



Residential Gas Delivery System Installation & Sizing

2010 California Plumbing Code And PG&E Regulations

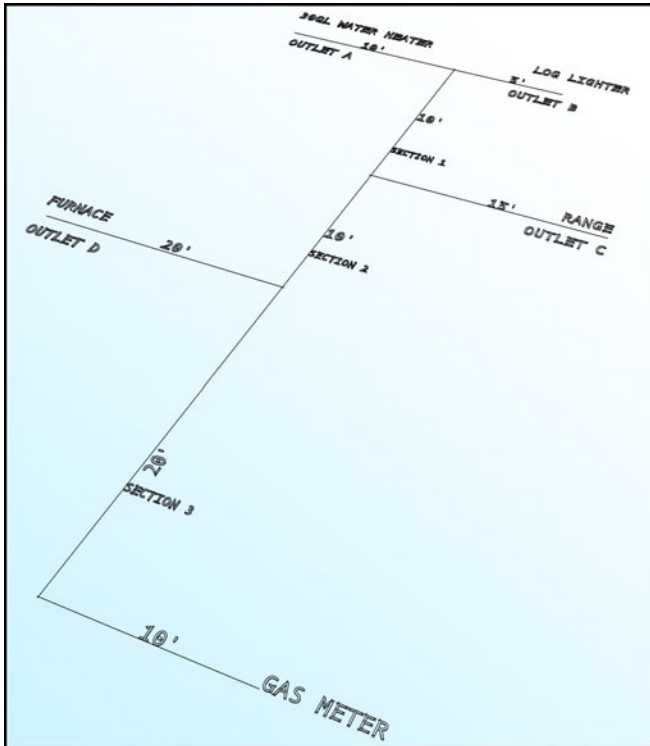
The information provided in this brochure answers a number of commonly asked questions. For additional information please refer to the California Plumbing Code or speak with one of the City's Building Inspectors.

<input type="checkbox"/>	Plumbing permit must be obtained prior to the installation, alteration or repair of a gas piping system.
<input type="checkbox"/>	All pipe used for the installation, extension, alteration, or repair of any gas piping shall be standard weight Schedule 40 wrought iron or steel (galvanized or black) CPC 1209.5.2.2
<input type="checkbox"/>	Corrugated stainless steel tubing. Approved PE pipe may be used in exterior buried piping systems when installed by certified technicians. CPC 1209.5.3.4
<input type="checkbox"/>	An exterior shutoff valve shall be installed before the line enters the building CPC 1211.11.3
<input type="checkbox"/>	Sediment traps must be installed on furnaces, wall heaters, boilers and water heaters downstream of shutoff valves. CPC1212.7
<input type="checkbox"/>	Corrugated stainless steel systems should be bonded to the electrical service grounding electrode system where it enters the building CPC 12.11.15.2
<input type="checkbox"/>	Gas piping shall not be used as a grounding conductor or electrode but it may be bonded. CPC 1211.15.3
<input type="checkbox"/>	Steel pipe installed outside and underground shall have no less than 12 inches of cover (where no damage is likely). And no less than 18 inches of cover in other areas. CPC 1211.1.2
<input type="checkbox"/>	Where unions are necessary, right and left nipples and couplings shall be used. Ground joint unions may only be used at exposed fixtures, appliance, or equipment connections and in exposed exterior locations immediately on the discharge side of a building shutoff valve. OMC15.04.940 - CPC 1211.3.2
<input type="checkbox"/>	An accessible shutoff valve shall be installed in the fuel supply piping outside of each appliance and ahead of the union connection thereto, in addition to any valve on the appliance. Shutoff valves shall be in the same room as the appliance and no further than 6 feet from the appliance. CPC1212.5
<input type="checkbox"/>	INSPECTION 1: Underground exterior gas piping requires one inspection which will occur after the pipe has been installed in a trench and pressurized but before it is covered.
<input type="checkbox"/>	INSPECTION 2: After the piping system has been installed but prior to it being covered or concealed, or any fixture or appliance has been attached thereto. This inspection will check for proper pipe size, material, and installation. Although not required, it is recommended that the piping system be pressurized.
<input type="checkbox"/>	INSPECTION 3: consists of a pressure test and occurs after the building is completely enclosed but prior to connecting any equipment or appliances. <i>For projects in which the gas piping will remain exposed, both inspections would be combined into a single inspection.</i>
<input type="checkbox"/>	Gas piping systems will be pressure tested at least once during the inspection process. The permit holder shall provide and install a temporary pressure gauge and to pressurize the piping system. All gas piping systems shall be pressurized using air, CO ₂ , or nitrogen. For residential installations the gas piping system shall be pressurized to no less than ten (10) psi. and shall hold that pressure for no less than 15 minutes. The gauge used for the pressure test shall have a pressure range not greater than twice the test pressure applied and shall have 1/10 psi increments. OMC 15.04.950 - CPC 1214.3.2, OMC15.04.955 - CPC 1214.3.3
<input type="checkbox"/>	Gas pipe needs to be sized correctly. You can size the gas pipe by following the example in this handout or you may request assistance from a Building Inspector. For the Building Inspector to help, you must provide a piping layout (similar to Figure "C") with the lengths of all piping and the input demand load of all appliances shown on the drawing. Sizing the pipe will depend on the type of pipe being used. CPC 1216.0



