THE CITY OF PLEASANTON

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Residential Gas Piping Sizing and Plan Submittal Guide

A plumbing trade permit is required for all new, relocated, extended, or altered gas piping systems.

This guide provides general information regarding gas permit submittal requirements, required plan information, and the proper sizing of gas piping systems. Natural gas and gas piping systems shall be designed and installed in accordance with the California Plumbing Code (CPC). Proper gas pipe sizing is critical to ensure each appliance receives the required gas volume and pressure for safe and efficient operation. Undersized gas piping can result in inadequate appliance performance, ignition failure, nuisance shutdowns, and potentially unsafe operating conditions.

Gas piping residential trade permits may be processed through our over-the-counter (OTC) review process or through the standard plan review process, depending on the project scope. Regardless of the review process, all applications, plans, and supporting documents shall be submitted electronically through the City's Accela Citizen Access (ACA) portal at **Accela Portal**.

The following are plan submittal requirements:

A cover sheet shall be provided with the following information:

- Include property owner's name, site address, phone number and Assessor's Parcel Number (APN).
- Provide the plan preparer's information on each sheet of the plans, including name, title, professional license number (if applicable), address, phone number, and signature.
- Indicate the current applicable codes and regulations in effect at the time of application (e.g., California Building Code, California Residential Code, California Electrical Code, California Plumbing Code, California Mechanical Code and City of Pleasanton Municipal Code).
- A complete scope of work describing all work which will be performed under the building permit.
- State if the dwelling is equipped with fire sprinklers.

Plan and Plumbing requirements:

- Provide a floor plan showing the location of all existing and proposed gas appliances, equipment, and gas outlets.
- Identify all gas appliances, including manufacturer, model number (if available), and BTU input rating of each connected appliance.
- Provide the location of the gas meter and point of connection to the existing gas system.
- Provide an isometric drawing showing all pipe materials, pipe sizes, developed lengths, and BTU of each connected appliance connected.
- Identify the longest developed length used for pipe sizing calculations.
- Provide manufacturer's specifications for all gas-fired appliances and equipment.
- For underground gas piping, specify pipe material, tracer wire size/type, and burial depth.
- Each appliance shall be provided with an accessible shutoff valve in accordance with the CPC.
- Gas piping systems shall be pressure tested in accordance with the CPC prior to concealment or operation of the system.

Example: Single-Family Dwelling Gas Piping Sizing Longest Length Method

Based on California Plumbing Code (CPC), Chapter 12

Purpose. This example is intended to show the type of information that may be provided on plans when sizing a single-family dwelling gas piping system using the Longest Length Method. Final gas piping design shall be based on the actual project layout, gas service pressure, appliance manufacturer input ratings, approved pipe material, and the applicable CPC chapter 12 pipe sizing tables.

