

# HEATEC TEC-NOTE

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## Vertical asphalt tanks Volumes and levels

### SCOPE

This document applies to *vertical* 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 vertical tanks this space is relatively small. The number of gallons displaced by the coils is listed in **Figure 2**. Be sure to deduct this amount from the gallons shown in **Figure 5** when converting levels to gallons.



Figure 1. Heatec vertical asphalt tanks.

### 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 space reserved for overflow control in current tanks equipped with either radar sensors or gauge boards extends 18-5/8 inches below the inside top bulkhead. This space is equal to 1088 gallons of asphalt. In the past different amounts of empty space have been reserved.

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 bulkhead inside the tank to the surface of the liquid asphalt. Each inch of height









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

LEVELS			VOLUME	LEVELS			VOLUME	LEVELS			VOLUME
Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons
467	38.9	38 11/12	27,457	426	35.5	35 6/12	25,046	385	32.1	32 1/12	22,636
466	38.8	38 10/12	27,398	425	35.4	35 5/12	24,987	384	32.0	32	22,577
465	38.8	38 9/12	27,339	424	35.3	35 4/12	24,928	383	31.9	31 11/12	22,518
464	38.7	38 8/12	27,280	423	35.3	35 3/12	24,870	382	31.8	31 10/12	22,459
463	38.6	38 7/12	27,221	422	35.2	35 2/12	24,811	381	31.8	31 9/12	22,400
462	38.5	38 6/12	27,163	421	35.1	35 1/12	24,752	380	31.7	31 8/12	22,342
461	38.4	38 5/12	27,104	420	35.0	35	24,693	379	31.6	31 7/12	22,283
460	38.3	38 4/12	27,045	419	34.9	34 11/12	24,634	378	31.5	31 6/12	22,224
459	38.3	38 3/12	26,986	418	34.8	34 10/12	24,576	377	31.4	31 5/12	22,165
458	38.2	38 2/12	26,927	417	34.8	34 9/12	24,517	376	31.3	31 4/12	22,106
457	38.1	38 1/12	26,869	416	34.7	34 8/12	24,458	375	31.3	31 3/12	22,048
456	38.0	38	26,810	415	34.6	34 7/12	24,399	374	31.2	31 2/12	21,989
455	37.9	37 11/12	26,751	414	34.5	34 6/12	24,341	373	31.1	31 1/12	21,930
