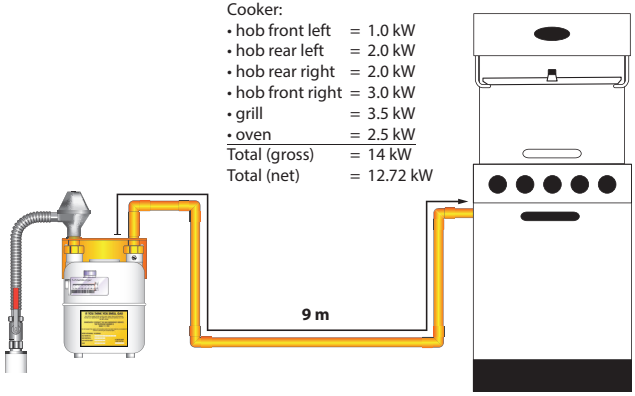
A GUIDE TO DOMESTIC PIPE SIZING (SINGLE APPLIANCE – NG)

This Pocket Guide reviews the theoretical method of calculating pipe size based on the information contained within *BS 6891* for gas pipework not exceeding 35 mm (R1 1/4). This Pocket Guide is split in to two parts: **PGG4A** deals with sizing for a single appliance and **PGG4B** deals with sizing for multiple appliances.

Gas pipework needs to be sized so that the pressure loss – frictional resistance caused by fittings and the length of the gas run – from the outlet of the meter to the appliance does not exceed 1 mbar.

With this pressure loss in mind and using the simple illustration below, the process of calculating the required minimum pipe size is a straight forward one:



A simple table is used to record the results of the calculation exercise.

1	2	3	4	5	6	7	8
Pipe section	Gas flow (m^3/hr)	Actual length (m)	Allowance for fittings (m)	Equivalent length (m)	Pipe size (mm)	Pressure loss (mbar/m)	Pressure loss total (mbar)
–	1.30	9	2	11	15	0.1414	1.55
–	1.30	9	3	12	22	0.0240	0.28

Step 1

Convert the maximum appliance heat input into a gas rate (m^3/hr) and enter into column 2 (two methods of calculation are shown) –

- (14 kW x 3.6) ÷ 38.9* (CV) = 1.30 m^3/h (rounded up), or
- (38.9 ÷ 3.6) = 10.80 ⇒ 14 kW ÷ 10.80 = 1.30 m^3/h

**The gross Calorific Value (CV) used in this Pocket Guide is 38.9 MJ/m^3.*

Step 2

Calculate the equivalent length of pipe required (this is the actual length [column 3] + an allowance for fittings & bends [column 4]; an assumption on pipe size is required here, starting with 15 mm copper [column 6]).

- 5 x 15 mm 90° elbows (see Table 1 extract)
  = 5 x 0.40 = 2 m
  = 2 m + 9 m = 11 m

Step 3

Referring to Table 2 extract, we can see that a flow rate of 1.3 m^3/h isn't tabulated, so we need to take the next available size of 1.5 m^3/h. Reading across from 1.5 and down from 15 mm we get a pressure loss per meter of pipe of 0.1414 [column 7].

Step 4

Multiply our equivalent length [column 5] by our pressure loss [column 7] provides our total loss of 1.55 mbar, which exceeds our design tolerance of 1 mbar. If we re-work the calculation using 22 mm copper (note the differing equivalent length at this size), we get a pressure loss of 0.28 mbar, well within our tolerance, which also allows for future alterations/additions.

Table 1. Extract of Table A.5 of *BS 6891*

Nominal pipe size	Equivalent length (m)				
	Bends		Fittings		
Copper (mm)	45°	90°	90° Elbow	Tee* (gas entering fitting from branch)	Tee* (gas leaving fitting into branch)
15	0.15	0.20	0.40	0.75	1.20
22	0.20	0.30	0.60	1.20	1.80
28	0.25	0.40	0.80	1.50	2.30
35	0.30	0.50	1.00	2.00	3.00
* Use the largest connection size on the fitting (if not equal)					

Table 2. Extract of Table A.1 of *BS 6891*

Flow rate (m^3h^{-1})	Heat input (KW)		Nominal pipe size - mm/R (assumed ID)					
	Gross	Net	8 (6)	10 (8)	12 (10)	15 (13)	22 (19)	
0.25	2.70	2.46	0.2675	0.0710	0.0255	0.0077	0.0014	
0.50	5.40	4.91	0.8348	0.2188	0.0777	0.0231	0.0040	
0.75	8.10	7.37		0.4285	0.1514	0.0447	0.0077	
1.00	10.81	9.82		0.6940	0.2444	0.0719	0.0123	
1.25	13.51	12.28			0.3553	0.1042	0.0178	
1.50	16.21	14.73			0.4833	0.1414	0.0240	