

HEATEC TEC-NOTE

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Horizontal asphalt tanks Volumes and levels

SCOPE

This document applies to *horizontal* asphalt tanks currently manufactured by Heatec (**Figure 1**). It defines *different* types of tank volumes and enables users to convert levels to volume.

VOLUME

This is the amount of space available for a specific use. Most of the space inside an asphalt tank is used to store liquid asphalt. However, some of the space is occupied by heating coils. And some of the space is reserved for overflow control.

It is helpful to call different spaces by names that indicate their use. These names and definitions are presented below and shown in **Figure 2**.

In this document volume is expressed in gallons. This is the most common unit of measure used for storage of liquid asphalt at HMA plants in the U.S.

NOMINAL VOLUME

This is the approximate capacity of an asphalt tank. This amount is usually a number rounded off in thousands of gallons. It is useful in classifying tank sizes, but is not an exact indication of how much asphalt can be stored in a tank.

GROSS VOLUME

This is the *total* amount of space *inside* an asphalt tank. It does *not* include the amount of space occupied by insulation. But it *does* include the space occupied by heating coils and the amount of space reserved for overflow control. Therefore, gross volume is always somewhat more than the amount of asphalt that can be stored in the tank.

NET VOLUME

This is the amount of liquid asphalt that can be stored in an asphalt tank. It is equal to the gross volume less the space occupied by the heating coils and less the amount of space reserved for overflow control. It ignores other components such as vent/overflow piping, fill piping, and mixer impellers because the space they occupy is not significant.

COIL DISPLACEMENT VOLUME

This is the amount of space occupied by the heating coils. In horizontal tanks this space is relatively large. The number of



Figure 1. Heatec horizontal asphalt tanks.

gallons displaced by the coils is listed in **Figure 2**. Be sure to deduct this amount from the gallons shown in **Figures 5 and 6** when converting levels to gallons.

RESERVED SPACE

This is empty space in the top of the tank reserved for overflow control. *It also allows for thermal expansion of the liquid asphalt.* This space extends downward several inches below the top inside bulkhead. Overflow controls cut off the unloading pump before asphalt fills this space. This space *is significant*. It is *not* included in net volumes shown in **Figure 2**.

The amount of space reserved for overflow control depends on the devices used for high-level control and how they are setup. A high-level float switch is built into all horizontal tanks to serve as the primary overflow control. It shuts off the unloading pumps at a level 11-11/16 inches below the inside top surface of the tank. This is equivalent to a level of 114-5/16 inches above the inside bottom.

When radar sensors are used, they also shutoff unloading pumps at a specific level. This level is governed by the settings made on the Honeywell controller used with the sensor to indicate asphalt levels. The settings can be changed to change the shutoff level.

FIGURE 2. VOLUMES* (GALLONS)

HORIZONTAL ASPHALT TANKS						
Nominal volume	10,000	15,000	20,000	25,000	30,000	35,000
Gross Volume	10,445	15,627	20,809	25,991	31,172	36,354
Coil displacement volume	65	107	148	190	231	273
Reserved space volume	506	757	1,008	1,260	1,510	1,761
Net volume	9,874	14,763	19,653	24,541	29,431	34,320
COMPARTMENTS OF HORIZONTAL ASPHALT TANKS						
Nominal volume	8,000	10,000	12,000	15,000	17,500	20,000
Gross Volume	8,340	10,229	12,118	15,411	18,002	20,593
Coil displacement volume	48	65	70	107	107	148
Reserved space volume	404	496	587	747	872	998
Net volume	7,888	9,668	11,461	14,557	17,023	19,447

*The volumes shown here apply only to the current line of Heatec tanks.

The reserved space in *your* tank may be different from the amount of space currently used. The best way to make sure how much reserved space is used for overflow control in *your* tank is to fill the tank until the overflow control shuts off the unloading pump. Then measure the vertical distance from the tank wall inside the tank at its highest point to the surface of the liquid asphalt. This is the amount of reserved space for *your* tank.

