TABLE 61. WEIGHTS AND MEASUREMENTS OF SEAMLESS BRASS AND COPPER TUBE.

IRON PIPE SIZES. REGULAR AND EXTRA HEAVY

Iron Pipe Sizes	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10
Regular																				
Brass, weight per lineal foot	.246	.437	.612	.911	1.235	1.740	2.557	3.037	4.017	5.83	8.314	10.85	12.29	13.74	15.4	18.44	23.92	30.05	36.94	43.91
Copper, weight per lineal foot	.259	.459	.644	.958	1.298	1.829	2.689	3.193	4.224	6.13	8.741	11.41	12.93	14.44	16.19	19.39	25.15	31.60	38.84	46.17
Exact outside diameter	.405	.540	.675	.840	1.050	1.315	1.660	1.900	2.375	2.875	3.500	4.000	4.500	5.000	5.563	6.625	7.625	8.625	9.625	10.750
Exact inside diameter	.281	.375	.484	.625	.822	1.062	1.368	1.600	2.062	2.500	3.062	3.500	4.000	4.500	5.062	6.125	7.062	8.00	8.937	10.019
Exact thickness of walls	.064	.083	.096	.1075	.114	.126	.146	.150	.157	.188	.219	.250	.250	.250	.250	.250	.283	.322	.340	.370
Brass, theoretical safe working pressure. Factor safety six	1776	1465	1160	1024	840	750	628	580	509	518	461	449	427	412	400	375	366	357	349	340
Copper, theoretical safe working pressure. Factor safety six	1332	1102	870	798	630	563	471	435	381	391	346	337	320	309	300	281	275	267	261	255
Internal area cross section	.057	.104	.192	.305	.533	.863	1.496	2.038	3.355	4.783	.7388	9.887	12.730	15.940	19.990	28.890	38.740	50.040	63.630	78.840
Thickness of walls at bottom of thread	.036	.040	.043	.048	.052	.059	.065	.070	.079	.096	.109	.118	.129	.139	.151	.172	.193	.214	.236	.258
Extra Heavy																				
Brass, weight per lineal foot	.353	.593	.805	1.191	1.622	2.386	3.291	3.986	5.508	8.407	11.24	13.66	16.41	20.07	22.51	31.32				
Copper, weight per lineal foot	.371	.624	.847	1.253	1.706	2.509	.346	4.191	5.791	8.839	11.82	14.37	17.25	21.10	23.67	32.93				
Exact outside diameter	.405	.540	.675	.840	1.050	1.315	1.660	1.900	2.375	2.875	3.500	4.000	4.500	5.000	5.563	6.625				
Exact inside diameter	.205	.294	.421	.542	.736	.951	1.272	1.494	1.933	2.315	2.892	3.358	3.818	4.250	4.813	5.750				
Exact thickness of walls	.100	.123	.127	.149	.157	.182	.194	.203	.221	.280	.304	.321	.341	.375	.375	.437				
Brass, theoretical safe working pressure. Factor safety six	4442	3401	2508	2166	1739	1500	1250	1142	1006	991	904	846	814		763	740				
Copper, theoretical safe working pressure. Factor safety six	3318	2551	1881	1625	1302	1125	938	857	755	748	678	635	611		578	555				
Internal area cross section	.033	.068	.139	.231	.452	.710	1.271	1.753	2.935	4.209	6.569	8.856	11.450	14.180	18.190	25.960				
Thickness of wall at bottom of thread	.068	.075	.079	.088	.096	.107	.119	.128	.146	.172	.196	.213	.233		.267	.329				
Number of threads per inch	27	18	18	14	14	11½	11½	11½	11½	8	8	8	8	8	8	8	8	8	8	8
Approximate length of threads	⅛"	½"	½"	⅝"	¾"	⅞"	1"	1"	1⅛"	1¼"	1¼"	1⅜"	1⅜"	1½"	1½"	1½"	1½"	1½"	1½"	1½"

NOTE—Weights are in pounds, Diameter and thickness in inches, Areas in square inches. The safe working pressure is calculated on thickness of walls at bottom of thread and indicates pounds per square inch internal pressure.

FIRECLAY BRICK AND REFRACTORY CEMENTS IN BOILER SETTINGS

FIRECLAY brick having melting points as low as 2750 deg. fahr. are used in the construction of boiler furnaces. For most purposes, however, it is necessary to employ brick of first quality refractoriness. Such brick should have the following characteristics:

Fusion or Melting Point.....Cone 31 to 34 (3182 to 3290 deg. fahr.)

End Cold Crushing Strength.....500 to 2500 lb. per sq. in. depending upon the burn and process of manufacture.

Porosity.....15 to 30 per cent.

Mean Thermal Conductivity from 0-1000 deg. cent.....0025 calories per second, per sq.cm., per deg. cent., difference in temperature on two parallel faces of a 1 centimeter cube. The mean conductivities at any two temperatures equals .0020+ .0000011 (t_1+t_2) where t_1 and t_2 are the temperatures in deg. cent. Thermal Expansion.....0.000008 per deg. cent.

Chemical Composition:

Silica	50.0 to 65.0	per cent
Alumina	30.0 to 45.0	" "
Iron Oxide	1.5 to 3.5	" "
Titania	1.5 to 3.5	" "
Lime	0.1 to 0.5	" "
Magnesia	0.1 to 0.5	" "
Soda and Potash	0.5 to 1.5	" "

The service obtained from first quality fireclay brick depends upon the design of the furnace, the operating conditions, and the type of firebrick used. The most satisfactory design is one in which the brick in the hottest part of the furnace are not subjected to a soaking heat. When one face of each brick is relatively cool, this brick is less liable to squeeze out of shape and allow the brickwork to settle. Likewise when the heating surface is small in comparison with the radiating surface the service obtained from the refractories is most satisfactory. Special shapes should be used only in cases of absolute necessity. They are more expensive, less uniform, and less readily available. A skillful brick mason can construct practically any kind of a furnace out of standard brick of the 9 in. series.

When furnaces are operated under a slight pressure the life of the refractories is considerably less than where there is a draft. This is due to the "soaking" effect that is more pronounced when the furnace is operated under pressure.

There is an opportunity for increasing the life of most furnaces by the proper selection of the brick. Those which are laid in the sidewalls are subjected to the action of the clinker; they are chipped and broken by the slice bar. Dense well burned brick are best suited to meet these conditions. The lighter burned brick are best suited to resist temperature