454	37.8	37 10/12	26,692	413	34.4	34 5/12	24,282	372	31.0	31	21,871
453	37.8	37 9/12	26,633	412	34.3	34 4/12	24,223	371	30.9	30 11/12	21,812
452	37.7	37 8/12	26,575	411	34.3	34 3/12	24,164	370	30.8	30 10/12	21,754
451	37.6	37 7/12	26,516	410	34.2	34 2/12	24,105	369	30.8	30 9/12	21,695
450	37.5	37 6/12	26,457	409	34.1	34 1/12	24,047	368	30.7	30 8/12	21,636
449	37.4	37 5/12	26,398	408	34.0	34	23,988	367	30.6	30 7/12	21,577
448	37.3	37 4/12	26,339	407	33.9	33 11/12	23,929	366	30.5	30 6/12	21,518
447	37.3	37 3/12	26,281	406	33.8	33 10/12	23,870	365	30.4	30 5/12	21,460
446	37.2	37 2/12	26,222	405	33.8	33 9/12	23,811	364	30.3	30 4/12	21,401
445	37.1	37 1/12	26,163	404	33.7	33 8/12	23,753	363	30.3	30 3/12	21,342
444	37.0	37	26,104	403	33.6	33 7/12	23,694	362	30.2	30 2/12	21,283
443	36.9	36 11/12	26,046	402	33.5	33 6/12	23,635	361	30.1	30 1/12	21,224
442	36.8	36 10/12	25,987	401	33.4	33 5/12	23,576	360	30.0	30	21,166
441	36.8	36 9/12	25,928	400	33.3	33 4/12	23,517	359	29.9	29 11/12	21,107
440	36.7	36 8/12	25,869	399	33.3	33 3/12	23,459	358	29.8	29 10/12	21,048
439	36.6	36 7/12	25,810	398	33.2	33 2/12	23,400	357	29.8	29 9/12	20,989
438	36.5	36 6/12	25,752	397	33.1	33 1/12	23,341	356	29.7	29 8/12	20,930
437	36.4	36 5/12	25,693	396	33.0	33	23,282	355	29.6	29 7/12	20,872
436	36.3	36 4/12	25,634	395	32.9	32 11/12	23,223	354	29.5	29 6/12	20,813
435	36.3	36 3/12	25,575	394	32.8	32 10/12	23,165	353	29.4	29 5/12	20,754
434	36.2	36 2/12	25,516	393	32.8	32 9/12	23,106	352	29.3	29 4/12	20,695
433	36.1	36 1/12	25,458	392	32.7	32 8/12	23,047	351	29.3	29 3/12	20,637
432	36.0	36	25,399	391	32.6	32 7/12	22,988	350	29.2	29 2/12	20,578
431	35.9	35 11/12	25,340	390	32.5	32 6/12	22,929	349	29.1	29 1/12	20,519
430	35.8	35 10/12	25,281	389	32.4	32 5/12	22,871	348	29.0	29	20,460
429	35.8	35 9/12	25,222	388	32.3	32 4/12	22,812	347	28.9	28 11/12	20,401
428	35.7	35 8/12	25,164	387	32.3	32 3/12	22,753	346	28.8	28 10/12	20,343
427	35.6	35 7/12	25,105	386	32.2	32 2/12	22,694	345	28.8	28 9/12	20,284

