



**City of Auburn | Building Department**  
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## GAS LINE SCHEMATIC

TO BE PREPARED BY A CALIFORNIA LICENSED PLUMBER OR ENGINEER

According to NFPA 54 National Fuel Gas code

SITE ADDRESS: \_\_\_\_\_ PERMIT #: \_\_\_\_\_

GAS TYPE: ☐ PROPANE ☐ NATURAL GAS TOTAL BTU'S \_\_\_\_\_

SPECIFIC GRAVITY: \_\_\_\_\_ WATER COLUMN: \_\_\_\_\_

TOTAL DEVELOPED LENGTH (LONGEST RUN): \_\_\_\_\_

DESIGNER: \_\_\_\_\_

NAME: \_\_\_\_\_

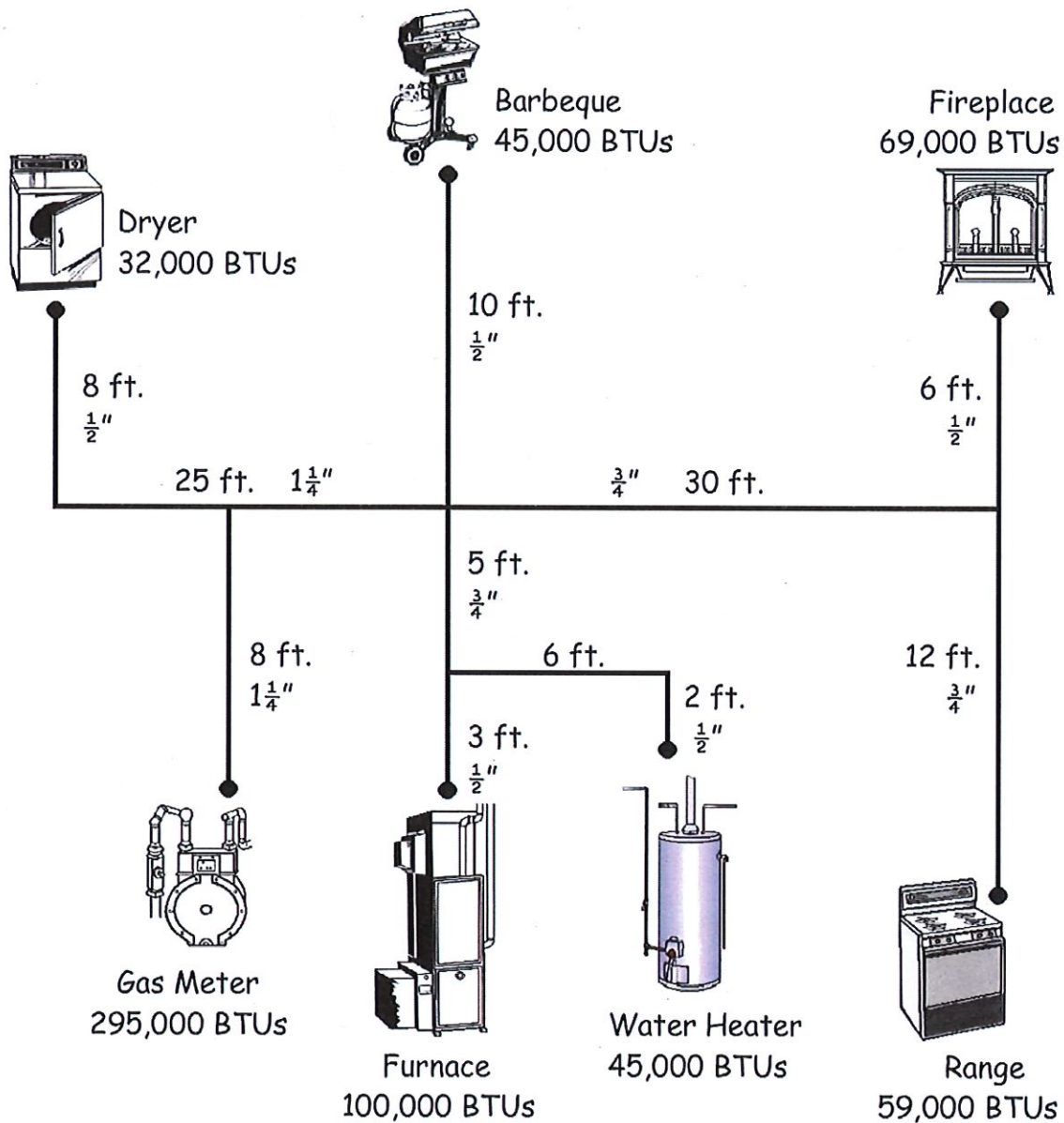
BUSINESS NAME: \_\_\_\_\_ LICENSE#: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