CONVERTING LEVELS TO VOLUMES

Figures 5 and 6 convert *levels* to *volume* or gallons of asphalt thereby indicating how much asphalt is stored in the tank.

It is important to understand that the levels shown in Figures 5 and 6 refer to the height of the liquid above the inside bottom of the tank. You should also be aware that levels indicated by *radar sensors* also refer to the height of the liquid above the inside bottom of the tank.

Do not confuse these levels with the distance found by extending a measuring tape through the manway at the top of the tank until it touches the asphalt. That is a measure of empty space in the top of the tank—not how much asphalt is in the tank.

However, you can use your measuring tape or “stick” measurement of empty space to determine the amount of asphalt in your tank (see Figure 3). To do so, subtract your measurement from the inside diameter of the tank. (The inside diameter of all current horizontal tanks is 126 inches.) This will give you the level of the asphalt above the *bottom* of

the tank. You can now use this level with Figures 5 and 6 to determine the gallons of asphalt stored in your tank.

Note: When making your measurement it is difficult to measure directly from the inside top surface of the tank to the asphalt surface. It is much easier to measure from the bottom edge of the manway to the surface of the asphalt. If you do that you will need to make a separate measurement to determine the distance from the edge of the manway to the topmost surface inside the tank. Then you should add the two measurements together.

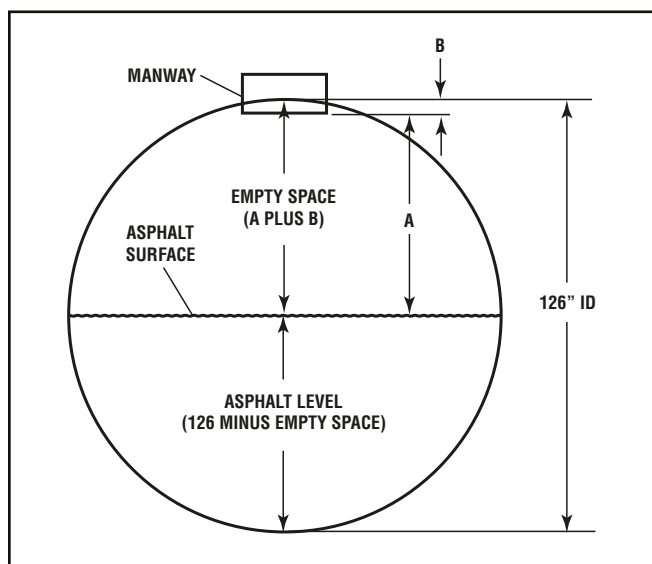


Figure 3. Making measurements from manway.

Figures 5 and 6 apply to various sizes of Heatec horizontal tanks and compartments. For your convenience, the first three columns show each level three different ways. The first column shows only inches. The second column shows feet and tenths of a foot. The third column shows feet and inches.

Note that the third column shows feet as a whole number and inches as a *fraction of twelve*. This is the way our computer program handles feet and inches. It makes perfect sense even though it may not be the way you are used to seeing feet and inches written. The fourth column shows gallons for each level.

Some people prefer to work with feet and inches, so the third column will eliminate the need to convert inches to feet and inches. Levels for the radar sensor are shown in tenths of a foot, so the second column will be more convenient for its levels.

The amount of space or volume displaced by the heating coils has *not* been deducted from the gallons shown in column 4. The amount ranges from 65 to 273 gallons. So, if you need to know exactly how much asphalt is in your tank, be sure to deduct the volume displaced by the coils.

The volumes displaced by the heating coils are shown in **Figure 2**. When the asphalt level totally covers the coils, deduct the full amount of the amount shown in the Figure. When levels are below the tops of the coils, you may wish to deduct a smaller amount based on your best estimate.

Note, unlike vertical tanks, volumes in horizontal tanks are *not* in direct proportion to the levels. The volume increases or decreases *different* amounts for each inch of change in level.