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

LEVELS			VOLUME	LEVELS			VOLUME	LEVELS			VOLUME
Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons
344	28.7	28 8/12	20,225	303	25.3	25 3/12	17,814	262	21.8	21 10/12	15,404
343	28.6	28 7/12	20,166	302	25.2	25 2/12	17,756	261	21.8	21 9/12	15,345
342	28.5	28 6/12	20,107	301	25.1	25 1/12	17,697	260	21.7	21 8/12	15,286
341	28.4	28 5/12	20,049	300	25.0	25	17,638	259	21.6	21 7/12	15,228
340	28.3	28 4/12	19,990	299	24.9	24 11/12	17,579	258	21.5	21 6/12	15,169
339	28.3	28 3/12	19,931	298	24.8	24 10/12	17,520	257	21.4	21 5/12	15,110
338	28.2	28 2/12	19,872	297	24.8	24 9/12	17,462	256	21.3	21 4/12	15,051
337	28.1	28 1/12	19,813	296	24.7	24 8/12	17,403	255	21.3	21 3/12	14,992
336	28.0	28	19,755	295	24.6	24 7/12	17,344	254	21.2	21 2/12	14,934
335	27.9	27 11/12	19,696	294	24.5	24 6/12	17,285	253	21.1	21 1/12	14,875
334	27.8	27 10/12	19,637	293	24.4	24 5/12	17,226	252	21.0	21	14,816
333	27.8	27 9/12	19,578	292	24.3	24 4/12	17,168	251	20.9	20 11/12	14,757
332	27.7	27 8/12	19,519	291	24.3	24 3/12	17,109	250	20.8	20 10/12	14,698
331	27.6	27 7/12	19,461	290	24.2	24 2/12	17,050	249	20.8	20 9/12	14,640
330	27.5	27 6/12	19,402	289	24.1	24 1/12	16,991	248	20.7	20 8/12	14,581
329	27.4	27 5/12	19,343	288	24.0	24	16,933	247	20.6	20 7/12	14,522
328	27.3	27 4/12	19,284	287	23.9	23 11/12	16,874	246	20.5	20 6/12	14,463
327	27.3	27 3/12	19,225	286	23.8	23 10/12	16,815	245	20.4	20 5/12	14,404
326	27.2	27 2/12	19,167	285	23.8	23 9/12	16,756	244	20.3	20 4/12	14,346
325	27.1	27 1/12	19,108	284	23.7	23 8/12	16,697	243	20.3	20 3/12	14,287
324	27.0	27	19,049	283	23.6	23 7/12	16,639	242	20.2	20 2/12	14,228
323	26.9	26 11/12	18,990	282	23.5	23 6/12	16,580	241	20.1	20 1/12	14,169
322	26.8	26 10/12	18,932	281	23.4	23 5/12	16,521	240	20.0	20	14,110
321	26.8	26 9/12	18,873	280	23.3	23 4/12	16,462	239	19.9	19 11/12	14,052
320	26.7	26 8/12	18,814	279	23.3	23 3/12	16,403	238	19.8	19 10/12	13,993
319	26.6	26 7/12	18,755	278	23.2	23 2/12	16,345	237	19.8	19 9/12	13,934
318	26.5	26 6/12	18,696	277	23.1	23 1/12	16,286	236	19.7	19 8/12	13,875
317	26.4	26 5/12	18,638	276	23.0	23	16,227	235	19.6	19 7/12	13,816
316	26.3	26 4/12	18,579	275	22.9	22 11/12	16,168	234	19.5	19 6/12	13,758
315	26.3	26 3/12	18,520	274	22.8	22 10/12	16,109	233	19.4	19 5/12	13,699
314	26.2	26 2/12	18,461	273	22.8	22 9/12	16,051	232	19.3	19 4/12	13,640
313	26.1	26 1/12	18,402	272	22.7	22 8/12	15,992	231	19.3	19 3/12	13,581
312	26.0	26	18,344	271	22.6	22 7/12	15,933	230	19.2	19 2/12	13,523
311	25.9	25 11/12	18,285	270	22.5	22 6/12	15,874	229	19.1	19 1/12	13,464
310	25.8	25 10/12	18,226	269	22.4	22 5/12	15,815	228	19.0	19	13,405
309	25.8	25 9/12	18,167	268	22.3	22 4/12	15,757	227	18.9	18 11/12	13,346
308	25.7	25 8/12	18,108	267	22.3	22 3/12	15,698	226	18.8	18 10/12	13,287
307	25.6	25 7/12	18,050	266	22.2	22 2/12	15,639	225	18.8	18 9/12	13,229
306	25.5	25 6/12	17,991	265	22.1	22 1/12	15,580	224	18.7	18 8/12	13,170
305	25.4	25 5/12	17,932	264	22.0	22	15,521	223	18.6	18 7/12	13,111
304	25.3	25 4/12	17,873	263	21.9	21 11/12	15,463	222	18.5	18 6/12	13,052