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APPLIANCE		INPUT Bth/h
Furnace		100,000
Hydronic boiler		100,000
Water heater, storage 30-40gl		35,000
Water heater, storage 50gl		50,000
Tankless	2 gl/min	142,800
	4 gl/min	285,000
	6 gl/min	428,400
Free standing range		65,000
Built-in cooktop		40,000
Built-in oven or broiler		25,000
Clothes dryer domestic		35,000
Gas fireplace direct vent		40,000
Gas log lighter		80,000
Barbecue		40,000
Refrigerator		3,000

Note: The demand ratings of the appliances listed in this table are minimums. Demand ratings of the actual installed appliances may be higher. Refer to name plate rating on appliance - use the input Btu/Hr number. The tables used to size gas piping are based on Cubic Feet per Hour (CF/H). To convert Btu/Hr to CF/H divide the Btu/Hr by 1,000 (per PG&E delivery capacity), which is the number of Btu/Hr in a single cubic foot of natural gas

Solution:

- Maximum gas demand of outlet A 35 cubic feet per hour (actual input/1000) (from Table 121)
 Maximum gas demand of outlet B 80 cubic feet per hour (actual input/1000) (from Table 121)
 Maximum gas demand of outlet C 65 cubic feet per hour (actual input/1000) (from Table 121)
 Maximum gas demand of outlet D 100 cubic feet per hour (actual input/1000) (from Table 121)
- The length of pipe from the gas meter to the most remote outlet (outlet A) is 60 feet.
- Using the length in feet column row marked 60 feet in Table 128:
 Outlet A, supplying 35 cubic feet per hour, requires onehalf (1/2) inch pipe.
 Section 1, supplying outlets A and B, or 115 cubic feet per hour requires threequarter (3/4) inch pipe.
 Section 2, supplying outlets A, B, and C, or 180 cubic feet per hour requires one (1) inch pipe.
 Section 3, supplying outlets A, B, C, and D, or 280 cubic feet per hour, requires one & onequarter (1 1/4) inch pipe.
- Using the column marked 60 feet in Table 128 (no column for actual length of 55 feet).
 Outlet B, supplying 80 cubic feet per hour, requires threequarter (3/4) inch pipe.
 Outlet C, supplying 65 cubic feet per hour, requires threequarter (3/4) inch pipe.
- Using the column marked 60 feet in Table 128:
 Outlet D, supplying 100 cubic feet per hour, requires three quarter (3/4) inch pipe.

Outlet	Appliance	Length ft	Demand BTU table 12-1	Demand CF/Hr	Pipe Size table 12-8
				/1000 BTU/CFHT	
A	30gl water heater	60 (use on 12-8)	35000	35	1/2
B	Gas log lighter	55	80000	80	3/4
C	Range	55	65000	65	1/2
D	Furnace	50	100000	100	3/4
Section					
1	A+B			115	3/4
2	A+B+C			180	1
3	A+B+C+D			280	1-1/4



