

7.1 PARTS PER MILLION TO GRAINS PER U.S. GALLON

HUNDREDS	TENS										UNITS	
	0	10	20	30	40	50	60	70	80	90		
0	.0	.6	1.2	1.8	2.3	2.9	3.5	4.1	4.7	5.3	1	.1
100	5.8	6.4	7.0	7.6	8.2	8.8	9.3	9.9	10.5	11.1	2	.1
200	11.7	12.3	12.8	13.4	14.0	14.6	15.2	15.8	16.3	16.9	3	.2
300	17.5	18.1	18.7	19.3	19.8	20.4	21.0	21.6	22.2	22.8	4	.2
400	23.3	23.9	24.5	25.1	25.7	26.3	26.8	27.4	28.0	28.6	5	.3
500	29.2	29.8	30.3	30.9	31.5	32.1	32.7	33.3	33.8	34.4	6	.4
600	35.0	35.6	36.2	36.8	37.3	37.9	38.5	39.1	39.7	40.3	7	.4
700	40.8	41.4	42.0	42.6	43.2	43.8	44.3	44.9	45.5	46.1	8	.5
800	46.7	47.3	47.8	48.4	49.0	49.6	50.2	50.8	51.3	51.9	9	.5
900	52.5	53.1	53.7	54.3	54.8	55.4	56.0	56.6	57.2	57.8		
1000	58.3	58.9	59.5	60.1	60.7	61.3	61.8	62.4	63.0	63.6		
1100	64.2	64.8	65.3	65.9	66.5	67.1	67.7	68.3	68.8	69.4		
1200	70.0	70.6	71.2	71.8	72.3	72.9	73.5	74.1	74.7	75.3		
1300	75.8	76.4	77.0	77.6	78.2	78.8	79.3	79.9	80.5	81.1		
1400	81.7	82.3	82.9	83.4	84.0	84.6	85.2	85.8	86.4	86.9		
1500	87.5	88.1	88.7	89.3	89.8	90.4	91.0	91.6	92.2	92.8		
1600	93.3	93.9	94.5	95.1	95.7	96.3	96.8	97.4	98.0	98.6		
1700	99.2	99.8	100.4	100.9	101.5	102.1	102.7	103.3	103.9	104.4		
1800	105.0	105.6	106.2	106.8	107.3	107.9	108.5	109.1	109.7	110.3		
1900	110.9	111.4	112.0	112.6	113.2	113.8	114.4	114.9	115.5	116.1		
2000	116.7	117.3	117.9	118.4	119.0	119.6	120.2	120.8	121.4	121.9		
2100	122.5	123.1	123.7	124.3	124.8	125.4	126.0	126.6	127.2	127.8		
2200	128.4	128.9	129.5	130.1	130.7	131.3	131.9	132.4	133.0	133.6		
2300	134.2	134.8	135.4	135.9	136.5	137.1	137.7	138.3	138.9	139.4		
2400	140.0	140.6	141.2	141.8	142.4	142.9	143.5	144.1	144.7	145.3		
2500	145.9	146.4	147.0	147.6	148.2	148.8	149.4	149.9	150.5	151.1		

Example: To convert 242 parts per million to grains per U.S. gallon. Read down in HUNDREDS column to 200 and across under 40 in TENS line the figure 14.0. Add to this the figure opposite 2 in the UNITS column, which is .1. Answer 14.0 + .1 = 14.1 grains per U. S. gallon.

7.2 GRAINS PER U.S. GALLON TO PARTS PER MILLION

TENS	UNITS										TENTHS	
	0	1	2	3	4	5	6	7	8	9		
0	0	17	34	51	69	86	103	120	137	154	.1	2
10	171	189	206	223	240	257	274	291	309	326	.2	3
20	343	360	377	394	411	429	446	463	480	497	.3	5
30	514	531	549	566	583	600	617	634	651	669	.4	7
40	686	703	720	737	754	771	788	806	823	840	.5	9
50	857	874	891	908	926	943	960	977	994	1011	.6	10
60	1028	1046	1063	1080	1097	1114	1131	1148	1166	1183	.7	12
70	1200	1217	1234	1251	1268	1286	1303	1320	1337	1354	.8	14
80	1371	1388	1406	1423	1440	1457	1474	1491	1508	1526	.9	15
90	1543	1560	1577	1594	1611	1628	1645	1663	1680	1697		
100	1714	1731	1748	1765	1783	1800	1817	1834	1851	1868		
110	1885	1902	1920	1937	1954	1971	1988	2005	2023	2040		
120	2057	2074	2091	2108	2125	2143	2160	2177	2194	2211		
130	2228	2245	2263	2280	2297	2314	2331	2348	2365	2383		
140	2400	2417	2434	2451	2468	2485	2502	2520	2537	2554		

Example: To convert 24.3 grains per U.S. gallon to parts per million. Read down in TENS column at 20 and across under 4 in UNITS line the figure 411. Add to this the figure opposite .3 in TENTHS column which is 5. Answer 411 + 5 = 416 parts per million.

