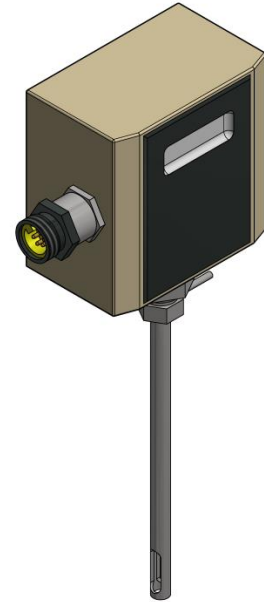


FLMTR Series

FLMTR-0.75-6.0KIT Natural Gas Flow Meter Kit



Product Information

The Natural Gas Flow Meter Kit measures and displays the instantaneous flow of natural gas in standard cubic feet per hour (SCFH).

Recommended Installation Tools

1. PTFE tape
 2. Tape measure
 3. 1" open end wrench or 8" crescent wrench
-

Components Supplied

Figure 1 shows all of the components that are supplied with the Natural Gas Flow Meter Kit.



Figure 1: Components Included in the Natural Gas Flow Meter Kit

1. Enclosure with remote display and 110V convenience outlet
2. Natural gas flow meter
3. Interconnecting cable, 25 feet long
4. Brass packing gland for 3/8" tube, 1/2"NPT connection, with O-rings and washers installed
5. Spare O-rings , Dash 204 (qty 4)
6. 120 VAC power cord, 10 feet long, 10A max

Installation Procedure

- The natural gas flow meter may be mounted in horizontal or vertical piping. The flow meter must be mounted at least 10 pipe diameters downstream of disturbances (elbows, reducers, etc.) and at least 5 pipe diameters upstream of disturbances. Longer distances of straight pipe may be necessary depending on the piping arrangement. See Figure 2 below for the necessary distance of straight pipe upstream and downstream of the meter. If the meter is not mounted per the requirements below, unstable flow readings may result.

Note: Proper upstream and downstream pipe diameters are critical to achieve accurate and stable flow readings.

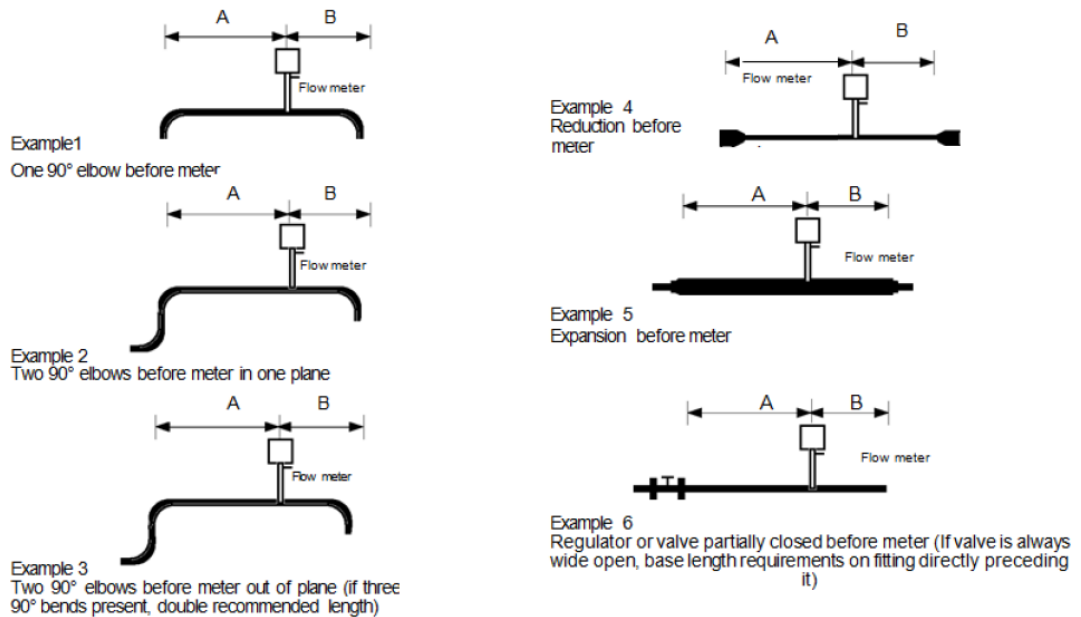


Figure 2-1. Recommended Pipe Length Requirements for Installation

Example	A – Upstream ⁽¹⁾ Requirements	B – Downstream ⁽²⁾ Requirements
1	15 D	5 D
2	20 D	5 D
3	40 D	10 D
4	15 D	5 D
5	30 D	10 D
6	40 D	5 D

(1) Number of diameters (D) of straight pipe required between upstream disturbance and the flow meter.
(2) Number of diameters (D) of straight pipe required downstream of the flow meter.