REFILL VOLUME

This is the amount of asphalt you can add to a tank that is partially filled. It is the difference between the *net* volume (**Figure 2**) and the volume currently in the tank. It is also an indication of how many gallons have been used since the tank was last filled. But this assumes that the net volume is accurate as discussed earlier. Moreover, it assumes that you are not actually using asphalt from the tank while it is being refilled.

The best way to verify how many gallons a supply truck has added to refill your tank is to record the levels before and after refilling. Then convert the two levels to gallons according to **Figures 5 and 6**. The difference between the two indicates how much the supply truck added. Again, you cannot make an accurate determination if you are using asphalt from the tank at the same time it is being filled.

ACCURACY

Certain errors are unavoidable when measuring levels and converting them to gallons of asphalt stored in the tank or the number of gallons used. Such determinations are not reliable substitutes for metering and calibration equipment.

Several factors affect the accuracy of determining exactly how many gallons of asphalt are in your tank. One factor is the amount of error in the level measurement. Another is the manufacturing tolerances related to the dimensions of the tank.

Level measurements are usually made by a radar sensor or by using a measuring tape. These measurements sometimes have errors up to an inch. Consequently, converting such levels to gallons causes errors in the number of gallons.

The actual dimensions of your tank may vary from its design diameter and length due to manufacturing tolerances. Horizontal tanks are currently designed with an inside diameter of 126 inches and the lengths listed in **Figure 4**. These are the dimensions used to calculate the gallons shown in **Figures 5 and 6**. Variances in diameter and length due to normal manufacturing tolerances may cause the actual number of gallons to differ slightly from the number of gallons shown in **Figures 5 and 6** for a specific level.

Horizontal tanks may have still another problem in determining exactly how much asphalt is in the tank. This problem is due to build up of asphalt residues on the walls of the tank. It is not uncommon for tanks that have been in use for several years to have such coatings on the walls. The coatings may be an inch thick or more. This can produce errors in volume determinations.

In the past not all Heatec tanks were designed with the dimensions mentioned above. If your tank was designed with different dimensions, you should not attempt to use **Figures 5 and 6**. The gallons shown these figures will be *significantly* different from your actual gallons. In that case, please contact Heatec for a custom-made levels vs. gallons table applicable to your tank.

CHECKING YOUR RADAR

You should periodically verify the accuracy of the levels indicated by your radar. A build-up of either asphalt residues or moisture on the antenna of the radar sensor can cause erroneous indications.

The usual way of checking that your radar is accurate is with a measuring tape. As explained earlier, measure the distance from the inside top of the tank to the surface of the asphalt. Then subtract this distance from the inside diameter of the tank (126 inches). This should closely agree with the level indications you see on your radar sensor.

FIGURE 4. INSIDE LENGTHS

HORIZONTAL TANKS

Nominal volume (gallons)	10,000	15,000	20,000	25,000	30,000	35,000
Length (inches)	193.5	289.5	385.5	481.5	577.5	673.5

COMPARTMENTS IN HORIZONTAL TANKS

Nominal volume (gallons)	8,000	10,000	12,000	15,000	17,500	20,000
Length (inches)	154.5	189.5	224.5	285.5	333.5	381.5

*The dimensions shown here apply only to the current line of Heatec tanks.

FIGURE 5. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 1 OF 3 PARTS)