SHOW LINE DIAGRAM BELOW:

EXAMPLE ATTACHED

## TYPICAL GAS LINE SCHEMATIC



The total connected hourly load shall be used as the basis for piping sizing, assuming all the appliances are operating at full capacity simultaneously.

**Exception:** Sizing shall be permitted to be based upon established load diversity factors. [NFPA 54:5.4.2.3]

**TABLE 1208.4.1**  
**APPROXIMATE GAS INPUT FOR**  
**TYPICAL APPLIANCES**  
**[NFPA 54: TABLE A.5.4.2.1]**

| APPLIANCE                                       | INPUT<br>(Btu/h approx.) |
|-------------------------------------------------|--------------------------|
| <b>Space Heating Units</b>                      |                          |
| Warm air furnace                                |                          |
| Single family                                   | 100 000                  |
| Multifamily, per unit                           | 60 000                   |
| Hydronic boiler                                 |                          |
| Single family                                   | 100 000                  |
| Multifamily, per unit                           | 60 000                   |
| <b>Space and Water Heating Units</b>            |                          |
| Hydronic boiler                                 |                          |
| Single-family                                   | 120 000                  |
| Multifamily, per unit                           | 75 000                   |
| <b>Water Heating Appliances</b>                 |                          |
| 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                  |
| Capacity at 4 gallons per minute                | 285 000                  |
| Capacity at 6 gallons per minute                | 428 400                  |
| Water heater, domestic, circulating or side-arm | 35 000                   |
| <b>Cooking Appliances</b>                       |                          |
| Range, freestanding, domestic                   | 65 000                   |
| Built-in oven or broiler unit, domestic         | 25 000                   |
| Built-in top unit, domestic                     | 40 000                   |
| <b>Other Appliances</b>                         |                          |
| Refrigerator                                    | 3000                     |
| Clothes dryer, Type 1 (domestic)                | 35 000                   |
| Gas fireplace direct vent                       | 40 000                   |
| Gas log                                         | 80 000                   |
| Barbecue                                        | 40 000                   |
| Gaslight                                        | 2500                     |

For SI units: 1000 British thermal units per hour = 0.293 kW

**1208.4.2 Sizing Methods.** Gas piping shall be sized in accordance with one of the following:

- (1) Pipe sizing tables or sizing equations in this chapter.
- (2) Other approved engineering methods acceptable to the Authority Having Jurisdiction.

- (3) Sizing tables included in a listed piping system manufacturer's installation instructions. [NFPA 54:5.4.3]

**1208.4.3 Allowable Pressure Drop.** The design pressure loss in any piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, shall be such that the supply pressure at the appliance is greater than or equal to the minimum pressure required by the appliance. [NFPA 54:5.4.4]

**1208.5 Maximum Design Operating Pressure.** The maximum design operating pressure for piping systems located inside buildings shall not exceed 5 psi (34 kPa) unless one or more of the following conditions are met:

- (1) The piping system is welded.
- (2) The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation.
- (3) The piping is located inside buildings or separate areas of buildings used exclusively for one of the following:
  - (a) Industrial processing or heating
  - (b) Research
  - (c) Warehousing
  - (d) Boiler or mechanical rooms
- (4) The piping is a temporary installation for buildings under construction.
- (5) The piping serves appliances or equipment used for agricultural purposes.
- (6) The piping system is an LP-Gas piping system with a design operating pressure greater than 20 psi (138 kPa) and complies with NFPA 58. [NFPA 54:5.5.1]

**1208.5.1 LP-Gas Systems.** LP-Gas systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into a liquid. [NFPA 54:5.5.2]