Figure 2: Necessary Amount of Straight Pipe for Mounting Flow Meter

Installation Procedure (continued)

2. Once a suitable location has been found, identify the pipe size and if possible, the pipe schedule. With this information, use Tables 4 and 5 in Appendix A to verify that the gas velocity through the pipe in this location is less than 166 ft/sec for 1" thru 5" pipe or 138 ft/sec for 6" pipe when the burner is at high fire.
3. Verify that the static pressure in the pipe is less than 50 PSIG and the natural gas temperature (when flowing) is between 20 and 120°F.
4. Verify that the natural gas piping into which the meter is going to be inserted is depressurized. If not, close the upstream gas valve and bleed off any residual trapped gas.
5. If a ½" NPT or larger half coupling is not available in a suitable location, one will need to be welded onto the pipe with a ½" or larger hole drilled through the center of the coupling. After this is completed, the assembly should look like Figure 3.

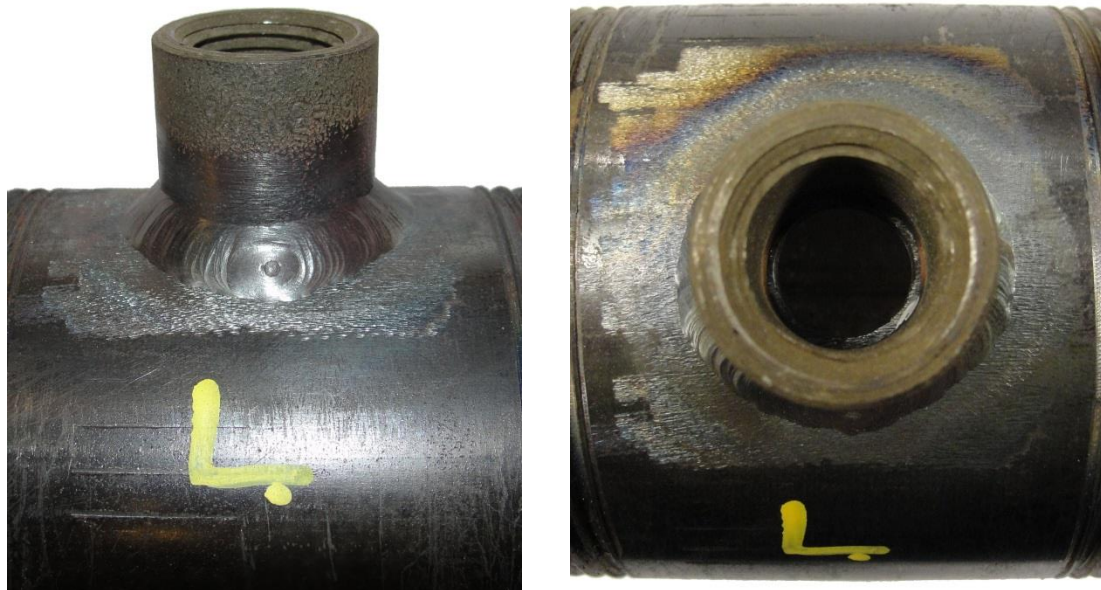


Figure 3: ½" NPT Half Coupling Welded to Pipe with ½" Hole Drilled Through Center

Installation Procedure (continued)

- Screw the packing gland into the 1/2" NPT half coupling. PTFE tape should be used to seal the NPT threads of the packing gland. O-rings and washers must be installed in the packing gland as shown in Figure 4.

Note: The O-rings will wear over time. Inspect the O-rings before each use and replace the O-rings if any wear is evident.

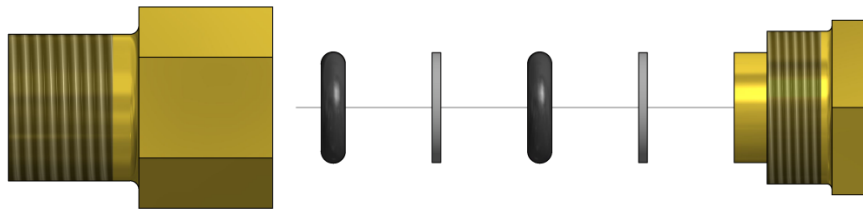


Figure 4: Proper Installation of Washers and O-rings in the Packing Gland

- Insert the meter sensing tube into the packing gland. Using Table 1 and Figure 5, center the meter's sensing element in the pipe by setting distance "X" (distance from the outer diameter of the pipe to the bottom of the pointer). This can be done carefully with a tape measure. Ensure that the pointer on the flow meter is pointing in the direction of flow.

