133946
.028	.006194	.078	.028356	.128	.058658	.178	.094601	.228	.134784
.029	.006527	.079	.028894	.129	.059328	.179	.095367	.229	.135624
.030	.006866	.080	.029435	.130	.059999	.180	.096135	.230	.136465
.031	.007209	.081	.029979	.131	.060673	.181	.096904	.231	.137307
.032	.007559	.082	.030526	.132	.061349	.182	.097675	.232	.138151
.033	.007913	.083	.031077	.133	.062027	.183	.098447	.233	.138996
.034	.008273	.084	.031630	.134	.062707	.184	.099221	.234	.139842
.035	.008638	.085	.032186	.135	.063389	.185	.099997	.235	.140689
.036	.009008	.086	.032746	.136	.064074	.186	.100775	.236	.141538
.037	.009383	.087	.033308	.137	.064761	.187	.101554	.237	.142388
.038	.009763	.088	.033873	.138	.065449	.188	.102334	.238	.143239
.039	.010148	.089	.034441	.139	.066140	.189	.103116	.239	.144091
.040	.010538	.090	.035012	.140	.066833	.190	.103900	.240	.144945
.041	.010932	.091	.035586	.141	.067528	.191	.104686	.241	.145800
.042	.011331	.092	.036162	.142	.068225	.192	.105473	.242	.146656
.043	.011734	.093	.036742	.143	.068924	.193	.106261	.243	.147513
.044	.012142	.094	.037324	.144	.069626	.194	.107051	.244	.148371
.045	.012555	.095	.037909	.145	.070329	.195	.107843	.245	.149231
.046	.012971	.096	.038497	.146	.071034	.196	.108636	.246	.150091
.047	.013393	.097	.039087	.147	.071741	.197	.109431	.247	.150953
.048	.013818	.098	.039681	.148	.072450	.198	.110227	.248	.151816
.049	.014248	.099	.040277	.149	.073162	.199	.111025	.249	.152681
.050	.014681	.100	.040875	.150	.073875	.200	.111824	.250	.153546

TABLE 1.—Coefficients for calculating areas of circular segments—Continued

[Area=coefficient $\times D^2$]

<i>h/D</i>	Coefficient	<i>h/D</i>	Coefficient	<i>h/D</i>	Coefficient	<i>h/D</i>	Coefficient	<i>h/D</i>	Coefficient
0.251	0.154413	0.301	0.199085	0.351	0.245935	0.401	0.294350	0.451	0.343778
.252	.155251	.302	.200003	.352	.246890	.402	.295330	.452	.344773
.253	.156149	.303	.200922	.353	.247845	.403	.296311	.453	.345768
.254	.157019	.304	.201841	.354	.248801	.404	.297292	.454	.346764
.255	.157891	.305	.202762	.355	.249753	.405	.298274	.455	.347760
.256	.158763	.306	.203683	.356	.250715	.406	.299256	.456	.348756
.257	.159636	.307	.204605	.357	.251673	.407	.300235	.457	.349752
.258	.160511	.308	.205528	.358	.252632	.408	.301221	.458	.350749
.259	.161386	.309	.206452	.359	.253591	.409	.302204	.459	.351745
.260	.162263	.310	.207376	.360	.254551	.410	.303187	.460	.352742
.261	.163141	.311	.208302	.361	.255511	.411	.304171	.461	.353739
.262	.164020	.312	.209228	.362	.256472	.412	.305156	.462	.354736
.263	.164900	.313	.210155	.363	.257433	.413	.306140	.463	.355733
.264	.165781	.314	.211083	.364	.258395	.414	.307125	.464	.356730
.265	.166663	.315	.212011	.365	.259358	.415	.308110	.465	.357728
.266	.167546	.316	.212941	.366	.260321	.416	.309096	.466	.358725
.267	.168431	.317	.213871	.367	.261285	.417	.310082	.467	.359723
.268	.169316	.318	.214802	.368	.262249	.418	.311068	.468	.360721
.269	.170202	.319	.215734	.369	.263214	.419	.312055	.469	.361719
.270	.171090	.320	.216666	.370	.264179	.420	.313042	.470	.362717
.271	.171978	.321	.217600	.371	.265145	.421	.314029	.471	.363715
.272	.172868	.322	.218534	.372	.266111	.422	.315017	.472	.364714
.273	.173758	.323	.219469	.373	.267078	.423	.316005	.473	.365712
.274	.174650	.324	.220404	.374	.268046	.424	.316993	.474	.366711
.275	.175542	.325	.221341	.375	.269014	.425	.317981	.475	.367709
.276	.176436	.326	.222278	.376	.269982	.426	.318970	.476	.368708
.277	.177330	.327	.223216	.377	.270951	.427	.319959	.477	.369707
.278	.178226	.328	.224154	.378	.271921	.428	.320949	.478	.370706
.279	.179122	.329	.225094	.379	.272891	.429	.321938	.479	.371705
.280	.180020	.330	.226034	.380	.273861	.430	.322928	.480	.372704
.281	.180918	.331	.226974	.381	.274832	.431	.323919	.481	.373704
.282	.181818	.332	.227916	.382	.275804	.432	.324909	.482	.374703
.283	.182718	.333	.228858	.383	.276776	.433	.325900	.483	.375702
.284	.183619	.334	.229801	.384	.277748	.434	.326891	.484	.376702
.285	.184522	.335	.230745	.385	.278721	.435	.327883	.485	.377701
.286	.185425	.336	.231689	.386	.279695	.436	.328874	.486	.378701
.287	.186329	.337	.232634	.387	.280669	.437	.329866	.487	.379701
.288	.187235	.338	.233580	.388	.281643	.438	.330858	.488	.380700
.289	.188141	.339	.234526	.389	.282618	.439	.331851	.489	.381700
.290	.189048	.340	.235473	.390	.283593	.440	.332843	.490	.382700
.291	.189956	.341	.236421	.391	.284569	.441	.333836	.491	.383699
.292	.190865	.342	.237369	.392	.285545	.442	.334829	.492	.384699
.293	.191774	.343	.238319	.393	.286521	.443	.335823	.493	.385699
.294	.192685	.344	.239268	.394	.287499	.444	.336816	.494	.386699
.295	.193597	.345	.240219	.395	.288476	.445	.337810	.495	.387699
.296	.194509	.346	.241170	.396	.289454	.446	.338804	.496	.388699
.297	.195423	.347	.242122	.397	.290432	.447	.339799	.497	.389699
.298	.196337	.348	.243074	.398	.291411	.448	.340793	.498	.390699
.299	.197252	.349	.244027	.399	.292390	.449	.341788	.499	.391699
.300	.198168	.350	.244981	.400	.293370	.450	.342783	.500	.392699

