Fuel Gas Pipe Sizing and Installation

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Code and Installation Information

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.

Material

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) or corrugated stainless steel tubing. Approved PE pipe may be used in exterior buried piping systems when installed by certified technicians.

Used Piping

Pipe shall be either new, or shall previously have been used for no other purpose than conveying gas.

Isolation of Underground Pipe

Underground ferrous gas piping shall be electrically isolated from the rest of the gas system with listed or approved isolation fittings installed a minimum of six inches above grade.

Unions

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.

Shutoff Valves

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 3 feet from the appliance.

Burial Depth

Steel pipe installed outside and underground shall have no less than 12 inches of cover. Plastic pipe shall have no less than 18 inches of cover.

Permits

A plumbing permit must be obtained prior to the installation, alteration or repair of a gas piping system.

Inspections of Underground Exterior Gas Pipe

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.

Inspections of Above Ground Interior Gas Pipe: All gas piping systems within buildings shall be inspected twice.

First Inspection: (referred to as a rough inspection) occurs 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.

Second Inspection: (referred to as a final inspection) consists of a pressure test and occurs after the building is completely enclosed but prior to connecting any equipment or appliances.

For projects in which the gas piping will remain exposed, both inspections would be combined into a single inspection.

Pressure Tests

All gas piping systems will be pressure tested at least once during the inspection process. It is the responsibility of the permit holder to provide and install a temporary pressure gauge and to pressurize the piping system. All gas piping systems shall be pressurized using air, CO2, or nitrogen. For most 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 incrementation.

Sizing Gas Pipe

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.

Table A
Minimum Demand of Typical Gas Appliances in BTUH and CFH

Appliance [Note 1]	BTUH	CFH
Domestic gas range	65,000	65
Domestic gas cook top	40,000	40
Domestic gas oven	25,000	25
30 gallon gas water heater	30,000	30
50 gallon gas water heater	50,000	50
Domestic clothes dryer	35,000	35
Residential fireplace gas log	25,000	25
Residential gas barbecue	50,000	50

Note 1 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 BTUH number. The tables used to size gas piping are based on Cubic Feet per Hour (CFH). To convert BTUH to CFH divide the BTUH by 1,000, which is the number of BTUHs in a single cubic foot of natural gas.

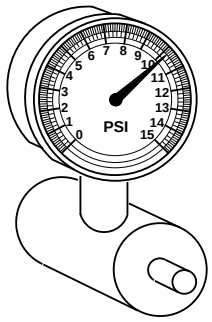

Figure B
For pressure testing gas lines use a 15 lb. gauge with 1/10 lb. increments

Example exercise for sizing gas pipe

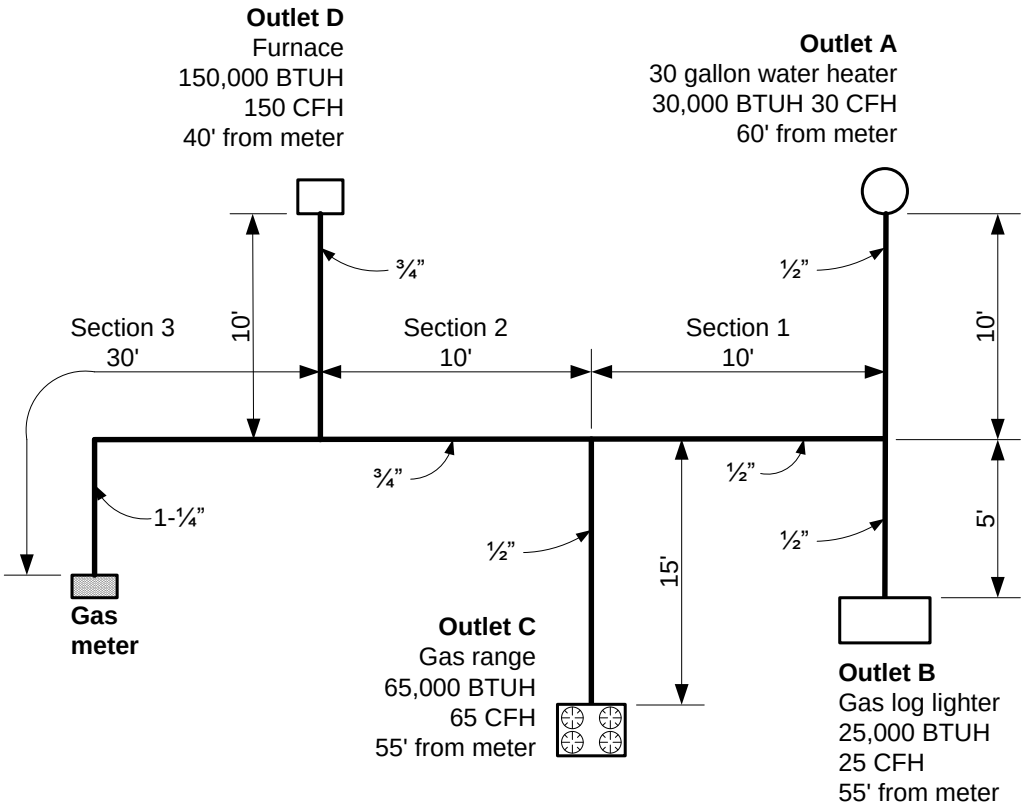

Figure C
Example Piping Layout and Appliance Demand

Example for Determining Pipe Sizes

Problem:

Determine the required pipe size of each section and outlet of the piping system shown in Figure "C." To figure the CFH (cubic feet per hour) of natural gas, divide the BTUH (British thermal units per hour) input rating of an appliance by 1,000. The type of pipe used will be Schedule 40 Metallic (Table E).

Solution:

(1) Determine the maximum input gas demand for each appliance by using Table "A" or from the actual name plate of the appliance.

(2) Determine the length of pipe from the gas meter to each outlet. If the length falls between those lengths shown on appropriate gas size piping table.
then go the the next higher column.

(3) Figure the lateral pipe sizes feeding the individual appliances
Outlet A – Use 60' column – with a demand load of 30 CFH the minimum pipe size is ½"
Outlet B – Use 60' column – with a demand load of 25 CFH the minimum pipe size is ½"
Outlet C – Use 60' column – with a demand load of 65 CFH the minimum pipe size is ½"
Outlet D – Use 40' column – with a demand load of 150 CFH the minimum pipe size is ¾"

(4) Figure the size of the main pipe which is feeding more than one appliance. Select the most remote outlet in the system which is Outlet A. It is 60' from the meter so use the 60' column. Then determine the various pipes sizes based upon the demand loads in each section of pipe.
Section 1 – Serves Outlets A and B with a total demand load of 55 CFH – minimum pipe size is ½"
Section 2 – Serves Outlets A, B and C with a total demand load of 120 CFH – minimum pipe size is ¾"
Section 3 – Serves all outlets with a total demand load of 270 CFH – minimum pipe size is 1-¼"

Table D
Schedule 40 Metallic Pipe (Black or galvanized iron pipe)
Maximum Capacity of Gas Pipe in CFH (Cubic Feet Per Hour)

From Table 12-8 of the 2007 UPC

Pipe Sizes	Distance from Meter to Most Remote Appliance in Feet on Each Branch												
	10	20	30	40	50	60	70	80	90	100	125	150	200
1/2"	172	118	95	81	72	65	60	56	52	50	44	40	34
3/4"	360	247	199	170	151	137	126	117	110	104	92	83	71
1"	678	466	374	320	284	257	237	220	207	195	173	157	134
1-1/4"	1,390	957	768	657	583	528	486	452	424	400	355	322	275
1-1/2"	2,090	1,430	1,150	985	873	791	728	677	635	600	532	482	412
2"	4,020	2,760	2,220	1,900	1,680	1,520	1,400	1,300	1,220	1,160	1,020	928	794
2-1/2"	6,400	4,400	3,530	3,020	2,680	2,430	2,230	2,080	1,950	1,840	1,630	1,480	1,270

Table E
Corrugated Stainless Steel Tubing
Maximum Capacity of Gas Pipe in CFH (Cubic Feet Per Hour)

From Table 12-19 of the 2007 UPC

Pipe Sizes	Distance from Meter to Most Remote Appliance in Feet on Each Branch												
	5	10	20	30	40	50	60	70	80	90	100	150	200
3/8"	63	44	31	25	21	19	17	16	15	14	13	10	9
1/2"	134	95	67	55	47	42	38	36	33	32	30	23	21
3/4"	270	192	137	112	97	87	80	74	69	65	62	48	44
1"	546	383	269	218	188	168	153	141	132	125	118	91	82
1-1/4"	895	639	456	374	325	292	267	248	232	219	208	171	148
1-1/2"	1,790	1,260	888	723	625	559	509	471	440	415	393	320	277
2"	4,140	2,930	2,080	1,700	1,470	1,320	1,200	1,110	1,040	983	933	762	661

Table F
Polyethylene Plastic Pipe
Maximum Capacity of Gas Pipe in CFH (Cubic Feet Per Hour)

From Table 12-25 of the 2007 UPC

Pipe Sizes	Distance from Meter to Most Remote Appliance in Feet on Each Branch												
	10	20	30	40	50	60	70	80	90	100	125	150	200
1/2"	201	138	111	95	84	76	70	65	61	58	51	46	40
3/4"	403	277	222	190	169	153	140	131	123	116	103	93	80
1"	726	499	401	343	304	276	254	236	221	209	185	168	144
1-1/4"	1,260	865	695	594	527	477	439	409	383	362	321	291	249
1-1/2"	1,900	1,310	1,050	898	796	721	663	617	579	547	485	439	376
2"	3,410	2,350	1,880	1,610	1,430	1,300	1,190	1,110	1,040	983	871	789	675