LEVELS			10,000 GALLON TANK	15,000 GALLON TANK	20,000 GALLON TANK	25,000 GALLON TANK	30,000 GALLON TANK	35,000 GALLON TANK
Inches	Feet/ Tenths	Feet/ Inches						
126	10.5	10 6/12	10445	15627	20809	25991	31172	36354
125	10.4	10 5/12	10432	15608	20784	25959	31135	36311
124	10.3	10 4/12	10410	15574	20738	25903	31067	36232
123	10.3	10 3/12	10380	15530	20680	25830	30979	36129
122	10.2	10 2/12	10345	15478	20611	25743	30876	36009
121	10.1	10 1/12	10306	15420	20533	25646	30759	35872
120	10.0	10	10263	15355	20447	25539	30630	35722
119	9.9	9 11/12	10217	15285	20354	25422	30491	35560
118	9.8	9 10/12	10167	15210	20254	25298	30342	35386
117	9.8	9 9/12	10114	15131	20149	25167	30184	35202
116	9.7	9 8/12	10058	15048	20038	25028	30018	35008
115	9.6	9 7/12	10000	14961	19922	24883	29844	34805
114	9.5	9 6/12	9939	14870	19801	24731	29662	34593
113	9.4	9 5/12	9876	14775	19675	24574	29474	34374
112	9.3	9 4/12	9810	14678	19545	24412	29279	34146
111	9.3	9 3/12	9743	14577	19411	24244	29078	33912
110	9.2	9 2/12	9674	14473	19272	24072	28871	33671
109	9.1	9 1/12	9603	14367	19131	23895	28659	33423
108	9.0	9	9530	14257	18985	23713	28441	33169
107	8.9	8 11/12	9455	14146	18836	23527	28218	32909
106	8.8	8 10/12	9378	14031	18684	23337	27990	32643
105	8.8	8 9/12	9301	13915	18529	23143	27757	32372
104	8.7	8 8/12	9221	13796	18371	22946	27520	32095
103	8.6	8 7/12	9140	13675	18210	22744	27279	31814
102	8.5	8 6/12	9058	13552	18046	22540	27034	31528
101	8.4	8 5/12	8975	13427	17880	22332	26784	31237
100	8.3	8 4/12	8890	13300	17711	22121	26531	30942
99	8.3	8 3/12	8804	13171	17539	21907	26275	30642
98	8.2	8 2/12	8717	13041	17365	21690	26014	30339
97	8.1	8 1/12	8628	12909	17190	21470	25751	30032
96	8.0	8	8539	12775	17011	21248	25484	29720
95	7.9	7 11/12	8448	12640	16831	21023	25214	29406
94	7.8	7 10/12	8357	12503	16649	20795	24941	29088
93	7.8	7 9/12	8265	12365	16465	20566	24666	28766
92	7.7	7 8/12	8171	12225	16279	20333	24387	28442
91	7.6	7 7/12	8077	12085	16092	20099	24107	28114
90	7.5	7 6/12	7982	11943	15903	19863	23823	27783
89	7.4	7 5/12	7887	11799	15712	19625	23537	27450
88	7.3	7 4/12	7790	11655	15520	19385	23249	27114
87	7.3	7 3/12	7693	11509	15326	19143	22959	26776
86	7.2	7 2/12	7595	11363	15131	18899	22667	26435
85	7.1	7 1/12	7496	11215	14934	18654	22373	26092

FIGURE 5. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 2 OF 3 PARTS)