TABLE 2.—Capacity table for horizontal tanks (per inch of length)

[illegible]

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

Depth	DIAMETER IN INCHES									
	40	42	44	46	48	50	52	54	56	58
<i>in.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>
1	0.036	0.037	0.038	0.039	0.040	0.041	0.041	0.042	0.043	0.044
2	.102	.104	.107	.109	.112	.114	.116	.118	.121	.123
3	.185	.190	.195	.199	.204	.208	.212	.217	.221	.225
4	.283	.291	.298	.305	.312	.319	.325	.332	.338	.344
5	.392	.403	.413	.423	.433	.442	.452	.461	.470	.479
6	.512	.526	.539	.552	.565	.578	.590	.602	.614	.626
7	.639	.657	.674	.691	.707	.723	.739	.754	.769	.784
8	.775	.796	.817	.838	.858	.878	.897	.916	.934	.952
9	.916	.942	.968	.993	1.017	1.040	1.064	1.086	1.108	1.130
10	1.064	1.094	1.125	1.154	1.182	1.210	1.237	1.264	1.290	1.316
11	1.216	1.252	1.287	1.321	1.354	1.387	1.418	1.449	1.479	1.509
12	1.373	1.414	1.454	1.493	1.531	1.569	1.605	1.641	1.675	1.709
13	1.533	1.580	1.626	1.670	1.714	1.756	1.797	1.838	1.877	1.916
14	1.697	1.750	1.802	1.852	1.901	1.948	1.995	2.040	2.085	2.128
15	1.863	1.923	1.981	2.037	2.091	2.145	2.197	2.247	2.297	2.345
16	2.032	2.098	2.163	2.225	2.286	2.345	2.403	2.459	2.514	2.568
17	2.202	2.276	2.347	2.416	2.483	2.548	2.612	2.674	2.735	2.794
18	2.374	2.455	2.534	2.609	2.683	2.755	2.825	2.893	2.960	3.025
19	2.547	2.636	2.722	2.805	2.885	2.964	3.040	3.115	3.188	3.259
20	2.720	2.817	2.911	3.002	3.089	3.175	3.258	3.339	3.419	3.496
21	2.893	2.999	3.101	3.199	3.295	3.388	3.478	3.565	3.652	3.736
22	3.066	3.181	3.291	3.398	3.502	3.602	3.700	3.795	3.888	3.978
23	3.238	3.362	3.482	3.597	3.709	3.818	3.923	4.026	4.126	4.223
24	3.408	3.542	3.672	3.796	3.917	4.034	4.147	4.257	4.365	4.470
25	3.577	3.722	3.851	3.995	4.125	4.250	4.372	4.490	4.605	4.718
26	3.743	3.899	4.049	4.193	4.332	4.466	4.597	4.723	4.847	4.967
27	3.907	4.075	4.235	4.390	4.539	4.682	4.822	4.957	5.089	5.217
28	4.067	4.248	4.420	4.585	4.744	4.898	5.047	5.191	5.331	5.468
29	4.224	4.417	4.602	4.778	4.948	5.112	5.271	5.424	5.574	5.719
30	4.376	4.584	4.781	4.969	5.150	5.325	5.494	5.657	5.816	5.970
31	4.524	4.746	4.956	5.158	5.350	5.536	5.715	5.889	6.057	6.221
32	4.665	4.903	5.128	5.343	5.548	5.745	5.935	6.119	6.298	6.471
33	4.801	5.055	5.296	5.524	5.742	5.952	6.153	6.348	6.537	6.720
34	4.928	5.201	5.458	5.701	5.933	6.155	6.369	6.575	6.775	6.968
35	5.048	5.341	5.615	5.873	6.120	6.355	6.582	6.800	7.010	7.214
36	5.157	5.472	5.765	6.041	6.302	6.552	6.791	7.021	7.244	7.459
37	5.255	5.595	5.908	6.202	6.479	6.744	6.997	7.240	7.475	7.702
38	5.338	5.707	6.043	6.356	6.651	6.931	7.199	7.456	7.703	7.942
39	5.404	5.807	6.169	6.503	6.817	7.113	7.396	7.667	7.928	8.179
40	5.440	5.893	6.285	6.642	6.975	7.290	7.589	7.874	8.149	8.413
41	5.560	6.060	6.488	6.871	7.226	7.560	7.875	8.174	8.458	8.728
42	5.668	6.188	6.646	7.059	7.442	7.806	8.151	8.476	8.781	9.068
43	5.765	6.295	6.783	7.226	7.639	8.032	8.405	8.759	9.094	9.411
44	5.852	6.392	6.900	7.373	7.806	8.229	8.631	8.995	9.340	9.668
45	5.928	6.478	6.996	7.469	7.922	8.365	8.797	9.181	9.546	9.893
46	5.994	6.544	7.072	7.585	8.058	8.521	8.973	9.377	9.762	10.129
47	6.050	6.600	7.138	7.671	8.164	8.647	9.119	9.543	9.948	10.335
48	6.097	6.647	7.185	7.728	8.231	8.724	9.207	9.641	10.057	10.455
49	6.135	6.685	7.223	7.776	8.284	8.787	9.270	9.714	10.141	10.550
50	6.164	6.714	7.252	7.805	8.313	8.826	9.309	9.753	10.180	10.599
51	6.184	6.734	7.272	7.825	8.336	8.859	9.342	9.786	10.213	10.632
52	6.196	6.746	7.284	7.837	8.348	8.881	9.364	9.808	10.225	10.644
53	6.200	6.750	7.288	7.841	8.352	8.885	9.368	9.812	10.229	10.648
54	6.204	6.754	7.292	7.845	8.356	8.889	9.372	9.816	10.233	10.652
55	6.208	6.758	7.296	7.849	8.360	8.893	9.376	9.820	10.237	10.656
56	6.212	6.762	7.300	7.853	8.364	8.897	9.380	9.824	10.241	10.660
57	6.216	6.766	7.304	7.857	8.368	8.901	9.384	9.828	10.245	10.664
58	6.220	6.770	7.308	7.861	8.372	8.905	9.388	9.832	10.249	10.668