Pipe Size	Distance "X"
1"	5.34"
1-1/4"	5.17"
1-1/2"	5.05"
2"	4.81"
2-1/2"	4.56"
3"	4.25"
4"	3.75"
5"	3.22"
6"	2.69"

Table 1: Meter Insertion Distance

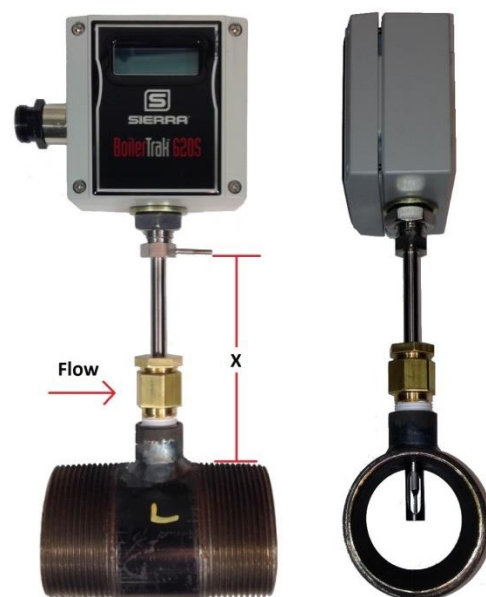


Figure 5: Meter Inserted into Pipe

Installation Procedure (continued)

8. After the meter is inserted to the correct depth with the pointer in the direction of flow, tighten the packing gland nut with the 1" open end wrench (or crescent wrench). This will cause the O-rings to compress around the meter's sensing tube.
9. Connect the interconnecting cable to the flow meter and to the enclosure. The male end of the cable connects to the enclosure and the female end connects to the flow meter.
10. Plug the power cord into the side of the enclosure and then into a 120 VAC receptacle. The meter and the remote display should power up. After this step, the meter and enclosure should look like Figure 6.



Figure 6: Flow Meter Connected and Powered

Installation Procedure (continued)

11. Scale the remote display for the pipe size that the meter is installed in. For Schedule 40 pipe, use the table provided on the front of the enclosure or Table 2 in Appendix A to obtain the correct scaling value for parameter “dSP.2”. For Schedule 80 pipe, use Table 3 in Appendix A. Once the correct scaling value has been obtained, the following steps are necessary to change the scaling of the remote display:
 - a. Press and hold down the button labeled LEVEL. The display will blink and “Cn-t” will appear on the display. Release the LEVEL button after “Cn-t” appears.
 - b. Press the button labeled MODE four times until “dSP.2” appears on the display.
 - c. Press the button labeled SHIFT. The current setting for parameter “dSP.2” should appear.
 - d. Press the SHIFT button again. Note that as the SHIFT button is tapped more times, different digits in the setting blink. Press the SHIFT button until the digit to be changed is blinking.
 - e. Change the blinking digit by pressing the UP key until the correct value for the digit is displayed.
 - f. Repeat steps “d” and “e” as required to change the setting of “dSP.2” to the correct value.
 - g. After all of the digits in the setting are changed and verified to be correct for the pipe size, press the MODE button. The display should then show “dP”.
 - h. Press and hold the LEVEL button. The entire display should light up as if the display is re-booting. Release the button after this. The current flow rate should then be shown on the remote display.

12. If the gas meter is being inserted into 6” pipe, the gas meter itself will need to be re-scaled to 8300 SFPM. This can be done by removing the cover of the flow meter and using the three red buttons. See the “User Full Scale Adjustment” section of the Sierra 620 manual which is provided for how to re-scale the flow meter. When commissioning is complete, set the meter back to 10,000 SFPM for 1” through 5” pipe sizes. See Tables 2 and 3 in Appendix A for more information.

13. The gas meter and remote display should now be ready for use. The enclosure with the remote display should be hung in a location where the remote display can be easily read. A convenience outlet is provided on the side of the enclosure for 120 VAC devices up to 7A.

Installation Procedure (continued)

14. After use, remove all power from the enclosure prior to de-pressurizing the gas piping and removing the flow meter and packing gland. Plug the half coupling where the meter was inserted. Place the flow meter and accessories back into the plastic case. When all components are put back into the case, the flow meter kit will appear as shown in Figure 7.

