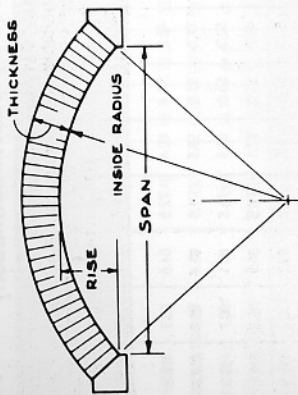


## Arch Constants



Rise In Inches Per Foot of Span	Inside Radius	Part of Circle
1"	Span X 1.5417	0.1051
1 1/4"	Span X 1.2521	0.1308
1 1/2"	Span X 1.0625	0.1560
1.608"	Span X 1.0000	0.1667
1 3/4"	Span X 0.9301	0.1807
2"	Span X 0.8333	0.2048
2 1/4"	Span X 0.7604	0.2284
2.302"	Span X 0.7474	0.2333
2 1/2"	Span X 0.7042	0.2513
2 3/4"	Span X 0.6600	0.2736
3"	Span X 0.6250	0.2952

### HOW TO USE ARCH CONSTANT TABLE

Example: Given an arch, 9" in thickness, with 10'-0" span, and 17 1/2" rise.

Then, the rise in inches per foot of span =  $\frac{17.5}{10} = 1.75$ " per foot.

To find radius:

$$\begin{aligned} \text{Radius} &= \text{Span} \times 0.9301 \text{ (from table)} \\ &= 120" \times 0.9301 \\ &= 111.6" = 9'-3\frac{1}{2}" \\ \text{Diameter} &= 223.2" = 18'-7\frac{1}{2}" \end{aligned}$$

To find number of brick for each course in arch:

Use the wedge brick table showing the number of brick for a complete circle, using the inside diameter as figured above, and multiply by the factor shown under "Part of Circle" in the arch constant table. (In this example, 0.1807)

From the brick table showing 9" No. 1-X Wedges and 9" Straights (Page 122), we find it requires to turn an 18'-7" inside diameter circle, approximately 227 — 9" No.1-X Wedges and 76 — 9" Straights.

Then, each course in the arch requires:

$$\begin{aligned} 227 \times 0.1807 &= 41 \text{ — } 9" \text{ No. 1-X Wedges} \\ 76 \times 0.1807 &= 14 \text{ — } 9" \text{ Straights} \end{aligned}$$

The same principle will apply in figuring arches of 4 1/2" thickness using 9x4 1/2x2 1/2" arch brick tables, or in figuring arches of 13 1/2" thickness using the 13 1/2x6" wedge brick tables.

## Temperature Equivalent of Pyrometric Cones

The test for Pyrometric Cone Equivalent (P.C.E.) is the oldest and most widely used test for fire-clay refractories. By means of this test, the comparative fusion point of a refractory material is determined by comparison with Standard Pyrometric Cones having known fusion properties. Standard Pyrometric Cones are available in a wide range of temperature equivalents. They are made according to a definite formula and, when heated in a furnace operated under proper conditions at the correct rate, will bend at a definite temperature.

Shown below are the approximate temperature equivalents corresponding to the end points of those Standard Pyrometric Cones (P.C.E.) that are used in connection with refractory testing in accordance with A.S.T.M. Method C24.

CONE NUMBER	END POINT		CONE NUMBER	END POINT	
	DEGREE F.	DEGREE C.		DEGREE F.	DEGREE C.
12	2439	1337	31	3061	1683
13	2460	1349	31 1/2	3090	1699
14	2548	1398	32	3123	1717
15	2606	1430	32 1/2	3135	1724
16	2716	1491	33	3169	1743
17	2754	1512	34	3205	1763
18	2772	1522	35	3245	1785
19	2806	1541	36	3279	1804
20	2847	1564	37	3308	1820
23	2921	1605	38	3335	1835
26	2950	1621	39	3389	1865
27	2984	1640	40	3425	1885
28	2995	1646	41	3578	1970
29	3018	1659	42	3659	2015
30	3029	1665			

Cones 28 and 30 are shown above as information only. They are manufactured and used in special applications in industry but are not used in the P.C.E. test as specified by A.S.T.M. Method C24.

Heating Rate: Cones 12 to 37, incl.: 1509°C. per hr.; Cone 38: 100°C. per hr.; Cones 39 to 42, incl.: 600°C. per hr.