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

Depth	DIAMETER IN INCHES									
	60	62	64	66	68	70	72	74	76	78
in.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.
1	0.044	0.045	0.046	0.047	0.047	0.048	0.049	0.049	0.050	0.051
2	.125	.127	.129	.131	.133	.135	.137	.139	.141	.143
3	.229	.233	.237	.240	.244	.248	.251	.255	.258	.262
4	.350	.356	.362	.368	.374	.380	.385	.391	.396	.401
5	.487	.496	.504	.512	.520	.528	.536	.544	.551	.559
6	.637	.648	.659	.670	.681	.691	.702	.712	.722	.732
7	.798	.813	.827	.840	.854	.867	.880	.893	.906	.918
8	.970	.988	1.005	1.022	1.038	1.054	1.071	1.086	1.102	1.117
9	1.151	1.172	1.193	1.213	1.233	1.252	1.272	1.291	1.309	1.328
10	1.341	1.366	1.390	1.414	1.437	1.460	1.483	1.505	1.527	1.549
11	1.538	1.567	1.595	1.623	1.650	1.676	1.703	1.728	1.754	1.779
12	1.743	1.775	1.808	1.839	1.870	1.901	1.931	1.960	1.990	2.018
13	1.954	1.991	2.027	2.063	2.098	2.133	2.167	2.201	2.234	2.266
14	2.171	2.212	2.253	2.294	2.333	2.372	2.410	2.448	2.485	2.522
15	2.393	2.440	2.485	2.530	2.574	2.618	2.660	2.702	2.744	2.784
16	2.620	2.672	2.723	2.772	2.821	2.869	2.916	2.963	3.009	3.054
17	2.852	2.909	2.965	3.020	3.074	3.126	3.178	3.230	3.280	3.330
18	3.088	3.151	3.212	3.272	3.331	3.389	3.446	3.502	3.557	3.611
19	3.328	3.396	3.463	3.529	3.593	3.656	3.718	3.779	3.839	3.898
20	3.572	3.646	3.718	3.789	3.859	3.928	3.995	4.061	4.127	4.191
21	3.818	3.898	3.977	4.054	4.129	4.204	4.277	4.348	4.419	4.488
22	4.067	4.254	4.238	4.322	4.403	4.483	4.562	4.639	4.715	4.790
23	4.318	4.412	4.503	4.592	4.680	4.766	4.851	4.934	5.015	5.096
24	4.572	4.672	4.770	4.866	4.960	5.052	5.143	5.232	5.320	5.406
25	4.827	4.935	5.039	5.142	5.243	5.341	5.438	5.534	5.627	5.719
26	5.084	5.199	5.311	5.420	5.528	5.633	5.736	5.838	5.938	6.036
27	5.342	5.464	5.584	5.700	5.815	5.927	6.037	6.145	6.251	6.356
28	5.601	5.731	5.858	5.982	6.104	6.223	6.340	6.455	6.568	6.678
29	5.860	5.998	6.133	6.265	6.394	6.521	6.645	6.767	6.886	7.004
30	6.120	6.266	6.409	6.549	6.686	6.820	6.951	7.080	7.207	7.331
31	6.380	6.535	6.686	6.834	6.979	7.121	7.259	7.396	7.529	7.661
32	6.639	6.803	6.963	7.119	7.272	7.422	7.569	7.712	7.853	7.992
33	6.898	7.071	7.240	7.405	7.566	7.724	7.879	8.030	8.179	8.325
34	7.156	7.339	7.517	7.691	7.861	8.027	8.190	8.349	8.506	8.659
35	7.413	7.605	7.793	7.976	8.155	8.330	8.501	8.669	8.833	8.994
36	7.668	7.871	8.068	8.261	8.449	8.633	8.813	8.989	9.161	9.331
37	7.921	8.135	8.343	8.545	8.743	8.936	9.124	9.309	9.490	9.668
38	8.173	8.398	8.616	8.828	9.036	9.238	9.436	9.629	9.819	10.005
39	8.422	8.658	8.887	9.110	9.327	9.539	9.747	9.950	10.148	10.343
40	8.668	8.916	9.156	9.390	9.618	9.840	10.057	10.269	10.477	10.680

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

Depth	DIAMETER IN INCHES									
	60	62	64	66	68	70	72	74	76	78
<i>in.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>
41.....	8.912	9.171	9.423	9.668	9.907	10.139	10.366	10.588	10.805	11.018
42.....	9.152	9.424	9.688	9.944	10.194	10.437	10.674	10.906	11.133	11.355
43.....	9.388	9.673	9.950	10.218	10.479	10.733	10.981	11.223	11.459	11.691
44.....	9.620	9.919	10.208	10.489	10.761	11.027	11.286	11.538	11.785	12.026
45.....	9.847	10.160	10.463	10.757	11.041	11.319	11.588	11.852	12.109	12.361
46.....	10.069	10.398	10.714	11.021	11.318	11.608	11.889	12.164	12.432	12.694
47.....	10.286	10.630	10.961	11.282	11.592	11.894	12.187	12.473	12.752	13.025
48.....	10.497	10.857	11.204	11.538	11.862	12.177	12.483	12.780	13.071	13.355
49.....	10.702	11.079	11.441	11.791	12.129	12.456	12.775	13.085	13.387	13.682
50.....	10.899	11.294	11.673	12.038	12.391	12.732	13.064	13.386	13.701	14.007
51.....	11.089	11.503	11.899	12.280	12.648	13.004	13.349	13.685	14.011	14.330
52.....	11.270	11.704	12.119	12.517	12.908	13.271	13.630	13.979	14.319	14.650
53.....	11.442	11.897	12.331	12.747	13.147	13.534	13.907	14.270	14.623	14.966
54.....	11.603	12.082	12.537	12.971	13.388	13.791	14.180	14.557	14.923	15.280
55.....	11.753	12.257	12.734	13.188	13.623	14.042	14.447	14.839	15.220	15.590
56.....	11.889	12.421	12.922	13.397	13.851	14.288	14.709	15.117	15.512	15.896
57.....	12.011	12.574	13.100	13.597	14.072	14.527	14.965	15.389	15.799	16.197
58.....	12.115	12.713	13.267	13.789	14.285	14.759	15.215	15.655	16.081	16.495
59.....	12.195	12.837	13.422	13.970	14.489	14.984	15.459	15.916	16.358	16.787
60.....	12.240	12.942	13.564	14.140	14.683	15.200	15.695	16.170	16.630	17.074
61.....		13.024	13.690	14.298	14.868	15.408	15.923	16.418	16.895	17.356
62.....		13.070	13.797	14.442	15.041	15.606	16.143	16.653	17.153	17.632
63.....			13.880	14.570	15.201	15.793	16.354	16.890	17.405	17.901
64.....			13.926	14.679	15.348	15.969	16.555	17.114	17.649	18.164
65.....				14.764	15.477	16.132	16.745	17.328	17.884	18.419
66.....				14.810	15.588	16.280	16.924	17.532	18.111	18.667
67.....					15.674	16.412	17.090	17.725	18.329	18.907
68.....					15.722	16.525	17.240	17.907	18.536	19.137
69.....						16.612	17.374	18.075	18.733	19.358
70.....						16.660	17.488	18.228	18.917	19.568
71.....							17.577	18.364	19.087	19.767
72.....							17.626	18.479	19.242	19.954
73.....								18.569	19.380	20.127
74.....								18.618	19.497	