**FIGURE 5. LEVELS VS. GROSS VOLUMES (PART 4 OF 5 PARTS)**

LEVELS			VOLUME	LEVELS			VOLUME	LEVELS			VOLUME
Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons
221	18.4	18 5/12	12,993	180	15.0	15	10,583	139	11.6	11 7/12	8,172
220	18.3	18 4/12	12,935	179	14.9	14 11/12	10,524	138	11.5	11 6/12	8,114
219	18.3	18 3/12	12,876	178	14.8	14 10/12	10,465	137	11.4	11 5/12	8,055
218	18.2	18 2/12	12,817	177	14.8	14 9/12	10,406	136	11.3	11 4/12	7,996
217	18.1	18 1/12	12,758	176	14.7	14 8/12	10,348	135	11.3	11 3/12	7,937
216	18.0	18	12,699	175	14.6	14 7/12	10,289	134	11.2	11 2/12	7,878
215	17.9	17 11/12	12,641	174	14.5	14 6/12	10,230	133	11.1	11 1/12	7,820
214	17.8	17 10/12	12,582	173	14.4	14 5/12	10,171	132	11.0	11	7,761
213	17.8	17 9/12	12,523	172	14.3	14 4/12	10,112	131	10.9	10 11/12	7,702
212	17.7	17 8/12	12,464	171	14.3	14 3/12	10,054	130	10.8	10 10/12	7,643
211	17.6	17 7/12	12,405	170	14.2	14 2/12	9,995	129	10.8	10 9/12	7,584
210	17.5	17 6/12	12,347	169	14.1	14 1/12	9,936	128	10.7	10 8/12	7,526
209	17.4	17 5/12	12,288	168	14.0	14	9,877	127	10.6	10 7/12	7,467
208	17.3	17 4/12	12,229	167	13.9	13 11/12	9,819	126	10.5	10 6/12	7,408
207	17.3	17 3/12	12,170	166	13.8	13 10/12	9,760	125	10.4	10 5/12	7,349
206	17.2	17 2/12	12,111	165	13.8	13 9/12	9,701	124	10.3	10 4/12	7,290
205	17.1	17 1/12	12,053	164	13.7	13 8/12	9,642	123	10.3	10 3/12	7,232
204	17.0	17	11,994	163	13.6	13 7/12	9,583	122	10.2	10 2/12	7,173
203	16.9	16 11/12	11,935	162	13.5	13 6/12	9,525	121	10.1	10 1/12	7,114
202	16.8	16 10/12	11,876	161	13.4	13 5/12	9,466	120	10.0	10	7,055
201	16.8	16 9/12	11,817	160	13.3	13 4/12	9,407	119	9.9	9 11/12	6,996
200	16.7	16 8/12	11,759	159	13.3	13 3/12	9,348	118	9.8	9 10/12	6,938
199	16.6	16 7/12	11,700	158	13.2	13 2/12	9,289	117	9.8	9 9/12	6,879
198	16.5	16 6/12	11,641	157	13.1	13 1/12	9,231	116	9.7	9 8/12	6,820
197	16.4	16 5/12	11,582	156	13.0	13	9,172	115	9.6	9 7/12	6,761
196	16.3	16 4/12	11,524	155	12.9	12 11/12	9,113	114	9.5	9 6/12	6,702
195	16.3	16 3/12	11,465	154	12.8	12 10/12	9,054	113	9.4	9 5/12	6,644
194	16.2	16 2/12	11,406	153	12.8	12 9/12	8,995	112	9.3	9 4/12	6,585
193	16.1	16 1/12	11,347	152	12.7	12 8/12	8,937	111	9.3	9 3/12	6,526
192	16.0	16	11,288	151	12.6	12 7/12	8,878	110	9.2	9 2/12	6,467
191	15.9	15 11/12	11,230	150	12.5	12 6/12	8,819	109	9.1	9 1/12	6,408
190	15.8	15 10/12	11,171	149	12.4	12 5/12	8,760	108	9.0	9	6,350
189	15.8	15 9/12	11,112	148	12.3	12 4/12	8,701	107	8.9	8 11/12	6,291
188	15.7	15 8/12	11,053	147	12.3	12 3/12	8,643	106	8.8	8 10/12	6,232
187	15.6	15 7/12	10,994	146	12.2	12 2/12	8,584	105	8.8	8 9/12	6,173
186	15.5	15 6/12	10,936	145	12.1	12 1/12	8,525	104	8.7	8 8/12	6,115
185	15.4	15 5/12	10,877	144	12.0	12	8,466	103	8.6	8 7/12	6,056
184	15.3	15 4/12	10,818	143	11.9	11 11/12	8,407	102	8.5	8 6/12	5,997
183	15.3	15 3/12	10,759	142	11.8	11 10/12	8,349	101	8.4	8 5/12	5,938
182	15.2	15 2/12	10,700	141	11.8	11 9/12	8,290	100	8.3	8 4/12	5,879
181	15.1	15 1/12	10,642	140	11.7	11 8/12	8,231	99	8.3	8 3/12	5,821