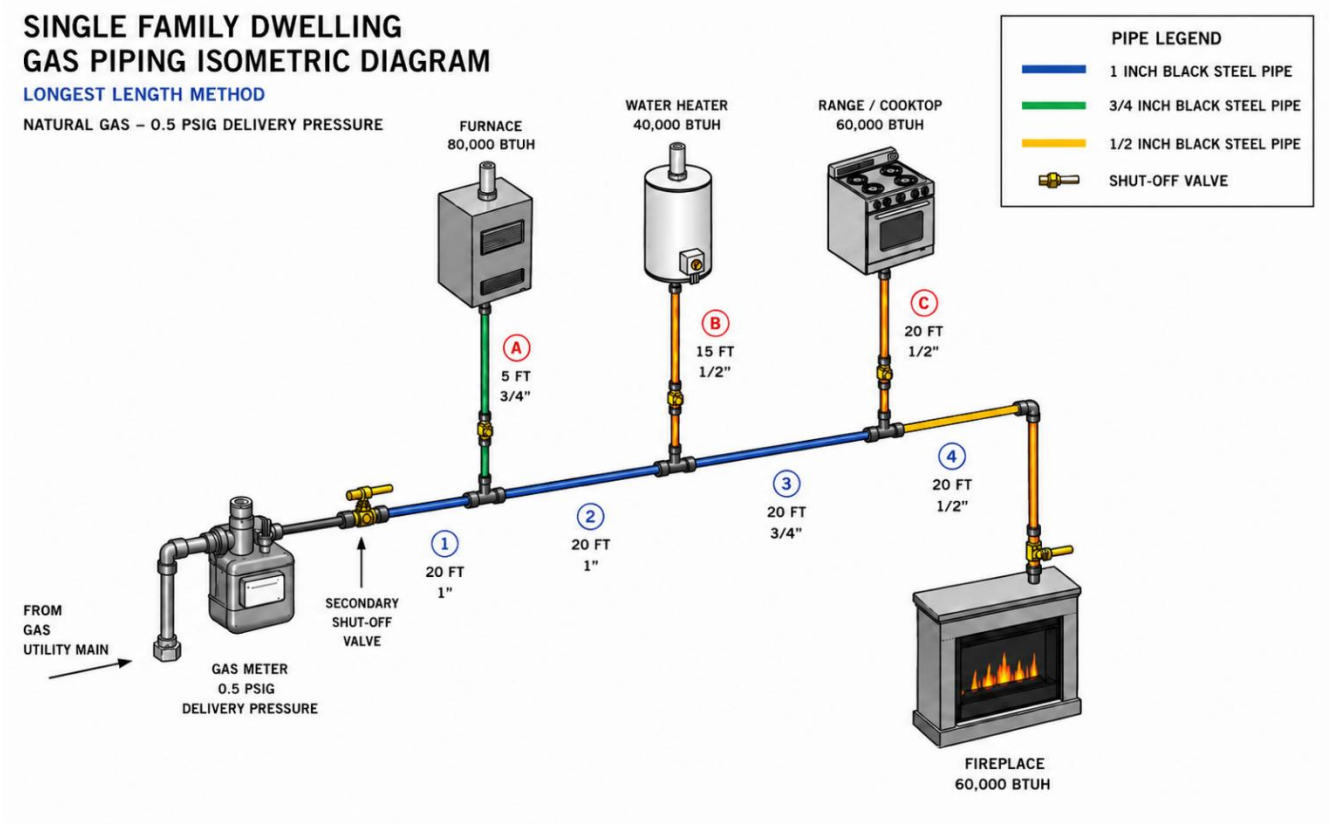
Example Assumptions

- Occupancy/use: Single-family dwelling (R-3)
- Fuel gas: Natural gas.
- Pipe material: Schedule 40 metallic pipe.
- Gas pressure: Less than 2 PSI, with a 0.5-inch water column pressure drop.
- Gas heating value used for conversion: 1,100 BTU per cubic foot. Verify with the gas utility when required.
- Sizing table used: CPC Table 1215.2(1), Natural Gas, Schedule 40 Metallic Pipe.
- Sizing method: Longest Length Method per CPC Section 1215.1.1.

The following are typical appliance input ratings (BTU/H) that may be used for gas piping sizing when manufacturer specifications are unavailable. It is strongly recommended that the actual appliance input rating be verified and provided from the manufacturer's specifications to ensure accurate gas pipe sizing and to avoid oversizing of the gas piping system

Approximate GAS APPLIANCE INPUT
(CPC Table 1208.3.1)

APPLIANCE	APPROXIMATE INPUT RATING (BTU/H)
SPACE HEATING UNITS	
Warm air furnace (Single family)	100,000
WATER HEATING APPLIANCES	
Water heater, automatic storage (30 to 40 gallon tank)	35,000
Water heater, automatic storage (50 gallon tank)	50,000
Water heater, automatic instantaneous (Capacity at 2 gallons per minute)	142,800
Water heater, automatic instantaneous (Capacity at 4 gallons per minute)	285,000
Water heater, automatic instantaneous (Capacity at 6 gallons per minute)	428,400
COOKING APPLIANCES	
Range, freestanding, domestic	65,000
Built-in oven or broiler unit, domestic	25,000
Built-in top unit, domestic	40,000
Clothes dryer, Type 1 (domestic)	35,000
Gas fireplace, direct-vent	40,000
Gas log	80,000
Barbecue	40,000



Step-by-Step: Longest Length Method

1. **Identify all gas appliances**
   List each appliance, BTU/H input rating, and location.

2. **Convert BTU/H to Cubic Feet of gas per hour (CFH)**
   Use: Appliance BTU/H ÷ 1,100 = CFH (Example: 80,000BTU ÷ 1,100 = 73 CFH.)
   - Identify appliance loads
   - Convert all appliances to Cubic Feet of gas per hour (CFH)

Appliance BTU/H rating and conversion to Cubic Feet of gas per hour (CFH) Table

Outlet	Appliance	Input Rating	Demand (CFH)
A	Furnace	80,000 BTU/H	73
B	Water Heater	40,000 BTU/H	36
C	Rang/Cooktop	60,000 BTU/H	55
D	Fireplace	60,000 BTU/H	55
	Total	240,000 BTU/H	219CFH (use 220CFH)

3. **Determine The longest outlet from the gas meter**.
Measure the longest continuous piping path from the point of delivery/gas meter to the most remote gas outlet. Include the final branch/drop to that appliance. Do not add unrelated branches. Example above: Section 1(20ft) + Section 2(20ft) + Section 3(20ft) + Section 4(20ft) = **80 feet.**