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

Depth	DIAMETER IN INCHES									
	80	82	84	86	88	90	92	94	96	98
<i>in.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>
1	0.051	0.052	0.053	0.053	0.054	0.055	0.055	0.056	0.056	0.057
2	.145	.147	.149	.150	.152	.154	.156	.157	.159	.161
3	.265	.269	.272	.275	.278	.282	.285	.288	.291	.294
4	.407	.412	.417	.422	.427	.432	.437	.442	.447	.451
5	.566	.574	.581	.588	.595	.602	.609	.616	.622	.629
6	.741	.751	.761	.770	.779	.789	.798	.806	.815	.824
7	.931	.943	.955	.967	.978	.990	1.002	1.013	1.024	1.035
8	1.132	1.147	1.162	1.177	1.191	1.205	1.220	1.233	1.247	1.261
9	1.346	1.364	1.382	1.399	1.416	1.433	1.450	1.467	1.483	1.500
10	1.570	1.591	1.612	1.632	1.653	1.673	1.693	1.712	1.731	1.751
11	1.804	1.828	1.852	1.876	1.900	1.923	1.946	1.968	1.991	2.013
12	2.047	2.075	2.102	2.129	2.156	2.183	2.209	2.235	2.261	2.286
13	2.298	2.330	2.361	2.392	2.422	2.452	2.482	2.511	2.540	2.569
14	2.558	2.593	2.628	2.663	2.697	2.731	2.764	2.797	2.829	2.861
15	2.824	2.864	2.903	2.942	2.980	3.017	3.054	3.091	3.127	3.163
16	3.098	3.142	3.185	3.228	3.270	3.311	3.352	3.393	3.433	3.472
17	3.378	3.427	3.474	3.521	3.567	3.613	3.658	3.702	3.746	3.790
18	3.665	3.717	3.769	3.821	3.871	3.921	3.970	4.019	4.067	4.115
19	3.957	4.014	4.071	4.127	4.182	4.236	4.290	4.343	4.395	4.447
20	4.254	4.316	4.378	4.438	4.498	4.557	4.615	4.673	4.729	4.785
21	4.556	4.624	4.690	4.756	4.820	4.884	4.947	5.009	5.070	5.131
22	4.864	4.936	5.008	5.078	5.147	5.216	5.284	5.350	5.416	5.482
23	5.175	5.253	5.330	5.405	5.480	5.553	5.626	5.698	5.768	5.838
24	5.490	5.574	5.656	5.737	5.817	5.896	5.973	6.050	6.126	6.201
25	5.810	5.899	5.987	6.073	6.158	6.243	6.326	6.407	6.488	6.568
26	6.132	6.227	6.321	6.413	6.504	6.594	6.682	6.769	6.855	6.940
27	6.458	6.559	6.659	6.757	6.854	6.949	7.043	7.135	7.227	7.317
28	6.787	6.895	7.000	7.104	7.207	7.308	7.407	7.506	7.603	7.698
29	7.119	7.233	7.345	7.455	7.563	7.670	7.776	7.880	7.982	8.084
30	7.453	7.573	7.692	7.808	7.923	8.036	8.147	8.257	8.366	8.473
31	7.790	7.917	8.041	8.164	8.285	8.405	8.522	8.638	8.753	8.866
32	8.128	8.262	8.393	8.523	8.651	8.776	8.900	9.022	9.143	9.262
33	8.468	8.609	8.748	8.884	9.018	9.151	9.281	9.410	9.536	9.661
34	8.810	8.958	9.104	9.247	9.388	9.527	9.664	9.799	9.933	10.064
35	9.153	9.309	9.462	9.612	9.760	9.906	10.050	10.192	10.331	10.469
36	9.497	9.660	9.821	9.979	10.134	10.287	10.438	10.586	10.733	10.877
37	9.842	10.013	10.181	10.347	10.509	10.670	10.827	10.983	11.136	11.287
38	10.188	10.367	10.543	10.716	10.886	11.054	11.219	11.381	11.542	11.700
39	10.534	10.721	10.905	11.086	11.264	11.439	11.612	11.782	11.949	12.114
40	10.880	11.076	11.268	11.457	11.643	11.826	12.006	12.183	12.358	12.530
41	11.226	11.431	11.632	11.829	12.023	12.214	12.401	12.586	12.768	12.948
42	11.572	11.786	11.995	12.201	12.403	12.602	12.798	12.990	13.180	13.367
43	11.918	12.140	12.359	12.573	12.784	12.991	13.195	13.395	13.593	13.788
44	12.263	12.495	12.722	12.945	13.165	13.380	13.592	13.801	14.007	14.209
45	12.607	12.848	13.085	13.318	13.546	13.770	13.991	14.207	14.421	14.632
46	12.950	13.201	13.448	13.689	13.926	14.160	14.389	14.614	14.836	15.055
47	13.292	13.553	13.809	14.060	14.307	14.549	14.787	15.021	15.252	15.479
48	13.632	13.904	14.170	14.430	14.686	14.938	15.185	15.428	15.667	15.903
49	13.970	14.252	14.529	14.800	15.065	15.326	15.583	15.835	16.083	16.327
50	14.307	14.600	14.887	15.168	15.443	15.714	15.980	16.241	16.498	16.751