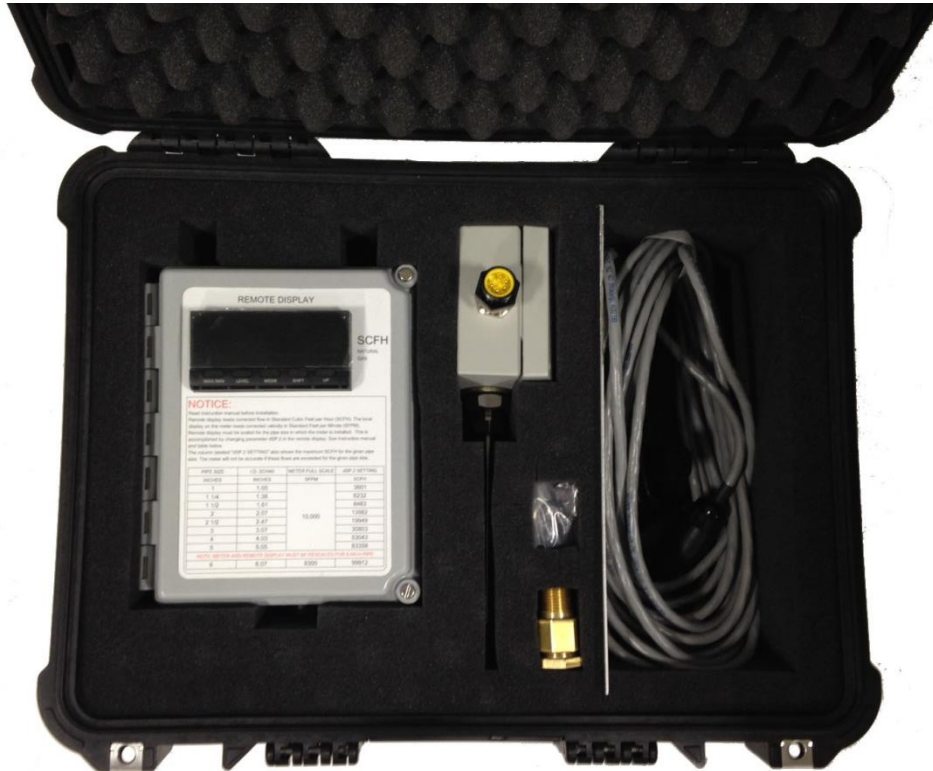


Figure 7: Flow Meter Kit Packaged in Case

Appendix A

Table 2: Display Scaling for Schedule 40 Pipe

Pipe Size	Setting of "dSP.2"	Meter Full Scale (SFPM)*
1"	3601	10000
1-1/4"	6232	10000
1-1/2"	8483	10000
2"	13982	10000
2-1/2"	19949	10000
3"	30803	10000
4"	53043	10000
5"	83358	10000
6"	99912	8300

Table 3: Display Scaling for Schedule 80 Pipe

Pipe Size	Setting of "dSP.2"	Meter Full Scale (SFPM)*
1"	2997	10000
1 1/4"	5345	10000
1 1/2"	7363	10000
2	12304	10000
2 1/2"	17659	10000
3"	27522	10000
4"	47904	10000
5"	75807	10000
6"	90116	8300

***Note:** Re-scale the meter if inserting it into a 6" gas pipe.

Appendix A (continued)