4. **Determine the gas piping design criteria.**
The following design information is necessary to determine the applicable gas sizing table within Chapter 12 of the California Plumbing Code (CPC), including delivery pressure, allowable pressure drop, gas specific gravity, and gas pipe materials. For this example, the gas piping system is based on the following design criteria. Delivery pressure of 0.5 PSI, a maximum allowable pressure drop of 0.5-inch water column, a specific gravity of 0.60, and black steel pipe (galvanized steel pipe if installed outdoors). These values are commonly used for residential natural gas systems within this area; however, applicants shall verify the actual gas system design criteria and utility delivery conditions for the specific project.

5. **Locate applicable gas-sizing table in CPC.**
Locate the proper gas sizing table based on step 4 design criteria. In this case it will be CPC chapter 12 Table 1215.2(1).

6. For longest length method, you must use the longest length value to size **ALL** main pipes and branch pipes.
The longest developed length is 80 feet; therefore, all main piping sections and branch piping sections shall be sized using only the 80-foot row of CPC Table 1215.2(1). The actual pipe section length is still shown on the isometric diagram for reference; however, the sizing values are selected exclusively from the 80-foot row.

Example:

- Branch “A” only has an actual developed length of 5 feet; however, it is still sized using the 80-foot row.
- Section “1” has an actual developed length of 20 feet; however, it is also sized using the 80-foot row.

This method simplifies the sizing process and provides a conservative design approach by sizing each pipe section based on the longest developed length within the system. This helps ensure that all pipe sections can supply the required gas demand to the connected appliance.

Portion of CPC table 1215.2(1). (For full table see chapter 12 of CPC)
(Used to illustrate long length method, for this example only 80ft row will be used)

Pipe Size				
Nominal	½	¾	1	1 ¼
Length (ft)	Capacity in Cubic Feet of Gas per Hour CFH Values			
60	65	137	257	528
70	60	126	237	486
80	56	117	220	452

Using the 80-foot row of the applicable CPC gas sizing table, locate the required CFH load for each branch pipe and select the first pipe size column that equals or exceeds the required CFH load. For main piping sections, add the total downstream CFH loads served by that section, then use the 80-foot row to select the first pipe size column that equals or exceeds the accumulated CFH load.

Pipe Sizing using CPC Table 1215.2(1)

Section	Section and Branch Load Served (CFH)	T 1215.2(1) Values Using 80ft row	Required Pipe Size
Main Lines			
1	2 + 3 + 4 + A = **220 CFH**	220 CFH	1”
2	3 + 4+ B= **146 CFH**	220 CFH	1”
3	4 + B= **110CFH**	117 CFH	¾”
4	4= **55 CFH**	56 CFH	½”
Branch Lines			
A	A= **73 CFH**	117 CFH	¾”
B	B= **36 CFH**	56 CFH	½”
C	4= **55 CFH**	56 CFH	½”

Inspection Procedures

Rough Gas Piping Inspection

- Gas piping system shall be installed per manufacture specification, properly supported and shall remain exposed at time of inspection approval.
- Underground gas piping, where applicable, shall be installed with proper burial depth, tracer wire, and pipe protection prior to concealment.
- Gas piping systems shall be pressure tested at 10 psi for a minimum of 15 minutes.
- Pressure gauges used for testing systems shall have a maximum 15 psi with 0.10 psi increments or less.

Final Inspection

- All gas appliances shall be installed, connected, and properly vented.
- Required appliance shutoff valves shall be accessible.
- Smoke alarms and carbon monoxide alarms may be verified by the inspector during the inspection, or a Smoke/Carbon Monoxide Alarm Certification Form completed and signed by the homeowner or property manager may be submitted to the Building Inspector. Smoke and carbon monoxide alarm requirements and the certification form can be found here: Smoke/Carbon Certification Form.

The example provided in this guide is intended to demonstrate one acceptable method for sizing residential gas piping systems using the Longest Length Method in accordance with the California Plumbing Code (CPC). This guide is intended for informational purposes only and does not replace the requirements of the adopted codes, manufacturer installation instructions, or utility provider requirements. Other approved gas sizing methods, engineered designs, and sizing calculations are permitted by the CPC and are accepted when properly prepared and submitted for plan review.

Applicants are encouraged to provide clear and complete plans, gas isometric diagrams, appliance specifications, and pipe sizing calculations at the time of permit submittal to help reduce plan review comments and avoid project delays. If you have questions regarding gas piping sizing, permit requirements, or plan submittal procedures, please contact the Building & Safety Division for additional assistance.

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