## WATER WEIGHT-TO-VOLUME CONVERSION TABLE

PER 100-POUNDS DRY REFRACTORY MATERIAL

By Weight %	EQUIVALENT VOLUMES		By Weight %	EQUIVALENT VOLUMES	
	Gallons	Pints		Gallons	Pints
1.04	1/4	1	17.73	8 1/2	17
2.09	1/2	2	18.78	9	18
3.13	3/4	3	19.82	9 1/2	19
4.17	1	4	20.86	10	20
5.22	1 1/4	5	21.91	10 1/2	21
6.26	1 1/2	6	22.95	11	22
7.30	1 3/4	7	23.99	11 1/2	23
8.35	2	8	25.04	12	24
9.39	2 1/4	9	26.08	12 1/2	25
10.43	2 1/2	10	27.12	13	26
11.47	2 3/4	11	28.17	13 1/2	27
12.52	3	12	29.21	14	28
13.56	3 1/4	13	30.25	14 1/2	29
14.60	3 1/2	14	31.29	15	30
15.65	3 3/4	15	32.34	15 1/2	31
16.69	4	16	33.38	16	32

Temperature Conversion Tables—Continued

C.		F.		C.		F.		C.		F.	
593	1100	2012	871	1600	2912	1149	2100	3812	1427	2600	4712
599	1110	2030	877	1610	2930	1154	2110	3830	1432	2610	4730
604	1120	2048	882	1620	2948	1160	2120	3848	1438	2620	4748
610	1130	2066	888	1630	2966	1166	2130	3866	1443	2630	4766
616	1140	2084	893	1640	2984	1171	2140	3884	1449	2640	4784
621	1150	2102	899	1650	3002	1177	2150	3902	1454	2650	4802
627	1160	2120	904	1660	3020	1182	2160	3920	1460	2660	4820
632	1170	2138	910	1670	3038	1188	2170	3938	1466	2670	4838
638	1180	2156	916	1680	3056	1193	2180	3956	1471	2680	4856
643	1190	2174	921	1690	3074	1199	2190	3974	1477	2690	4874
649	1200	2192	927	1700	3092	1204	2200	3992	1482	2700	4892
654	1210	2210	932	1710	3110	1210	2210	4010	1488	2710	4910
660	1220	2228	938	1720	3128	1216	2220	4028	1493	2720	4928
666	1230	2246	943	1730	3146	1221	2230	4046	1499	2730	4946
671	1240	2264	949	1740	3164	1227	2240	4064	1504	2740	4964
677	1250	2282	954	1750	3182	1232	2250	4082	1510	2750	4982
682	1260	2300	960	1760	3200	1238	2260	4100	1516	2760	5000
688	1270	2318	966	1770	3218	1243	2270	4118	1521	2770	5018
693	1280	2336	971	1780	3236	1249	2280	4136	1527	2780	5036
699	1290	2354	977	1790	3254	1254	2290	4154	1532	2790	5054
704	1300	2372	982	1800	3272	1260	2300	4172	1538	2800	5072
710	1310	2390	988	1810	3290	1266	2310	4190	1543	2810	5090
716	1320	2408	993	1820	3308	1271	2320	4208	1549	2820	5108
721	1330	2426	999	1830	3326	1277	2330	4226	1554	2830	5126
727	1340	2444	1004	1840	3344	1282	2340	4244	1560	2840	5144
732	1350	2462	1010	1850	3362	1288	2350	4262	1566	2850	5162
738	1360	2480	1016	1860	3380	1293	2360	4280	1571	2860	5180
743	1370	2498	1021	1870	3398	1299	2370	4298	1577	2870	5198
749	1380	2516	1027	1880	3416	1304	2380	4316	1582	2880	5216
754	1390	2534	1032	1890	3434	1310	2390	4334	1588	2890	5234
760	1400	2552	1038	1900	3452	1316	2400	4352	1593	2900	5252
766	1410	2570	1043	1910	3470	1321	2410	4370	1599	2910	5270
771	1420	2588	1049	1920	3488	1327	2420	4388	1604	2920	5288
777	1430	2606	1054	1930	3506	1332	2430	4406	1610	2930	5306
782	1440	2624	1060	1940	3524	1338	2440	4424	1616	2940	5324
788	1450	2642	1066	1950	3542	1343	2450	4442	1621	2950	5342
793	1460	2660	1071	1960	3560	1349	2460	4460	1627	2960	5360
799	1470	2678	1077	1970	3578	1354	2470	4478	1632	2970	5378
804	1480	2696	1082	1980	3596	1360	2480	4496	1638	2980	5396
810	1490	2714	1088	1990	3614	1366	2490	4514	1643	2990	5414
816	1500	2732	1093	2000	3632	1371	2500	4532	1649	3000	5432
821	1510	2750	1099	2010	3650	1377	2510	4550	INTERPOLATION FACTORS		
827	1520	2768	1104	2020	3668	1382	2520	4568	0.66	1	1.8
832	1530	2786	1110	2030	3686	1388	2530	4586	1.11	2	3.6
838	1540	2804	1116	2040	3704	1393	2540	4604	1.67	3	5.4
843	1550	2822	1121	2050	3722	1399	2550	4622	2.22	4	7.2
849	1560	2840	1127	2060	3740	1404	2560	4640	2.78	5	9.0
854	1570	2858	1132	2070	3758	1410	2570	4658	3.33	6	10.8
860	1580	2876	1138	2080	3776	1416	2580	4676	3.89	7	12.6
866	1590	2894	1143	2090	3794	1421	2590	4694	4.44	8	14.4
						1427	2600	4712	5.00	9	16.2
						1432	2610	4730	5.56	10	18.0