LEVELS			10,000 GALLON TANK	15,000 GALLON TANK	20,000 GALLON TANK	25,000 GALLON TANK	30,000 GALLON TANK	35,000 GALLON TANK
Inches	Feet/ Tenths	Feet/ Inches						
84	7.0	7	7397	11067	14737	18407	22077	25746
83	6.9	6 11/12	7297	10918	14538	18158	21779	25399
82	6.8	6 10/12	7197	10768	14338	17909	21479	25050
81	6.8	6 9/12	7096	10617	14137	17658	21178	24699
80	6.7	6 8/12	6995	10465	13935	17405	20876	24346
79	6.6	6 7/12	6893	10312	13732	17152	20572	23991
78	6.5	6 6/12	6790	10159	13528	16897	20266	23635
77	6.4	6 5/12	6688	10006	13324	16642	19960	23278
76	6.3	6 4/12	6585	9852	13118	16385	19652	22919
75	6.3	6 3/12	6481	9697	12912	16128	19343	22559
74	6.2	6 2/12	6377	9541	12706	15870	19034	22198
73	6.1	6 1/12	6273	9386	12498	15611	18723	21835
72	6.0	6	6169	9230	12290	15351	18412	21472
71	5.9	5 11/12	6064	9073	12082	15091	18099	21108
70	5.8	5 10/12	5960	8916	11873	14830	17787	20743
69	5.8	5 9/12	5855	8759	11664	14569	17473	20378
68	5.7	5 8/12	5750	8602	11455	14307	17160	20012
67	5.6	5 7/12	5644	8445	11245	14045	16845	19646
66	5.5	5 6/12	5539	8287	11035	13783	16531	19279
65	5.4	5 5/12	5433	8129	10825	13520	16216	18912
64	5.3	5 4/12	5328	7971	10615	13258	15901	18545
63	5.3	5 3/12	5222	7813	10404	12995	15586	18177
62	5.2	5 2/12	5117	7655	10194	12733	15271	17810
61	5.1	5 1/12	5011	7498	9984	12470	14956	17443
60	5.0	5	4906	7340	9774	12208	14642	17076
59	4.9	4 11/12	4800	7182	9564	11945	14327	16709
58	4.8	4 10/12	4695	7025	9354	11683	14013	16342
57	4.8	4 9/12	4590	6867	9145	11422	13699	15976
56	4.7	4 8/12	4485	6710	8935	11161	13386	15611
55	4.6	4 7/12	4380	6553	8727	10900	13073	15246
54	4.5	4 6/12	4276	6397	8518	10640	12761	14882
53	4.4	4 5/12	4171	6241	8310	10380	12450	14519
52	4.3	4 4/12	4067	6085	8103	10121	12139	14157
51	4.3	4 3/12	3964	5930	7896	9863	11829	13796
50	4.2	4 2/12	3860	5775	7690	9605	11520	13436
49	4.1	4 1/12	3757	5621	7485	9349	11213	13077
48	4.0	4	3654	5467	7280	9093	10906	12719
47	3.9	3 11/12	3552	5314	7076	8839	10601	12363
46	3.8	3 10/12	3450	5162	6874	8585	10297	12009
45	3.8	3 9/12	3349	5010	6672	8333	9994	11656
44	3.7	3 8/12	3248	4859	6471	8082	9693	11305
43	3.6	3 7/12	3148	4709	6271	7832	9394	10955

FIGURE 5. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 3 OF 3 PARTS)

LEVELS			10,000 GALLON TANK	15,000 GALLON TANK	20,000 GALLON TANK	25,000 GALLON TANK	30,000 GALLON TANK	35,000 GALLON TANK
Inches	Feet/ Tenths	Feet/ Inches						
42	3.5	3 6/12	3048	4560	6072	7584	9096	10608
41	3.4	3 5/12	2948	4411	5874	7337	8800	10263
40	3.3	3 4/12	2850	4264	5678	7092	8506	9919
39	3.3	3 3/12	2752	4117	5483	6848	8213	9579
38	3.2	3 2/12	2655	3972	5289	6606	7923	9240
37	3.1	3 1/12	2558	3827	5097	6366	7635	8904
36	3.0	3	2462	3684	4906	6128	7349	8571
35	2.9	2 11/12	2368	3542	4717	5891	7066	8240
34	2.8	2 10/12	2273	3401	4529	5657	6785	7913
33	2.8	2 9/12	2180	3262	4343	5425	6507	7588
32	2.7	2 8/12	2088	3124	4159	5195	6231	7267
31	2.6	2 7/12	1996	2987	3977	4968	5958	6949
30	2.5	2 6/12	1906	2852	3797	4743	5688	6634
29	2.4	2 5/12	1817	2718	3619	4520	5422	6323
28	2.3	2 4/12	1728	2586	3443	4301	5158	6015
27	2.3	2 3/12	1641	2455	3269	4084	4898	5712
26	2.2	2 2/12	1555	2327	3098	3870	4641	5413
25	2.1	2 1/12	1470	2200	2929	3659	4388	5117
24	2.0	2	1387	2075	2763	3451	4139	4827
23	1.9	1 11/12	1304	1952	2599	3246	3893	4540
22	1.8	1 10/12	1224	1831	2438	3045	3652	4259
21	1.8	1 9/12	1144	1712	2280	2847	3415	3983
20	1.7	1 8/12	1066	1595	2124	2653	3182	3711
19	1.6	1 7/12	990	1481	1972	2463	2955	3446
18	1.5	1 6/12	915	1369	1823	2278	2732	3186
17	1.4	1 5/12	842	1260	1678	2096	2514	2932
16	1.3	1 4/12	771	1154	1536	1919	2301	2684
15	1.3	1 3/12	702	1050	1398	1746	2094	2442
14	1.2	1 2/12	634	949	1264	1579	1893	2208
13	1.1	1 1/12	569	851	1134	1416	1698	1981
12	1.0	1	506	757	1008	1259	1510	1761
11	0.9	11/12	445	666	887	1108	1329	1550
10	0.8	10/12	387	579	771	963	1155	1347
9	0.8	9/12	331	495	660	824	988	1153
8	0.7	8/12	278	416	554	692	830	968
7	0.6	7/12	228	342	455	568	681	795
6	0.5	6/12	182	272	362	452	542	632
5	0.4	5/12	138	207	276	345	413	482
4	0.3	4/12	99	149	198	247	296	346
3	0.3	3/12	65	97	129	161	193	225
2	0.2	2/12	35	53	70	88	105	123
1	0.1	1/12	13	19	25	31	37	44