**1208.6 Acceptable Piping Materials and Joining Methods.** Materials used for piping systems shall either comply with the requirements of this chapter or be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.1]

**1208.6.1 Used Materials.** Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign materials and have been ascertained to be approved for the service intended. [NFPA 54:5.6.1.2]

**1208.6.2 Other Materials.** Material not covered by the standards specifications listed herein shall meet the following criteria:

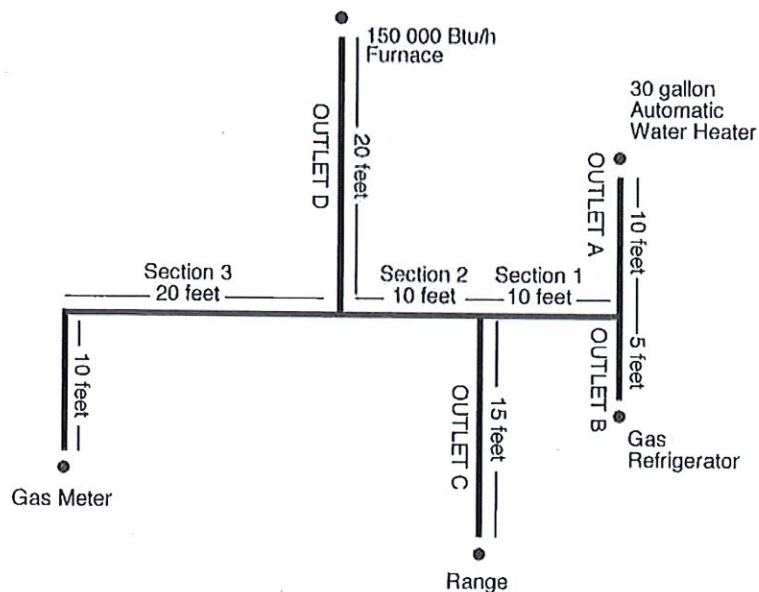
- (1) Be investigated and tested to determine that it is safe and suitable for the proposed service.
- (2) Be recommended for that service by the manufacturer.
- (3) Be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.3]



FIGURE 1215.1.1

## EXAMPLE ILLUSTRATING USE OF TABLE 1208.4.1 AND TABLE 1215.2(1)

**Problem:** Determine the required pipe size of each section and outlet of the piping system shown in Figure 1215.1.1. Gas to be used has a specific gravity of 0.60 and 1100 British thermal units (Btu) per cubic foot (0.0114 kW•h/L), delivered at 8 inch water column (1.9 kPa) pressure.



For SI units: 1 foot = 304.8 mm, 1 gallon = 3.785 L, 1000 British thermal units per hour = 0.293 kW, 1 cubic foot per hour = 0.0283 m<sup>3</sup>/h

**Solution:**

- (1) Maximum gas demand of Outlet A —

32 cubic feet per hour (0.91 m<sup>3</sup>/h) (from Table 1208.4.1).

- Maximum gas demand of Outlet B —

3 cubic feet per hour (0.08 m<sup>3</sup>/h) (from Table 1208.4.1).

- Maximum gas demand of Outlet C —

59 cubic feet per hour (1.67 m<sup>3</sup>/h) (from Table 1208.4.1).

- Maximum gas demand of Outlet D —

136 cubic feet per hour (3.85 m<sup>3</sup>/h) [150 000 Btu/hour (44 kW) divided by 1100 Btu per cubic foot (0.0114 kW•h/L)].

- (2) The length of pipe from the gas meter to the most remote outlet (Outlet A) is 60 feet (18 288 mm).

- (3) Using the length in feet column row marked 60 feet (18 288 mm) in Table 1215.2(1):

Outlet A, supplying 32 cubic feet per hour (0.91 m<sup>3</sup>/h), requires ½ of an inch (15 mm) pipe.

Section 1, supplying Outlets A and B, or 35 cubic feet per hour (0.99 m<sup>3</sup>/h) requires ½ of an inch (15 mm) pipe.

Section 2, supplying Outlets A, B, and C, or 94 cubic feet per hour (2.66 m<sup>3</sup>/h) requires ¾ of an inch (20 mm) pipe.