Table 4: Schedule 40 Pipe Velocities and Flows

Standard Velocity			1"		1- 1/4"		1 -1/2"		2"		2 -1/2"	
			Flow		Flow		Flow		Flow		Flow	
STD ft/sec	STD ft/min	STD ft/hr	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP
0.0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	400	24000	144	4	249	6	339	9	559	14	798	20
13.3	800	48000	288	7	499	13	679	17	1119	28	1596	41
20.0	1200	72000	432	11	748	19	1018	26	1678	43	2394	61
26.7	1600	96000	576	15	997	25	1357	34	2237	57	3192	81
33.3	2000	120000	720	18	1246	32	1697	43	2796	71	3990	101
40.0	2400	144000	864	22	1496	38	2036	52	3356	85	4788	122
46.7	2800	168000	1008	26	1745	44	2375	60	3915	99	5586	142
53.3	3200	192000	1152	29	1994	51	2714	69	4474	114	6384	162
60.0	3600	216000	1296	33	2244	57	3054	78	5033	128	7182	182
66.7	4000	240000	1440	37	2493	63	3393	86	5593	142	7980	203
73.3	4400	264000	1584	40	2742	70	3732	95	6152	156	8778	223
80.0	4800	288000	1729	44	2991	76	4072	103	6711	170	9576	243
86.7	5200	312000	1873	48	3241	82	4411	112	7270	185	10373	263
93.3	5600	336000	2017	51	3490	89	4750	121	7830	199	11171	284
100.0	6000	360000	2161	55	3739	95	5090	129	8389	213	11969	304
106.7	6400	384000	2305	59	3989	101	5429	138	8948	227	12767	324
113.3	6800	408000	2449	62	4238	108	5768	146	9508	241	13565	344
120.0	7200	432000	2593	66	4487	114	6107	155	10067	256	14363	365
126.7	7600	456000	2737	69	4736	120	6447	164	10626	270	15161	385
133.3	8000	480000	2881	73	4986	127	6786	172	11185	284	15959	405
140.0	8400	504000	3025	77	5235	133	7125	181	11745	298	16757	425
146.7	8800	528000	3169	80	5484	139	7465	190	12304	312	17555	446
153.3	9200	552000	3313	84	5734	146	7804	198	12863	327	18353	466
160.0	9600	576000	3457	88	5983	152	8143	207	13422	341	19151	486
166.7	10000	600000	3601	91	6232	158	8483	215	13982	355	19949	507

Note:

Boiler Horsepower numbers assume a natural gas heating value of 1000 BTU / SCFH and a boiler efficiency of 85%.

Appendix A (continued)

Table 4: Schedule 40 Pipe Velocities and Flows (continued)

Standard Velocity			3"		4"		5"		6"	
			Flow		Flow		Flow		Flow	
STD ft/sec	STD ft/min	STD ft/hr	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP
0.0	0	0	0	0	0	0	0	0	0	0
6.7	400	24000	1232	31	2122	54	3334	85	4815	122
13.3	800	48000	2464	63	4243	108	6669	169	9630	245
20.0	1200	72000	3696	94	6365	162	10003	254	14445	367
26.7	1600	96000	4928	125	8487	215	13337	339	19260	489
33.3	2000	120000	6161	156	10609	269	16672	423	24075	611
40.0	2400	144000	7393	188	12730	323	20006	508	28890	734
46.7	2800	168000	8625	219	14852	377	23340	593	33705	856
53.3	3200	192000	9857	250	16974	431	26674	677	38520	978
60.0	3600	216000	11089	282	19095	485	30009	762	43335	1100
66.7	4000	240000	12321	313	21217	539	33343	847	48150	1223
73.3	4400	264000	13553	344	23339	593	36677	931	52965	1345
80.0	4800	288000	14785	375	25461	646	40012	1016	57781	1467
86.7	5200	312000	16017	407	27582	700	43346	1101	62596	1589
93.3	5600	336000	17250	438	29704	754	46680	1185	67411	1712
100.0	6000	360000	18482	469	31826	808	50015	1270	72226	1834
106.7	6400	384000	19714	501	33947	862	53349	1355	77041	1956
113.3	6800	408000	20946	532	36069	916	56683	1439	81856	2078
120.0	7200	432000	22178	563	38191	970	60017	1524	86671	2201
126.7	7600	456000	23410	594	40313	1024	63352	1609	91486	2323
133.3	8000	480000	24642	626	42434	1077	66686	1693	96301	2445
140.0	8400	504000	25874	657	44556	1131	70020	1778	-	-
146.7	8800	528000	27106	688	46678	1185	73355	1863	-	-
153.3	9200	552000	28339	720	48799	1239	76689	1947	-	-
160.0	9600	576000	29571	751	50921	1293	80023	2032	-	-
166.7	10000	600000	30803	782	53043	1347	83358	2117	-	-

Note:

Boiler Horsepower numbers assume a natural gas heating value of 1000 BTU / SCFH and a boiler efficiency of 85%.