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

		DIAMETER IN INCHES									
Depth		80	82	84	86	88	90	92	94	96	98
<i>in.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>
-----	14.641	14.945	15.243	15.534	15.820	16.101	16.376	16.647	16.913	17.175	17.437
-----	14.973	15.288	15.597	15.899	16.196	16.486	16.772	17.052	17.328	17.599	17.869
-----	15.302	15.629	15.949	16.262	16.569	16.870	17.166	17.456	17.741	18.022	18.292
-----	15.628	15.967	16.299	16.623	16.941	17.253	17.559	17.859	18.154	18.444	18.724
-----	15.950	16.302	16.646	16.982	17.311	17.634	17.950	18.261	18.566	18.866	19.156
-----	16.270	16.634	16.990	17.338	17.679	18.013	18.340	18.661	18.976	19.286	19.586
-----	16.585	16.963	17.331	17.692	18.044	18.389	18.728	19.060	19.385	19.706	20.016
-----	16.896	17.288	17.669	18.042	18.407	18.764	19.113	19.456	19.793	20.123	20.443
-----	17.203	17.609	18.004	18.389	18.766	19.135	19.496	19.851	20.198	20.540	20.870
-----	17.506	17.925	18.334	18.733	19.123	19.504	19.877	20.243	20.602	20.954	21.294
-----	17.803	18.238	18.661	19.073	19.476	19.870	20.255	20.633	21.003	21.366	21.718
-----	18.095	18.545	18.983	19.409	19.826	20.232	20.630	21.020	21.402	21.776	22.138
-----	18.382	18.847	19.300	19.741	20.171	20.591	21.002	21.404	21.798	22.184	22.556
-----	18.662	19.144	19.613	20.068	20.513	20.946	21.370	21.785	22.191	22.590	22.976
-----	18.936	19.435	19.920	20.391	20.850	21.297	21.735	22.163	22.582	22.992	23.391
-----	19.202	19.720	20.221	20.708	21.182	21.644	22.096	22.537	22.968	23.391	23.799
-----	19.462	19.998	20.516	21.020	21.509	21.987	22.452	22.907	23.352	23.788	24.196
-----	19.713	20.268	20.805	21.326	21.831	22.324	22.804	23.273	23.732	24.181	24.617
-----	19.956	20.532	21.087	21.625	22.148	22.656	23.151	23.635	24.107	24.570	25.016
-----	20.190	20.787	21.362	21.919	22.458	22.983	23.494	23.992	24.479	24.955	25.416
-----	20.414	21.033	21.629	22.205	22.762	23.304	23.831	24.344	24.846	25.336	25.812
-----	20.627	21.271	21.888	22.484	23.060	23.619	24.162	24.692	25.208	25.713	26.203
-----	20.829	21.498	22.138	22.754	23.350	23.927	24.488	25.034	25.566	26.085	26.586
-----	21.019	21.714	22.379	23.017	23.633	24.229	24.807	25.370	25.918	26.453	26.964
-----	21.194	21.919	22.609	23.270	23.907	24.523	25.120	25.700	26.264	26.815	27.356
-----	21.353	22.110	22.828	23.514	24.173	24.809	25.425	26.023	26.605	27.172	27.723
-----	21.495	22.288	23.035	23.747	24.430	25.088	25.723	26.340	26.939	27.523	28.084
-----	21.615	22.450	23.230	23.970	24.677	25.357	26.014	26.649	27.267	27.888	28.469
-----	21.709	22.593	23.410	24.180	24.913	25.617	26.295	26.952	27.588	28.207	28.797
-----	21.760	22.715	23.573	24.376	25.138	25.867	26.568	27.246	27.902	28.539	29.156
-----		22.809	23.718	24.558	25.351	26.107	26.832	27.531	28.207	28.864	29.501
-----		22.862	23.842	24.724	25.550	26.335	27.085	27.808	28.505	29.181	29.828
-----			23.938	24.871	25.735	26.550	27.327	28.074	28.794	29.491	30.168
-----			23.990	24.996	25.902	26.751	27.558	28.330	29.074	29.792	30.485
-----				25.093	26.051	26.938	27.776	28.576	29.344	30.085	30.796
-----					26.177	27.108	27.980	28.809	29.603	30.368	31.109
-----					26.276	27.258	28.169	29.029	29.851	30.641	31.399
-----					26.330	27.386	28.340	29.236	30.087	30.903	31.689
-----						27.485	28.493	29.427	30.310	31.154	31.964
-----						27.540	28.622	29.600	30.519	31.393	32.154
-----								28.722	29.754	30.712	31.618
-----								28.778	29.885	30.888	31.829
-----									29.986	31.043	32.025
-----									30.042	31.175	32.202
-----										31.278	32.359
-----											32.493
-----										31.334	32.597
-----											32.654