Section 3, supplying Outlets A, B, C, and D, or 230 cubic feet per hour (6.51 m<sup>3</sup>/h), requires 1 inch (25 mm) pipe.

- (4) Using the column marked 60 feet (18 288 mm) in Table 1215.2(1) [no column for actual length of 55 feet (16 764 mm)]:

Outlet B supplying 3 cubic feet per hour (0.08 m<sup>3</sup>/h), requires ½ of an inch (15 mm) pipe.

Outlet C, supplying 59 cubic feet per hour (1.67 m<sup>3</sup>/h), requires ½ of an inch (15 mm) pipe.

- (5) Using the column marked 60 feet (18 288 mm) in Table 1215.2(1):

Outlet D, supplying 136 cubic feet per hour (3.85 m<sup>3</sup>/h), requires ¾ of an inch (20 mm) pipe.

TABLE 1215.2(1)

|               |                                        |       |       |       |       |       |       |        | GAS:              |        | NATURAL         |         |         |         |
|---------------|----------------------------------------|-------|-------|-------|-------|-------|-------|--------|-------------------|--------|-----------------|---------|---------|---------|
|               |                                        |       |       |       |       |       |       |        | INLET PRESSURE:   |        | LESS THAN 2 psi |         |         |         |
|               |                                        |       |       |       |       |       |       |        | PRESSURE DROP:    |        | 0.5 in. w.c.    |         |         |         |
|               |                                        |       |       |       |       |       |       |        | SPECIFIC GRAVITY: |        | 0.60            |         |         |         |
|               | PIPE SIZE (Inch)                       |       |       |       |       |       |       |        |                   |        |                 |         |         |         |
| NOMINAL:      | ½                                      | ¾     | 1     | 1¼    | 1½    | 2     | 2½    | 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 (feet) | CAPACITY IN CUBIC FEET OF GAS PER HOUR |       |       |       |       |       |       |        |                   |        |                 |         |         |         |
| 10            | 172                                    | 360   | 678   | 1390  | 2090  | 4020  | 6400  | 11 300 | 23 100            | 41 800 | 67 600          | 139 000 | 252 000 | 399 000 |
| 20            | 118                                    | 247   | 466   | 957   | 1430  | 2760  | 4400  | 7780   | 15 900            | 28 700 | 46 500          | 95 500  | 173 000 | 275 000 |
| 30            | 95                                     | 199   | 374   | 768   | 1150  | 2220  | 3530  | 6250   | 12 700            | 23 000 | 37 300          | 76 700  | 139 000 | 220 000 |
| 40            | 81                                     | 170   | 320   | 657   | 985   | 1900  | 3020  | 5350   | 10 900            | 19 700 | 31 900          | 65 600  | 119 000 | 189 000 |
| 50            | 72                                     | 151   | 284   | 583   | 873   | 1680  | 2680  | 4740   | 9660              | 17 500 | 28 300          | 58 200  | 106 000 | 167 000 |
| 60            | 65                                     | 137   | 257   | 528   | 791   | 1520  | 2430  | 4290   | 8760              | 15 800 | 25 600          | 52 700  | 95 700  | 152 000 |
| 70            | 60                                     | 126   | 237   | 486   | 728   | 1400  | 2230  | 3950   | 8050              | 14 600 | 23 600          | 48 500  | 88 100  | 139 000 |
| 80            | 56                                     | 117   | 220   | 452   | 677   | 1300  | 2080  | 3670   | 7490              | 13 600 | 22 000          | 45 100  | 81 900  | 130 000 |
| 90            | 52                                     | 110   | 207   | 424   | 635   | 1220  | 1950  | 3450   | 7030              | 12 700 | 20 600          | 42 300  | 76 900  | 122 000 |
| 100           | 50                                     | 104   | 195   | 400   | 600   | 1160  | 1840  | 3260   | 6640              | 12 000 | 19 500          | 40 000  | 72 600  | 115 000 |
| 125           | 44                                     | 92    | 173   | 355   | 532   | 1020  | 1630  | 2890   | 5890              | 10 600 | 17 200          | 35 400  | 64 300  | 102 000 |
| 150           | 40                                     | 83    | 157   | 322   | 482   | 928   | 1480  | 2610   | 5330              | 9650   | 15 600          | 32 100  | 58 300  | 92 300  |
| 175           | 37                                     | 77    | 144   | 296   | 443   | 854   | 1360  | 2410   | 4910              | 8880   | 14 400          | 29 500  | 53 600  | 84 900  |
| 200           | 34                                     | 71    | 134   | 275   | 412   | 794   | 1270  | 2240   | 4560              | 8260   | 13 400          | 27 500  | 49 900  | 79 000  |