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

LEVELS			VOLUME	LEVELS			VOLUME	LEVELS			VOLUME
Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons	Inches	Feet/ Tenths	Feet/ Inches	Gallons
98	8.2	8 2/12	5,762	57	4.8	4 9/12	3,351	16	1.3	1 4/12	941
97	8.1	8 1/12	5,703	56	4.7	4 8/12	3,292	15	1.3	1 3/12	882
96	8.0	8	5,644	55	4.6	4 7/12	3,234	14	1.2	1 2/12	823
95	7.9	7 11/12	5,585	54	4.5	4 6/12	3,175	13	1.1	1 1/12	764
94	7.8	7 10/12	5,527	53	4.4	4 5/12	3,116	12	1.0	1	706
93	7.8	7 9/12	5,468	52	4.3	4 4/12	3,057	11	0.9	11/12	647
92	7.7	7 8/12	5,409	51	4.3	4 3/12	2,998	10	0.8	10/12	588
91	7.6	7 7/12	5,350	50	4.2	4 2/12	2,940	9	0.8	9/12	529
90	7.5	7 6/12	5,291	49	4.1	4 1/12	2,881	8	0.7	8/12	470
89	7.4	7 5/12	5,233	48	4.0	4	2,822	7	0.6	7/12	412
88	7.3	7 4/12	5,174	47	3.9	3 11/12	2,763	6	0.5	6/12	353
87	7.3	7 3/12	5,115	46	3.8	3 10/12	2,705	5	0.4	5/12	294
86	7.2	7 2/12	5,056	45	3.8	3 9/12	2,646	4	0.3	4/12	235
85	7.1	7 1/12	4,997	44	3.7	3 8/12	2,587	3	0.3	3/12	176
84	7.0	7	4,939	43	3.6	3 7/12	2,528	2	0.2	2/12	118
83	6.9	6 11/12	4,880	42	3.5	3 6/12	2,469	1	0.1	1/12	59
82	6.8	6 10/12	4,821	41	3.4	3 5/12	2,411				
81	6.8	6 9/12	4,762	40	3.3	3 4/12	2,352				
80	6.7	6 8/12	4,703	39	3.3	3 3/12	2,293				
79	6.6	6 7/12	4,645	38	3.2	3 2/12	2,234				
78	6.5	6 6/12	4,586	37	3.1	3 1/12	2,175				
77	6.4	6 5/12	4,527	36	3.0	3	2,117				
76	6.3	6 4/12	4,468	35	2.9	2 11/12	2,058				
75	6.3	6 3/12	4,410	34	2.8	2 10/12	1,999				
74	6.2	6 2/12	4,351	33	2.8	2 9/12	1,940				
73	6.1	6 1/12	4,292	32	2.7	2 8/12	1,881				
72	6.0	6	4,233	31	2.6	2 7/12	1,823				
71	5.9	5 11/12	4,174	30	2.5	2 6/12	1,764				
70	5.8	5 10/12	4,116	29	2.4	2 5/12	1,705				
69	5.8	5 9/12	4,057	28	2.3	2 4/12	1,646				
68	5.7	5 8/12	3,998	27	2.3	2 3/12	1,587				
67	5.6	5 7/12	3,939	26	2.2	2 2/12	1,529				
66	5.5	5 6/12	3,880	25	2.1	2 1/12	1,470				
65	5.4	5 5/12	3,822	24	2.0	2	1,411				
64	5.3	5 4/12	3,763	23	1.9	1 11/12	1,352				
63	5.3	5 3/12	3,704	22	1.8	1 10/12	1,293				
62	5.2	5 2/12	3,645	21	1.8	1 9/12	1,235				
61	5.1	5 1/12	3,586	20	1.7	1 8/12	1,176				
60	5.0	5	3,528	19	1.6	1 7/12	1,117				
59	4.9	4 11/12	3,469	18	1.5	1 6/12	1,058				
58	4.8	4 10/12	3,410	17	1.4	1 5/12	999				