

Fuel Gas Pipe Sizing and Installation

CITY OF NEWARK, CALIFORNIA

BUILDING INSPECTION DIVISION

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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 Polyethylene plastic pipe (PE) 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. Where a minimum of 12 inches of cover cannot be provided, the pipe shall be installed in conduit or bridged (shielded). 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.

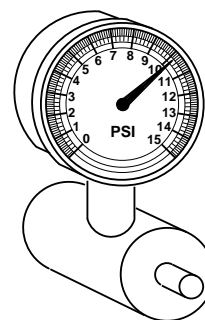


Figure B
For pressure testing gas lines use a 15 lb. gauge with 1/10 lb. increments

Example exercise for sizing gas pipe

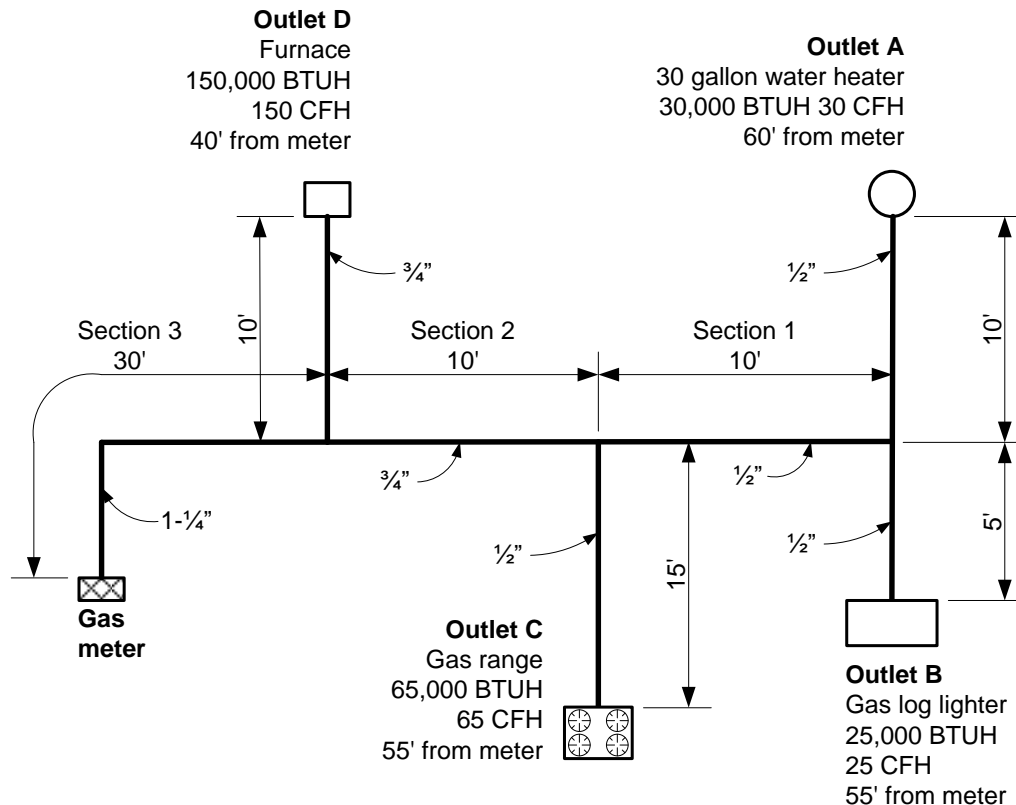


Figure C
Example Piping Layout and Appliance Demand

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 to 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 1/2"
 - Outlet B – Use 60' column – with a demand load of 25 CFH the minimum pipe size is 1/2"
 - Outlet C – Use 60' column – with a demand load of 65 CFH the minimum pipe size is 1/2"
 - Outlet D – Use 40' column – with a demand load of 150 CFH the minimum pipe size is 3/4"
- (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 1/2"
 - Section 2 – Serves Outlets A, B and C with a total demand load of 120 CFH – minimum pipe size is 3/4"
 - Section 3 – Serves all outlets with a total demand load of 270 CFH – minimum pipe size is 1-1/4"

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 |