TECHNICAL DATA

8.1 FEET OF PIPE EQUIVALENTS FOR VARIOUS FITTINGS USED IN MAIN OR TRUNK CONNECTIONS

	1/2		3/4		1		1 1/4		1 1/2		2		2 1/2		3		4		5		6		8		10		12				
	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	COP.	C.I.	C.I.	C.I.	C.I.	C.I.	C.I.	C.I.	C.I.	C.I.	C.I.			
45° Elbow	<				1.0				>	2.2	2.2	2.8	2.8	3.3	3.3	4.0	4.0	5.5	5.5	6.6	8.0	11.0	13.2	16.0							
90° Elbow or Union Elbow	<				2.5				>	4.3	4.3	5.5	5.5	6.5	6.5	8.0	8.0	11.0	11.0	13.0	16.0	22.0	26.0	32.0							
90° Elbow Long Turn	<				1.5				>	2.7	2.7	3.5	3.5	4.2	4.2	5.2	5.2	7.0	7.0	8.4	10.4	14.0	16.8	20.8							
Gate Valve Open	<				.5				>	1.0	1.0	1.2	1.2	1.4	1.4	1.7	1.7	2.3	2.3	2.8	3.4	4.6	5.6	6.8							
Globe Valve Open	17	17	22	22	27	27	36	36	43	43	55	55	67	67	82	82	110	110	134	164	220	268	328								
Radiator Valve Angle	<				5.0				>																						
Tee	<				5.0				>	9	9	12	12	14	14	17	17	22	22	28	34	44	56	68							
Boiler	4.0	5.0	5.0	7.0	6.5	9.0	9.0	12.0	9.0	12.0	12.6	16.8	15.6	20.8	18.6	24.8	25.2	33.6	31.2	37.2	50.4	62.4	74.4								
Square Head Cock Open	<				1.5				>	2.5	2.5	3.2	3.2	3.9	3.9	4.7	4.7	6.1	6.1												
Radiator C.I.	<				7.5				>																						
Std. Venturi *			22.5	18	13.5	14	13.5	9.5	13.5	10.5	14.5		14		14																
Super Venturi *			37.0	31.5	27.5	28.5	33	21	32.5	26	30		29.5		28.5																
Air Scoop			2.0	2.0	2.7	2.7	4.0	4.0	4.8	4.8	6.8	6.8	8.0	8.0	13.3	13.3	15.0	15.0													
Flow Check			27	27	42	42	60	60	63	63	83	83	104	104	125	125	166	166													
3 Way Mix Valve	Refer To Manufacturers Catalog																														
Convactor	Refer To Manufacturers Catalog																														
Baseboard	One Lineal Foot is equal to One Lineal Foot of Pipe																														

* Figures shown include Venturi Fitting and Standard Tee

8.2

DIMENSIONS AND CAPACITIES OF TYPE "L" COPPER TUBING

Nominal Size, In.	Outside Diameter, In.	Inside Diameter, In.	U. S. Gallons contained in 100 ft. of Tube	Weight of Tube lbs. per ft.
1/8	0.250	0.200	0.163	0.068
1/4	0.375	0.315	0.405	0.126
3/8	0.500	0.430	0.754	0.198
1/2	0.625	0.545	1.21	0.284
5/8	0.750	0.666	1.81	0.362
3/4	0.875	0.785	2.51	0.454
1	1.125	1.025	4.28	0.653
1 1/4	1.375	1.265	6.52	0.884
1 1/2	1.625	1.505	9.25	1.14
2	2.125	1.985	16.06	1.75
2 1/2	2.625	2.465	24.78	2.48
3	3.125	2.945	35.37	3.33
3 1/2	3.625	3.425	47.86	4.29
4	4.125	3.905	62.18	5.38

8.3

DIMENSIONS AND CAPACITIES OF STANDARD STEEL PIPE

Nominal Size, In.	Outside Diameter, In.	Inside Diameter, In.	U. S. Gallons contained in 100 ft. of Tube	Weight of Pipe lbs. per ft.
1/8	0.405	0.269	0.3	0.244
1/4	0.540	0.364	0.5	0.424
3/8	0.675	0.493	1.0	0.567
1/2	0.840	0.622	1.6	0.850
3/4	1.050	0.824	2.8	1.130
1	1.315	1.049	4.5	1.678
1 1/4	1.660	1.380	6.3	2.28
1 1/2	1.900	1.610	10.2	2.72
2	2.375	2.067	17.0	3.66
2 1/2	2.875	2.469	27.5	5.80
3	3.50	3.068	39.0	7.58
3 1/2	4.00	3.548	53.0	9.11
4	4.50	4.026	69.0	10.8