| 250           | 30                                     | 63    | 119   | 244   | 366   | 704   | 1120  | 1980   | 4050              | 7320   | 11 900          | 24 300  | 44 200  | 70 000  |
| 300           | 27                                     | 57    | 108   | 221   | 331   | 638   | 1020  | 1800   | 3670              | 6630   | 10 700          | 22 100  | 40 100  | 63 400  |
| 350           | 25                                     | 53    | 99    | 203   | 305   | 587   | 935   | 1650   | 3370              | 6100   | 9880            | 20 300  | 36 900  | 58 400  |
| 400           | 23                                     | 49    | 92    | 189   | 283   | 546   | 870   | 1540   | 3140              | 5680   | 9190            | 18 900  | 34 300  | 54 300  |
| 450           | 22                                     | 46    | 86    | 177   | 266   | 512   | 816   | 1440   | 2940              | 5330   | 8620            | 17 700  | 32 200  | 50 900  |
| 500           | 21                                     | 43    | 82    | 168   | 251   | 484   | 771   | 1360   | 2780              | 5030   | 8150            | 16 700  | 30 400  | 48 100  |
| 550           | 20                                     | 41    | 78    | 159   | 239   | 459   | 732   | 1290   | 2640              | 4780   | 7740            | 15 900  | 28 900  | 45 700  |
| 600           | 19                                     | 39    | 74    | 152   | 228   | 438   | 699   | 1240   | 2520              | 4560   | 7380            | 15 200  | 27 500  | 43 600  |
| 650           | 18                                     | 38    | 71    | 145   | 218   | 420   | 669   | 1180   | 2410              | 4360   | 7070            | 14 500  | 26 400  | 41 800  |
| 700           | 17                                     | 36    | 68    | 140   | 209   | 403   | 643   | 1140   | 2320              | 4190   | 6790            | 14 000  | 25 300  | 40 100  |
| 750           | 17                                     | 35    | 66    | 135   | 202   | 389   | 619   | 1090   | 2230              | 4040   | 6540            | 13 400  | 24 400  | 38 600  |
| 800           | 16                                     | 34    | 63    | 130   | 195   | 375   | 598   | 1060   | 2160              | 3900   | 6320            | 13 000  | 23 600  | 37 300  |
| 850           | 16                                     | 33    | 61    | 126   | 189   | 363   | 579   | 1020   | 2090              | 3780   | 6110            | 12 600  | 22 800  | 36 100  |
| 900           | 15                                     | 32    | 59    | 122   | 183   | 352   | 561   | 992    | 2020              | 3660   | 5930            | 12 200  | 22 100  | 35 000  |
| 950           | 15                                     | 31    | 58    | 118   | 178   | 342   | 545   | 963    | 1960              | 3550   | 5760            | 11 800  | 21 500  | 34 000  |
| 1000          | 14                                     | 30    | 56    | 115   | 173   | 333   | 530   | 937    | 1910              | 3460   | 5600            | 11 500  | 20 900  | 33 100  |
| 1100          | 14                                     | 28    | 53    | 109   | 164   | 316   | 503   | 890    | 1810              | 3280   | 5320            | 10 900  | 19 800  | 31 400  |
| 1200          | 13                                     | 27    | 51    | 104   | 156   | 301   | 480   | 849    | 1730              | 3130   | 5070            | 10 400  | 18 900  | 30 000  |
| 1300          | 12                                     | 26    | 49    | 100   | 150   | 289   | 460   | 813    | 1660              | 3000   | 4860            | 9980    | 18 100  | 28 700  |
| 1400          | 12                                     | 25    | 47    | 96    | 144   | 277   | 442   | 781    | 1590              | 2880   | 4670            | 9590    | 17 400  | 27 600  |
| 1500          | 11                                     | 24    | 45    | 93    | 139   | 267   | 426   | 752    | 1530              | 2780   | 4500            | 9240    | 16 800  | 26 600  |
| 1600          | 11                                     | 23    | 44    | 89    | 134   | 258   | 411   | 727    | 1480              | 2680   | 4340            | 8920    | 16 200  | 25 600  |
| 1700          | 11                                     | 22    | 42    | 86    | 130   | 250   | 398   | 703    | 1430              | 2590   | 4200            | 8630    | 15 700  | 24 800  |
| 1800          | 10                                     | 22    | 41    | 84    | 126   | 242   | 386   | 682    | 1390              | 2520   | 4070            | 8370    | 15 200  | 24 100  |
| 1900          | 10                                     | 21    | 40    | 81    | 122   | 235   | 375   | 662    | 1350              | 2440   | 3960            | 8130    | 14 800  | 23 400  |
| 2000          | NA                                     | 20    | 39    | 79    | 119   | 229   | 364   | 644    | 1310              | 2380   | 3850            | 7910    | 14 400  | 22 700  |