FIGURE 6. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 1 OF 3 PARTS)

LEVELS			8,000 GAL. COM- PARTMENT	10,000 GAL. COM- PARTMENT	12,000 GAL. COM- PARTMENT	15,000 GAL. COM- PARTMENT	17,500 GAL. COM- PARTMENT	20,000 GAL. COM- PARTMENT
Inches	Feet/ Tenths	Feet/ Inches						
126	10.5	10 6/12	8340	10229	12118	15411	18002	20593
125	10.4	10 5/12	8330	10217	12104	15392	17980	20568
124	10.3	10 4/12	8311	10194	12077	15359	17941	20523
123	10.3	10 3/12	8288	10166	12043	15315	17890	20465
122	10.2	10 2/12	8260	10132	12003	15264	17831	20397
121	10.1	10 1/12	8229	10093	11957	15206	17763	20320
120	10.0	10	8195	10051	11907	15143	17689	20235
119	9.9	9 11/12	8157	10005	11853	15074	17608	20143
118	9.8	9 10/12	8118	9956	11795	15000	17522	20044
117	9.8	9 9/12	8075	9905	11734	14922	17431	19940
116	9.7	9 8/12	8031	9850	11669	14840	17335	19830
115	9.6	9 7/12	7984	9793	11602	14754	17234	19715
114	9.5	9 6/12	7936	9733	11531	14664	17130	19595
113	9.4	9 5/12	7885	9672	11458	14571	17021	19471
112	9.3	9 4/12	7833	9608	11382	14475	16908	19342
111	9.3	9 3/12	7779	9542	11304	14375	16792	19209
110	9.2	9 2/12	7724	9474	11224	14273	16673	19072
109	9.1	9 1/12	7667	9404	11141	14168	16550	18932
108	9.0	9	7609	9333	11056	14060	16424	18788
107	8.9	8 11/12	7549	9259	10970	13950	16296	18641
106	8.8	8 10/12	7488	9185	10881	13837	16164	18490
105	8.8	8 9/12	7426	9108	10791	13723	16030	18337
104	8.7	8 8/12	7363	9031	10698	13605	15893	18180
103	8.6	8 7/12	7298	8951	10605	13486	15753	18021
102	8.5	8 6/12	7232	8871	10509	13365	15612	17859
101	8.4	8 5/12	7166	8789	10412	13242	15468	17694
100	8.3	8 4/12	7098	8706	10314	13116	15322	17527
99	8.3	8 3/12	7029	8622	10214	12989	15173	17357
98	8.2	8 2/12	6960	8536	10113	12861	15023	17185
97	8.1	8 1/12	6889	8450	10011	12731	14871	17011
96	8.0	8	6818	8362	9907	12599	14717	16835
95	7.9	7 11/12	6746	8274	9802	12465	14561	16657
94	7.8	7 10/12	6673	8184	9696	12330	14403	16476
93	7.8	7 9/12	6599	8094	9589	12194	14244	16294
92	7.7	7 8/12	6524	8002	9481	12057	14084	16111
91	7.6	7 7/12	6449	7910	9371	11918	13921	15925
90	7.5	7 6/12	6373	7817	9261	11778	13758	15738
89	7.4	7 5/12	6297	7724	9150	11636	13593	15549
88	7.3	7 4/12	6220	7629	9038	11494	13426	15359
87	7.3	7 3/12	6142	7534	8925	11350	13259	15167
86	7.2	7 2/12	6064	7438	8812	11206	13090	14974
85	7.1	7 1/12	5985	7341	8697	11060	12920	14780