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

Depth	DIAMETER IN INCHES													
	100	104	108	112	116	120	124	128	132	136	140	144	148	
<i>in.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	<i>gal.</i>	
1.....	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.065	0.066	0.067	0.068	0.069	0.070	
2.....	.162	.166	.169	.172	.175	.178	.181	.184	.187	.190	.192	.195	.198	
3.....	.297	.303	.309	.315	.320	.326	.332	.337	.342	.347	.353	.358	.363	
4.....	.456	.465	.474	.483	.492	.501	.509	.517	.526	.534	.542	.549	.557	
5.....	.636	.649	.661	.674	.686	.698	.710	.721	.733	.744	.755	.766	.777	
6.....	.833	.850	.867	.883	.899	.915	.931	.946	.961	.976	.991	1.005	1.019	
7.....	1.046	1.068	1.089	1.110	1.130	1.150	1.170	1.189	1.208	1.227	1.246	1.264	1.282	
8.....	1.274	1.301	1.327	1.352	1.377	1.402	1.426	1.450	1.473	1.496	1.519	1.541	1.563	
9.....	1.516	1.547	1.578	1.609	1.639	1.668	1.697	1.725	1.753	1.781	1.808	1.835	1.861	
10.....	1.769	1.807	1.843	1.879	1.914	1.949	1.983	2.016	2.049	2.081	2.113	2.144	2.174	
11.....	2.035	2.078	2.120	2.162	2.202	2.242	2.282	2.320	2.358	2.395	2.432	2.468	2.503	
12.....	2.311	2.360	2.409	2.456	2.502	2.548	2.593	2.637	2.680	2.723	2.765	2.806	2.845	
13.....	2.597	2.653	2.708	2.761	2.814	2.865	2.916	2.966	3.015	3.063	3.110	3.157	3.202	
14.....	2.893	2.956	3.017	3.077	3.136	3.194	3.250	3.306	3.361	3.415	3.468	3.520	3.570	
15.....	3.198	3.268	3.336	3.403	3.468	3.532	3.595	3.657	3.718	3.778	3.838	3.896	3.951	
16.....	3.511	3.588	3.664	3.737	3.810	3.881	3.950	4.019	4.086	4.153	4.218	4.282	4.343	
17.....	3.833	3.917	4.000	4.081	4.161	4.239	4.315	4.390	4.464	4.537	4.609	4.679	4.747	
18.....	4.162	4.254	4.345	4.433	4.520	4.605	4.689	4.771	4.852	4.931	5.010	5.087	5.161	
19.....	4.498	4.598	4.697	4.793	4.888	4.980	5.071	5.161	5.249	5.335	5.420	5.504	5.585	
20.....	4.841	4.950	5.056	5.161	5.263	5.364	5.462	5.559	5.654	5.748	5.840	5.930	6.019	
21.....	5.190	5.308	5.423	5.536	5.646	5.755	5.861	5.965	6.068	6.169	6.268	6.366	6.461	
22.....	5.546	5.673	5.797	5.918	6.037	6.153	6.267	6.380	6.490	6.598	6.705	6.810	6.913	
23.....	5.908	6.043	6.176	6.306	6.434	6.559	6.681	6.801	6.920	7.036	7.150	7.263	7.373	
24.....	6.275	6.420	6.562	6.701	6.837	6.971	7.102	7.231	7.357	7.481	7.603	7.724	7.843	
25.....	6.647	6.802	6.954	7.102	7.247	7.390	7.529	7.667	7.801	7.934	8.064	8.192	8.318	
26.....	7.024	7.189	7.351	7.509	7.663	7.815	7.963	8.109	8.252	8.393	8.532	8.668	8.801	
27.....	7.406	7.582	7.753	7.921	8.085	8.246	8.403	8.558	8.710	8.860	9.007	9.151	9.292	
28.....	7.793	7.979	8.160	8.338	8.512	8.682	8.849	9.013	9.174	9.332	9.488	9.641	9.791	
29.....	8.184	8.380	8.573	8.760	8.944	9.124	9.301	9.474	9.645	9.812	9.976	10.138	10.297	
30.....	8.579	8.786	8.989	9.187	9.382	9.572	9.758	9.941	10.121	10.297	10.470	10.641	10.809	
31.....	8.977	9.196	9.410	9.619	9.824	10.024	10.220	10.413	10.602	10.788	10.971	11.150	11.326	
32.....	9.379	9.610	9.835	10.055	10.270	10.481	10.688	10.890	11.089	11.285	11.477	11.666	11.851	
33.....	9.785	10.027	10.264	10.495	10.721	10.943	11.160	11.373	11.582	11.787	11.989	12.187	12.381	
34.....	10.194	10.448	10.696	10.939	11.177	11.409	11.637	11.860	12.079	12.294	12.506	12.714	12.918	
35.....	10.605	10.872	11.132	11.387	11.636	11.879	12.118	12.352	12.581	12.807	13.028	13.246	13.459	
36.....	11.020	11.299	11.572	11.838	12.098	12.353	12.603	12.848	13.088	13.324	13.555	13.783	14.006	
37.....	11.436	11.729	12.014	12.293	12.565	12.831	13.092	13.348	13.599	13.846	14.088	14.326	14.559	
38.....	11.855	12.161	12.459	12.750	13.035	13.313	13.585	13.853	14.115	14.372	14.624	14.873	15.117	
39.....	12.277	12.596	12.907	13.211	13.507	13.798	14.082	14.361	14.634	14.902	15.166	15.425	15.678	