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m<sup>3</sup>/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

**Notes:**

<sup>1</sup> Table entries are rounded to 3 significant digits.

<sup>2</sup> NA means a flow of less than 10 ft<sup>3</sup>/h (0.283 m<sup>3</sup>/h).



» TABLE 1215.2(27)  
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3(d)]\*

|                                                                                                 |                                       |       |       |       |       | GAS: UNDILUTED PROPANE        |        |        |        |
|-------------------------------------------------------------------------------------------------|---------------------------------------|-------|-------|-------|-------|-------------------------------|--------|--------|--------|
|                                                                                                 |                                       |       |       |       |       | INLET PRESSURE: 11.0 in. w.c. |        |        |        |
|                                                                                                 |                                       |       |       |       |       | PRESSURE DROP: 0.5 in. w.c.   |        |        |        |
|                                                                                                 |                                       |       |       |       |       | SPECIFIC GRAVITY: 1.50        |        |        |        |
| INTENDED USE: PIPE SIZING BETWEEN SINGLE OR SECOND STAGE (LOW PRESSURE) REGULATOR AND APPLIANCE |                                       |       |       |       |       |                               |        |        |        |
| NOMINAL INSIDE:                                                                                 | PIPE SIZE (inch)                      |       |       |       |       |                               |        |        |        |
|                                                                                                 | ½                                     | ¾     | 1     | 1¼    | 1½    | 2                             | 2½     | 3      | 4      |
| ACTUAL:                                                                                         | 0.622                                 | 0.824 | 1.049 | 1.380 | 1.610 | 2.067                         | 2.469  | 3.068  | 4.026  |
| LENGTH (feet)                                                                                   | CAPACITY IN THOUSANDS OF BTU PER HOUR |       |       |       |       |                               |        |        |        |
| 10                                                                                              | 291                                   | 608   | 1150  | 2350  | 3520  | 6790                          | 10 800 | 19 100 | 39 000 |
| 20                                                                                              | 200                                   | 418   | 787   | 1620  | 2420  | 4660                          | 7430   | 13 100 | 26 800 |
| 30                                                                                              | 160                                   | 336   | 632   | 1300  | 1940  | 3750                          | 5970   | 10 600 | 21 500 |
| 40                                                                                              | 137                                   | 287   | 541   | 1110  | 1660  | 3210                          | 5110   | 9030   | 18 400 |
| 50                                                                                              | 122                                   | 255   | 480   | 985   | 1480  | 2840                          | 4530   | 8000   | 16 300 |
| 60                                                                                              | 110                                   | 231   | 434   | 892   | 1340  | 2570                          | 4100   | 7250   | 14 800 |
| 80                                                                                              | 101                                   | 212   | 400   | 821   | 1230  | 2370                          | 3770   | 6670   | 13 600 |
| 100                                                                                             | 94                                    | 197   | 372   | 763   | 1140  | 2200                          | 3510   | 6210   | 12 700 |
| 125                                                                                             | 89                                    | 185   | 349   | 716   | 1070  | 2070                          | 3290   | 5820   | 11 900 |
| 150                                                                                             | 84                                    | 175   | 330   | 677   | 1010  | 1950                          | 3110   | 5500   | 11 200 |
| 175                                                                                             | 74                                    | 155   | 292   | 600   | 899   | 1730                          | 2760   | 4880   | 9950   |
| 200                                                                                             | 67                                    | 140   | 265   | 543   | 814   | 1570                          | 2500   | 4420   | 9010   |
| 250                                                                                             | 62                                    | 129   | 243   | 500   | 749   | 1440                          | 2300   | 4060   | 8290   |