Appendix A (continued)

Table 5: Schedule 80 Pipe Velocities and Flows

Standard Velocity			1"		1- 1/4"		1 -1/2"		2"		2 -1/2"	
			Flow		Flow		Flow		Flow		Flow	
STD ft/sec	STD ft/min	STD ft/hr	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP
0.0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	400	24000	120	3	214	5	295	7	492	12	706	18
13.3	800	48000	240	6	428	11	589	15	984	25	1413	36
20.0	1200	72000	360	9	641	16	884	22	1476	37	2119	54
26.7	1600	96000	480	12	855	22	1178	30	1969	50	2826	72
33.3	2000	120000	599	15	1069	27	1473	37	2461	62	3532	90
40.0	2400	144000	719	18	1283	33	1767	45	2953	75	4238	108
46.7	2800	168000	839	21	1497	38	2062	52	3445	87	4945	126
53.3	3200	192000	959	24	1710	43	2356	60	3937	100	5651	143
60.0	3600	216000	1079	27	1924	49	2651	67	4429	112	6357	161
66.7	4000	240000	1199	30	2138	54	2945	75	4921	125	7064	179
73.3	4400	264000	1319	33	2352	60	3240	82	5414	137	7770	197
80.0	4800	288000	1439	37	2566	65	3534	90	5906	150	8477	215
86.7	5200	312000	1558	40	2779	71	3829	97	6398	162	9183	233
93.3	5600	336000	1678	43	2993	76	4123	105	6890	175	9889	251
100.0	6000	360000	1798	46	3207	81	4418	112	7382	187	10596	269
106.7	6400	384000	1918	49	3421	87	4712	120	7874	200	11302	287
113.3	6800	408000	2038	52	3635	92	5007	127	8366	212	12008	305
120.0	7200	432000	2158	55	3848	98	5301	135	8859	225	12715	323
126.7	7600	456000	2278	58	4062	103	5596	142	9351	237	13421	341
133.3	8000	480000	2398	61	4276	109	5890	150	9843	250	14128	359
140.0	8400	504000	2518	64	4490	114	6185	157	10335	262	14834	377
146.7	8800	528000	2637	67	4704	119	6480	165	10827	275	15540	395
153.3	9200	552000	2757	70	4917	125	6774	172	11319	287	16247	413
160.0	9600	576000	2877	73	5131	130	7069	179	11812	300	16953	430
166.7	10000	600000	2997	76	5345	136	7363	187	12304	312	17659	448

Note:

Boiler Horsepower numbers assume a natural gas heating value of 1000 BTU / SCFH and a boiler efficiency of 85%.

Appendix A (continued)

Table 5: Schedule 80 Pipe Velocities and Flows (continued)

Standard Velocity			3"		4"		5"		6"	
			Flow		Flow		Flow		Flow	
STD ft/sec	STD ft/min	STD ft/hr	SCFH	BHP	SCFH	BHP	SCFH	BHP	SCFH	BHP
0.0	0	0	0	0	0	0	0	0	0	0
6.7	400	24000	1101	28	1916	49	3032	77	4343	110
13.3	800	48000	2202	56	3832	97	6065	154	8686	221
20.0	1200	72000	3303	84	5748	146	9097	231	13029	331
26.7	1600	96000	4403	112	7665	195	12129	308	17372	441
33.3	2000	120000	5504	140	9581	243	15161	385	21715	551
40.0	2400	144000	6605	168	11497	292	18194	462	26058	662
46.7	2800	168000	7706	196	13413	341	21226	539	30401	772
53.3	3200	192000	8807	224	15329	389	24258	616	34744	882
60.0	3600	216000	9908	252	17245	438	27291	693	39086	992
66.7	4000	240000	11009	280	19161	487	30323	770	43429	1103
73.3	4400	264000	12110	307	21078	535	33355	847	47772	1213
80.0	4800	288000	13210	335	22994	584	36387	924	52115	1323
86.7	5200	312000	14311	363	24910	633	39420	1001	56458	1434
93.3	5600	336000	15412	391	26826	681	42452	1078	60801	1544
100.0	6000	360000	16513	419	28742	730	45484	1155	65144	1654
106.7	6400	384000	17614	447	30658	778	48517	1232	69487	1764
113.3	6800	408000	18715	475	32574	827	51549	1309	73830	1875
120.0	7200	432000	19816	503	34491	876	54581	1386	78173	1985
126.7	7600	456000	20916	531	36407	924	57613	1463	82516	2095
133.3	8000	480000	22017	559	38323	973	60646	1540	86859	2206
140.0	8400	504000	23118	587	40239	1022	63678	1617	-	-
146.7	8800	528000	24219	615	42155	1070	66710	1694	-	-
153.3	9200	552000	25320	643	44071	1119	69743	1771	-	-
160.0	9600	576000	26421	671	45988	1168	72775	1848	-	-
166.7	10000	600000	27522	699	47904	1216	75807	1925	-	-

Note:

Boiler Horsepower numbers assume a natural gas heating value of 1000 BTU / SCFH and a boiler efficiency of 85%.

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