FIGURE 6. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 2 OF 3 PARTS)

LEVELS			8,000 GAL. COM- PARTMENT	10,000 GAL. COM- PARTMENT	12,000 GAL. COM- PARTMENT	15,000 GAL. COM- PARTMENT	17,500 GAL. COM- PARTMENT	20,000 GAL. COM- PARTMENT
Inches	Feet/ Tenths	Feet/ Inches						
84	7.0	7	5906	7244	8582	10914	12749	14584
83	6.9	6 11/12	5827	7146	8466	10767	12577	14387
82	6.8	6 10/12	5746	7048	8350	10619	12404	14189
81	6.8	6 9/12	5666	6949	8233	10470	12230	13990
80	6.7	6 8/12	5585	6850	8115	10320	12055	13790
79	6.6	6 7/12	5504	6750	7997	10170	11880	13590
78	6.5	6 6/12	5422	6650	7878	10019	11704	13388
77	6.4	6 5/12	5340	6550	7759	9868	11526	13185
76	6.3	6 4/12	5258	6449	7640	9715	11349	12982
75	6.3	6 3/12	5175	6347	7520	9563	11171	12778
74	6.2	6 2/12	5092	6246	7399	9410	10992	12574
73	6.1	6 1/12	5009	6144	7278	9256	10812	12368
72	6.0	6	4926	6042	7157	9102	10632	12163
71	5.9	5 11/12	4842	5939	7036	8948	10452	11957
70	5.8	5 10/12	4759	5836	6914	8793	10272	11750
69	5.8	5 9/12	4675	5734	6793	8638	10091	11543
68	5.7	5 8/12	4591	5631	6671	8483	9909	11336
67	5.6	5 7/12	4507	5528	6549	8328	9728	11128
66	5.5	5 6/12	4423	5424	6426	8172	9546	10920
65	5.4	5 5/12	4338	5321	6304	8017	9365	10712
64	5.3	5 4/12	4254	5218	6182	7861	9183	10504
63	5.3	5 3/12	4170	5114	6059	7705	9001	10296
62	5.2	5 2/12	4086	5011	5937	7550	8819	10088
61	5.1	5 1/12	4001	4908	5814	7394	8637	9880
60	5.0	5	3917	4804	5692	7238	8455	9672
59	4.9	4 11/12	3833	4701	5570	7083	8274	9465
58	4.8	4 10/12	3749	4598	5447	6928	8092	9257
57	4.8	4 9/12	3665	4495	5325	6772	7911	9050
56	4.7	4 8/12	3581	4392	5204	6618	7730	8843
55	4.6	4 7/12	3497	4290	5082	6463	7550	8636
54	4.5	4 6/12	3414	4187	4961	6309	7369	8430
53	4.4	4 5/12	3331	4085	4840	6155	7189	8224
52	4.3	4 4/12	3248	3983	4719	6001	7010	8019
51	4.3	4 3/12	3165	3882	4599	5848	6831	7814
50	4.2	4 2/12	3082	3780	4479	5695	6653	7610
49	4.1	4 1/12	3000	3679	4359	5543	6475	7407
48	4.0	4	2918	3579	4240	5392	6298	7205
47	3.9	3 11/12	2836	3479	4121	5241	6122	7003
46	3.8	3 10/12	2755	3379	4003	5091	5946	6802
45	3.8	3 9/12	2674	3280	3885	4941	5772	6602
44	3.7	3 8/12	2593	3181	3768	4792	5598	6403
43	3.6	3 7/12	2513	3082	3652	4644	5425	6206