| 300                                                                                             | 58                                    | 120   | 227   | 465   | 697   | 1340                          | 2140   | 3780   | 7710   |
| 350                                                                                             | 51                                    | 107   | 201   | 412   | 618   | 1190                          | 1900   | 3350   | 6840   |
| 400                                                                                             | 46                                    | 97    | 182   | 373   | 560   | 1080                          | 1720   | 3040   | 6190   |
| 450                                                                                             | 42                                    | 89    | 167   | 344   | 515   | 991                           | 1580   | 2790   | 5700   |
| 500                                                                                             | 40                                    | 83    | 156   | 320   | 479   | 922                           | 1470   | 2600   | 5300   |
| 550                                                                                             | 37                                    | 78    | 146   | 300   | 449   | 865                           | 1380   | 2440   | 4970   |
| 600                                                                                             | 35                                    | 73    | 138   | 283   | 424   | 817                           | 1300   | 2300   | 4700   |
| 650                                                                                             | 33                                    | 70    | 131   | 269   | 403   | 776                           | 1240   | 2190   | 4460   |
| 700                                                                                             | 32                                    | 66    | 125   | 257   | 385   | 741                           | 1180   | 2090   | 4260   |
| 750                                                                                             | 30                                    | 64    | 120   | 246   | 368   | 709                           | 1130   | 2000   | 4080   |
| 800                                                                                             | 29                                    | 61    | 115   | 236   | 354   | 681                           | 1090   | 1920   | 3920   |
| 850                                                                                             | 28                                    | 59    | 111   | 227   | 341   | 656                           | 1050   | 1850   | 3770   |
| 900                                                                                             | 27                                    | 57    | 107   | 220   | 329   | 634                           | 1010   | 1790   | 3640   |
| 950                                                                                             | 26                                    | 55    | 104   | 213   | 319   | 613                           | 978    | 1730   | 3530   |
| 1000                                                                                            | 25                                    | 53    | 100   | 206   | 309   | 595                           | 948    | 1680   | 3420   |
| 1100                                                                                            | 25                                    | 52    | 97    | 200   | 300   | 578                           | 921    | 1630   | 3320   |
| 1200                                                                                            | 24                                    | 50    | 95    | 195   | 292   | 562                           | 895    | 1580   | 3230   |
| 1300                                                                                            | 23                                    | 48    | 90    | 185   | 277   | 534                           | 850    | 1500   | 3070   |
| 1400                                                                                            | 22                                    | 46    | 86    | 176   | 264   | 509                           | 811    | 1430   | 2930   |
| 1500                                                                                            | 21                                    | 44    | 82    | 169   | 253   | 487                           | 777    | 1370   | 2800   |
| 1600                                                                                            | 20                                    | 42    | 79    | 162   | 243   | 468                           | 746    | 1320   | 2690   |
| 1700                                                                                            | 19                                    | 40    | 76    | 156   | 234   | 451                           | 719    | 1270   | 2590   |
| 1800                                                                                            | 19                                    | 39    | 74    | 151   | 226   | 436                           | 694    | 1230   | 2500   |
| 1900                                                                                            | 18                                    | 38    | 71    | 146   | 219   | 422                           | 672    | 1190   | 2420   |
| 2000                                                                                            | 18                                    | 37    | 69    | 142   | 212   | 409                           | 652    | 1150   | 2350   |

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

\* Table entries are rounded to 3 significant digits.