40.....	12.700	13.033	13.357	13.674	13.983	14.286	14.582	14.873	15.157	15.437	15.711	15.981	16.245	
41.....	13.125	13.472	13.810	14.140	14.462	14.777	15.086	15.388	15.684	15.975	16.261	16.541	16.815	
42.....	13.552	13.913	14.265	14.608	14.944	15.271	15.592	15.907	16.215	16.517	16.814	17.106	17.392	
43.....	13.980	14.356	14.722	15.079	15.428	15.768	16.102	16.429	16.749	17.063	17.372	17.675	17.972	
44.....	14.409	14.800	15.180	15.551	15.914	16.268	16.614	16.954	17.286	17.612	17.933	18.247	18.555	
45.....	14.839	15.245	15.641	16.026	16.402	16.770	17.129	17.481	17.826	18.165	18.497	18.823	19.144	
46.....	15.270	15.692	16.102	16.502	16.892	17.274	17.647	18.012	18.370	18.720	19.065	19.403	19.734	
47.....	15.702	16.140	16.565	16.980	17.385	17.780	18.166	18.545	18.915	19.279	19.636	19.986	20.329	
48.....	16.134	16.588	17.029	17.459	17.878	18.288	18.688	19.080	19.464	19.840	20.209	20.572	20.929	
49.....	16.567	17.037	17.494	17.940	18.374	18.798	19.212	19.618	20.015	20.404	20.786	21.161	21.529	
50.....	17.000	17.487	17.960	18.421	18.871	19.309	19.738	20.157	20.568	20.971	21.366	21.753	22.131	
51.....	17.433	17.937	18.427	18.904	19.369	19.822	20.265	20.699	21.124	21.540	21.948	22.348	22.739	
52.....	17.866	18.387	18.894	19.387	19.868	20.336	20.795	21.243	21.681	22.111	22.532	22.946	23.352	
53.....	18.298	18.837	19.361	19.871	20.367	20.852	21.325	21.788	22.240	22.684	23.119	23.546	23.964	
54.....	18.730	19.287	19.829	20.355	20.868	21.368	21.857	22.334	22.802	23.259	23.708	24.148	24.578	
55.....	19.161	19.737	20.296	20.840	21.369	21.886	22.390	22.882	23.364	23.836	24.299	24.753	25.197	
56.....	19.591	20.186	20.763	21.325	21.871	22.404	22.923	23.431	23.928	24.415	24.892	25.360	25.818	
57.....	20.020	20.635	21.230	21.810	22.373	22.922	23.458	23.982	24.494	24.995	25.487	25.969	26.441	
58.....	20.448	21.082	21.697	22.294	22.875	23.441	23.993	24.533	25.061	25.577	26.083	26.579	27.064	
59.....	20.875	21.529	22.163	22.779	23.377	23.960	24.529	25.085	25.628	26.160	26.681	27.191	27.689	
60.....	21.300	21.975	22.628	23.263	23.879	24.480	25.066	25.638	26.197	26.744	27.280	27.805	28.319	
61.....	21.723	22.419	23.092	23.746	24.381	24.999	25.602	26.191	26.766	27.329	27.880	28.421	28.951	
62.....	22.144	22.861	23.555	24.228	24.882	25.519	26.139	26.745	27.336	27.915	28.482	29.037	29.581	
63.....	22.564	23.302	24.017	24.710	25.383	26.038	26.676	27.299	27.907	28.502	29.085	29.655	30.213	
64.....	22.980	23.741	24.477	25.190	25.883	26.556	27.213	27.853	28.478	29.089	29.688	30.274	30.847	
65.....	23.395	24.178	24.936	25.669	26.382	27.074	27.749	28.407	29.049	29.677	30.292	30.894	31.484	
66.....	23.806	24.613	25.392	26.147	26.880	27.592	28.285	28.961	29.621	30.266	30.897	31.515	32.119	
67.....	24.215	25.046	25.847	26.624	27.376	28.108	28.820	29.515	30.192	30.854	31.502	32.137	32.758	
68.....	24.620	25.475	26.300	27.098	27.872	28.623	29.355	30.068	30.763	31.443	32.108	32.759	33.396	
69.....	25.023	25.902	26.750	27.571	28.366	29.138	29.889	30.620	31.334	32.032	32.714	33.382	34.036	
70.....	25.421	26.326	27.198	28.041	28.858	29.651	30.422	31.173	31.905	32.620	33.320	34.005	34.675	
71.....	25.816	26.747	27.643	28.510	29.348	30.162	30.953	31.724	32.475	33.209	33.926	34.628	35.315	
72.....	26.207	27.164	28.086	28.975	29.837	30.672	31.484	32.274	33.045	33.797	34.532	35.251	35.954	
73.....	26.593	27.578	28.525	29.439	30.323	31.180	32.013	32.823	33.613	34.384	35.138	35.874	36.592	
74.....	26.976	27.983	28.961	29.899	30.807	31.686	32.540	33.371	34.181	34.971	35.743	36.498	37.237	
75.....	27.353	28.394	29.393	30.357	31.288	32.190	33.066	33.918	34.748	35.557	36.348	37.121	37.878	