FIGURE 6. LEVELS VS. GROSS VOLUMES (GALLONS) (PART 3 OF 3 PARTS)

LEVELS			8,000 GAL. COM- PARTMENT	10,000 GAL. COM- PARTMENT	12,000 GAL. COM- PARTMENT	15,000 GAL. COM- PARTMENT	17,500 GAL. COM- PARTMENT	20,000 GAL. COM- PARTMENT
Inches	Feet/ Tenths	Feet/ Inches						
42	3.5	3 6/12	2433	2985	3536	4497	5253	6009
41	3.4	3 5/12	2354	2888	3421	4350	5082	5813
40	3.3	3 4/12	2276	2791	3306	4205	4912	5619
39	3.3	3 3/12	2197	2695	3193	4060	4743	5426
38	3.2	3 2/12	2120	2600	3080	3917	4575	5234
37	3.1	3 1/12	2043	2505	2968	3775	4409	5044
36	3.0	3	1966	2412	2857	3633	4244	4855
35	2.9	2 11/12	1890	2319	2747	3493	4080	4668
34	2.8	2 10/12	1815	2226	2638	3354	3918	4482
33	2.8	2 9/12	1741	2135	2529	3217	3758	4298
32	2.7	2 8/12	1667	2045	2422	3080	3598	4116
31	2.6	2 7/12	1594	1955	2316	2946	3441	3936
30	2.5	2 6/12	1522	1867	2211	2812	3285	3758
29	2.4	2 5/12	1450	1779	2108	2680	3131	3582
28	2.3	2 4/12	1380	1693	2005	2550	2979	3407
27	2.3	2 3/12	1310	1607	1904	2421	2828	3236
26	2.2	2 2/12	1242	1523	1804	2294	2680	3066
25	2.1	2 1/12	1174	1440	1706	2169	2534	2899
24	2.0	2	1107	1358	1609	2046	2390	2734
23	1.9	1 11/12	1042	1278	1513	1925	2248	2572
22	1.8	1 10/12	977	1198	1420	1805	2109	2413
21	1.8	1 9/12	914	1121	1328	1688	1972	2256
20	1.7	1 8/12	851	1044	1237	1573	1838	2102
19	1.6	1 7/12	790	970	1149	1461	1706	1952
18	1.5	1 6/12	731	896	1062	1350	1577	1805
17	1.4	1 5/12	673	825	977	1243	1452	1661
16	1.3	1 4/12	616	755	895	1138	1329	1520
15	1.3	1 3/12	560	687	814	1035	1209	1384
14	1.2	1 2/12	507	621	736	936	1093	1251
13	1.1	1 1/12	454	557	660	840	981	1122
12	1.0	1	404	496	587	747	872	998
11	0.9	11/12	355	436	517	657	767	878
10	0.8	10/12	309	379	449	571	667	763
9	0.8	9/12	264	324	384	489	571	653
8	0.7	8/12	222	272	323	410	480	549
7	0.6	7/12	182	224	265	337	393	450
6	0.5	6/12	145	178	211	268	313	358
5	0.4	5/12	111	136	161	204	239	273
4	0.3	4/12	79	97	115	147	171	196
3	0.3	3/12	52	63	75	95	111	128
2	0.2	2/12	28	35	41	52	61	70
1	0.1	1/12	10	12	15	18	22	25