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Table 12-8 Schedule 40 Metallic Pipe [NFPA Table 6.2 (b)]														
Gas: Natural • Inlet Pressure: Less than 2 psi • Pressure Drop: 0.5 in. w.c. • Specific Gravity: 0.60														
Nominal:	Pipe Size (in.)													
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12
Actual ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
Length (ft)	Capacity in Cubic Feet of Gas per Hour													
10	172	360	678	1,390	2,090	4,020	6,400	11,300	23,100	41,800	67,600	139,000	252,000	399,000
20	118	247	466	957	1,430	2,760	4,400	7,780	15,900	28,700	46,500	95,500	173,000	275,000
30	95	199	374	768	1,150	2,220	3,530	6,250	12,700	23,000	37,300	76,700	139,000	220,000
40	81	170	320	657	985	1,900	3,020	5,350	10,900	19,700	31,900	65,600	119,000	189,000
50	72	151	284	583	873	1,680	2,680	4,740	9,660	17,500	28,300	58,200	106,000	167,000
60	65	137	257	528	791	1,520	2,430	4,290	8,760	15,800	25,600	52,700	95,700	152,000
70	60	126	237	486	728	1,400	2,230	3,950	8,050	14,600	23,600	48,500	88,100	139,000
80	56	117	220	452	677	1,300	2,080	3,670	7,490	13,600	22,000	45,100	81,900	130,000
90	52	110	207	424	635	1,220	1,950	3,450	7,030	12,700	20,600	42,300	76,900	122,000
100	50	104	195	400	600	1,160	1,840	3,260	6,640	12,000	19,500	40,000	72,600	115,000
125	44	92	173	355	532	1,020	1,630	2,890	5,890	10,600	17,200	35,400	64,300	102,000
150	40	83	157	322	482	928	1,480	2,610	5,330	9,650	15,600	32,100	58,300	92,300
175	37	77	144	296	443	854	1,360	2,410	4,910	8,880	14,400	29,500	53,600	84,900
200	34	71	134	275	412	794	1,270	2,240	4,560	8,260	13,400	27,500	49,900	79,000
250	30	63	119	244	366	704	1,120	1,980	4,050	7,320	11,900	24,300	44,200	70,000

TABLE 12-8 • SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.2(b)]														
Gas: Natural • Inlet Pressure: Less than 2 psi • Pressure Drop: 0.5 in. w.c. • Specific Gravity: 0.60														
Flow designation:	TUBE SIZE (EHD)*													
	13	15	18	19	23	25	30	31	37	39	46	48	60	62
Length (ft)	Capacity in Cubic Feet of Gas per Hour													
5	46	63	115	134	225	270	471	546	895	1,037	1,790	2,070	3,660	4,140
10	32	44	82	95	161	192	330	383	639	746	1,260	1,470	2,600	2,930
15	25	35	66	77	132	157	267	310	524	615	1,030	1,200	2,140	2,400
20	22	31	58	67	116	137	231	269	456	536	888	1,050	1,850	2,080
25	19	27	52	60	104	122	206	240	409	482	793	936	1,660	1,860
30	18	25	47	55	96	112	188	218	374	442	723	856	1,520	1,700
40	15	21	41	47	83	97	162	188	325	386	625	742	1,320	1,470
50	13	19	37	42	75	87	144	168	292	347	559	665	1,180	1,320
60	12	17	34	38	68	80	131	153	267	318	509	608	1,080	1,200
70	11	16	31	36	63	74	121	141	248	295	471	563	1,000	1,110
80	10	15	29	33	60	69	113	132	232	277	440	527	940	1,040
90	10	14	28	32	57	65	107	125	219	262	415	498	887	983
100	9	13	26	30	54	62	101	118	208	249	393	472	843	933
150	7	10	20	23	42	48	78	91	171	205	320	387	691	762
200	6	9	18	21	38	44	71	82	148	179	277	336	600	661
250	5	8	16	19	34	39	63	74	133	161	247	301	538	591
300	5	7	15	17	32	36	57	67	95	148	226	275	492	540

*EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

Notes: Table includes losses for four 90 degree bends and two end fittings. Tubing runs with larger numbers of bends and/or fittings shall be increased by an equivalent length of tubing to the following equation: L = 1.3n, where L is additional length(ft) of tubing and n is the number of additional fittings and/or bends.
All table entries are rounded to 3 significant digits.