TABLE 2.—Capacity table for horizontal tanks (per inch of length)—Continued

DIAMETER IN INCHES													
	100	104	108	112	116	120	124	128	132	136	140	144	148
	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.
27.725	28.795	29.822	30.811	31.767	32.692	33.590	34.463	35.313	36.142	36.952	37.743	38.518	
28.092	29.193	30.247	31.263	32.243	33.191	34.112	35.006	35.877	36.726	37.555	38.365	39.158	
28.454	29.585	30.668	31.710	32.716	33.688	34.632	35.548	36.440	37.309	38.158	38.987	39.798	
28.810	29.972	31.085	32.154	33.185	34.183	35.149	36.088	37.001	37.891	38.759	39.608	40.438	
29.159	30.354	31.497	32.594	33.652	34.674	35.664	36.625	37.560	38.471	39.360	40.228	41.077	
29.502	30.731	31.904	33.030	34.115	35.162	36.176	37.161	38.118	39.050	39.959	40.847	41.715	
29.838	31.102	32.307	33.462	34.574	35.647	36.686	37.694	38.673	39.627	40.557	41.465	42.352	
30.167	31.466	32.704	33.889	35.029	36.129	37.192	38.224	39.226	40.202	41.153	42.081	42.989	
30.489	31.824	33.095	34.311	35.480	36.607	37.696	38.752	39.777	40.775	41.748	42.697	43.624	
30.802	32.176	33.481	34.729	35.927	37.081	38.196	39.277	40.326	41.347	42.341	43.311	44.258	
31.107	32.520	33.861	35.141	36.369	37.551	38.693	39.799	40.872	41.915	42.932	43.923	44.891	
31.403	32.857	34.234	35.548	36.806	38.017	39.186	40.317	41.415	42.482	43.521	44.534	45.523	
31.689	33.186	34.601	35.948	37.238	38.479	39.675	40.833	41.955	43.046	44.108	45.142	46.153	
31.965	33.507	34.961	36.313	37.665	38.936	40.161	41.345	42.492	43.607	44.692	45.749	46.781	
32.230	33.819	35.363	36.732	38.087	39.388	40.642	41.853	43.026	44.166	45.274	46.354	47.407	
32.484	34.121	35.657	37.114	38.503	39.835	41.118	42.357	43.557	44.721	45.854	46.956	48.032	
32.726	34.414	35.994	37.489	38.913	40.278	41.590	42.858	44.084	45.274	46.430	47.556	48.654	
32.954	34.696	36.322	37.856	39.317	40.714	42.058	43.354	44.607	45.823	47.004	48.154	49.275	
33.167	34.968	36.640	38.216	39.714	41.145	42.520	43.846	45.127	46.369	47.575	48.749	49.893	
33.364	35.227	36.950	38.568	40.104	41.570	42.977	44.333	45.642	46.911	48.143	49.341	50.508	
33.544	35.474	37.249	38.912	40.487	41.989	43.429	44.815	46.154	47.449	48.707	49.930	51.121	
33.703	35.706	37.537	39.247	40.863	42.401	43.875	45.292	46.660	47.984	49.268	50.516	51.732	
33.838	35.924	37.814	39.572	41.230	42.607	44.031	45.454	46.861	48.254	49.626	50.979	52.309	
33.942	36.126	38.079	39.888	41.590	43.205	44.749	46.231	47.660	49.041	50.379	51.679	52.944	
34.000	36.309	38.331	40.194	41.941	43.596	45.176	46.692	48.152	49.562	50.929	52.255	53.545	
36.471	38.568	40.488	42.282	43.980	45.597	47.147	48.639	50.080	51.474	52.828	54.144	55.398	
36.609	38.791	40.740	42.614	44.355	46.011	47.596	49.121	50.592	52.015	53.396	54.730	56.030	
36.716	38.996	41.000	42.836	44.721	46.417	48.039	49.597	51.099	52.552	53.961	55.330	56.651	
36.774	39.183	41.297	43.248	45.079	46.816	48.475	50.067	51.601	53.084	54.521	55.917	57.270	
39.348	41.540	43.448	45.428	47.207	48.904	50.531	52.098	53.612	55.078	56.493	57.858	59.162	
39.489	41.766	43.836	45.766	47.589	49.326	50.989	52.589	54.134	55.629	57.081	58.482	59.830	
39.558	41.976	44.111	46.094	47.963	49.740	51.440	53.075	54.651	56.177	57.656	59.080	60.454	
42.166	44.373	46.412	48.328	50.147	51.885	53.554	55.163	56.719	58.228	59.689	61.100	62.464	
42.335	44.620	46.718	48.683	50.545	52.322	54.027	55.669	57.256	58.794	60.282	61.720	63.110	
42.478	44.851	47.011	49.028	50.934	52.751	54.493	56.169	57.788	59.356	60.874	62.342	63.760	
42.589	45.064	47.292	49.362	51.315	53.173	54.953	56.664	58.315	59.916	61.467	62.968	64.419	
42.649	45.258	47.588	49.652	51.686	53.587	55.405	57.152	58.836	60.467	62.048	63.570	65.032	
45.370	47.810	49.997	52.048	53.993	55.850	57.633	59.352	61.013	62.614	64.165	65.666	67.117	
45.435	48.045	50.296	52.399	54.390	56.288	58.108	59.861	61.615	63.316	64.967	66.568	68.119	
45.688	48.262	50.581	52.740	54.777	56.717	58.576	60.364	62.091	63.792	65.443	67.094	68.645	
45.750	48.459	50.852	53.069	55.155	57.139	59.036	60.861	62.622	64.343	66.014	67.665	69.216	
48.634	51.108	53.385	55.523	57.551	59.489	61.351	63.166	64.919	66.620	68.271	69.922	71.473	
48.782	51.347	53.690	55.880	57.955	59.835	61.649	63.403	65.116	66.767	68.418	69.969	71.520	
48.897	51.568	53.980	56.227	58.349	60.372	62.110	63.761	65.412	67.063	68.614	70.165	71.716	
48.960	51.769	54.256	56.561	58.734	60.800	62.579	64.130	65.681	67.232	68.783	70.334	71.885	
51.947	54.516	56.883	59.108	61.220	63.239	65.180	67.061	68.892	70.673	72.404	74.085	75.716	
52.097	54.759	57.193	59.471	61.630	63.692	65.571	67.352	69.083	70.814	72.495	74.176	75.807	
52.214	54.984	57.488	59.823	62.031	64.136	66.155	67.836	69.517	71.198	72.879	74.560	76.188	
52.278	55.188	57.768	60.163	62.422	64.572	66.631	68.312	69.993	71.674	73.355	75.036	76.617	
55.369	58.033	60.491	62.802	64.999	67.100	68.991	70.772	72.553	74.334	76.115	77.896	79.677	
55.522	58.280	60.805	63.172	65.416	67.560	69.451	71.232	72.963	74.644	76.325	78.006	79.687	
55.640	58.509	61.105	63.529	65.823	68.011	69.802	71.583	73.364	75.145	76.926	78.707	80.488	
55.705	58.716	61.390	63.875	66.220	68.454	70.245	72.026	73.807	75.588	77.369	79.150	80.931	
58.899	61.659	64.208	66.607	68.887	70.918	72.799	74.680	76.561	78.442	80.323	82.204	84.085	
59.055	61.910	64.527	66.982	69.311	71.292	73.173	75.054	76.935	78.816	80.697	82.578	84.459	
59.175	62.142	64.832	67.345	69.725	71.706	73.587	75.468	77.349	79.230	81.111	82.992	84.873	
59.241	62.353	65.121	67.696	70.128	72.109	73.988	75.869	77.750	79.631	81.512	83.393	85.274	
62.539	65.394	68.034	70.520	72.901	74.882	76.763	78.644	80.525	82.406	84.287	86.168	88.049	
62.697	65.649	68.358	70.901	72.883	74.864	76.745	78.626	80.507	82.388	84.269	86.150	88.031	
62.819	65.885	68.667	71.270	73.211	75.111	77.002	78.883	80.764	82.645	84.526	86.407	88.288	
62.886	66.098	68.961	71.627	73.517	75.408	77.289	79.170	81.051	82.932	84.813	86.694	88.575	
66.287	69.238	71.970	74.276	76.403	78.434	80.465	82.496	84.527	86.558	88.589	90.620	92.651	
66.447	69.497	72.298	74.603	76.730	78.761	80.792	82.823	84.854	86.885	88.916	90.947	92.978	
66.572	69.736	72.612	74.911	77.038	79.069	81.100	83.131	85.162	87.193	89.224	91.255	93.286	
66.640	69.953	72.911	75.145	77.270	79.301	81.332	83.363	85.394	87.425	89.456	91.487	93.518	
70.145	73.192	76.403	79.404	82.405	85.406	88.407	91.408	94.409	97.410	100.411	103.412	106.413	
70.307	73.454	76.665	79.666	82.667	85.668	88.669	91.670	94.671	97.672	100.673	103.674	106.675	
70.432	73.656	76.867	79.868	82.869	85.870	88.871	91.872	94.873	97.874	100.875	103.876	106.877	
70.500	73.916	77.127	80.128	83.129	86.130	89.131	92.132	95.133	98.134	101.135	104.136	107.137	
74.276	77.403	80.614	83.615	86.616	89.617	92.618	95.619	98.620	101.621	104.622	107.623	110.624	
74.403	77.645	80.856	83.857	86.858	89.859	92.860	95.861	98.862	101.863	104.864	107.865	110.866	
74.473	77.716	80.927	83.928	86.929	89.930	92.931	95.932	98.933	101.934	104.935	107.936	110.937	
74.500	77.743	80.954	83.955	86.956	89.957	92.958	95.959	98.960	101.961	104.962	107.963	110.964	