Temperature Conversion Tables

NOTE.—The numbers in bold face type refer to the temperature either in degrees Centigrade or Fahrenheit which is to be converted into the other scale. If converting from Fahrenheit to Centigrade the equivalent temperature will be found in the left column. When converting from degrees Centigrade to Fahrenheit, the answer will be found in the column on the right. Interpolation factors are at the bottom right hand corner of the table.

C.	F.	C.	F.	C.	F.	C.	F.
-17.8	0	32	10.0	50	122.0	88	190
-17.2	1	33.8	10.6	51	123.8	93	200
-16.7	2	35.6	11.1	52	125.6	99	210
-16.1	3	37.4	11.7	53	127.4	104	220
-15.6	4	39.2	12.2	54	129.2	110	230
-15.0	5	41.0	12.8	55	131.0	116	240
-14.4	6	42.8	13.3	56	132.8	121	250
-13.9	7	44.6	13.9	57	134.6	127	260
-13.3	8	46.4	14.4	58	136.4	132	270
-12.8	9	48.2	15.0	59	138.2	138	280
-12.2	10	50.0	15.6	60	140.0	143	290
-11.7	11	51.8	16.1	61	141.8	149	300
-11.1	12	53.6	16.7	62	143.6	154	310
-10.6	13	55.4	17.2	63	145.4	160	320
-10.0	14	57.2	17.8	64	147.2	166	330
-9.44	15	59.0	18.3	65	149.0	171	340
-8.89	16	60.8	18.9	66	150.8	177	350
-8.33	17	62.6	19.4	67	152.6	182	360
-7.78	18	64.4	20.0	68	154.4	188	370
-7.22	19	66.2	20.6	69	156.2	193	380
-6.67	20	68.0	21.1	70	158.0	199	390
-6.11	21	69.8	21.7	71	159.8	204	400
-5.56	22	71.6	22.2	72	161.6	210	410
-5.00	23	73.4	22.8	73	163.4	216	420
-4.44	24	75.2	23.3	74	165.2	221	430
-3.89	25	77.0	23.9	75	167.0	227	440
-3.33	26	78.8	24.4	76	168.8	232	450
-2.78	27	80.6	25.0	77	170.6	238	460
-2.22	28	82.4	25.6	78	172.4	243	470
-1.67	29	84.2	26.1	79	174.2	249	480
-1.11	30	86.0	26.7	80	176.0	254	490
-0.56	31	87.8	27.2	81	177.8	260	500
0	32	89.6	27.8	82	179.6	266	510
0.56	33	91.4	28.3	83	181.4	271	520
1.11	34	93.2	28.9	84	183.2	277	530
1.67	35	95.0	29.4	85	185.0	282	540
2.22	36	96.8	30.0	86	186.8	288	550
2.78	37	98.6	30.6	87	188.6	293	560
3.33	38	100.4	31.1	88	190.4	299	570
3.89	39	102.2	31.7	89	192.2	304	580
4.44	40	104.0	32.2	90	194.0	310	590
5.00	41	105.8	32.8	91	195.8	316	600
5.56	42	107.6	33.3	92	197.6	321	610
6.11	43	109.4	33.9	93	199.4	327	620
6.67	44	111.2	34.4	94	201.2	332	630
7.22	45	113.0	35.0	95	203.0	338	640
7.78	46	114.8	35.6	96	204.8	343	650
8.33	47	116.6	36.1	97	206.6	349	660
8.89	48	118.4	36.7	98	208.4	354	670
9.44	49	120.2	37.2	99	210.2	360	680