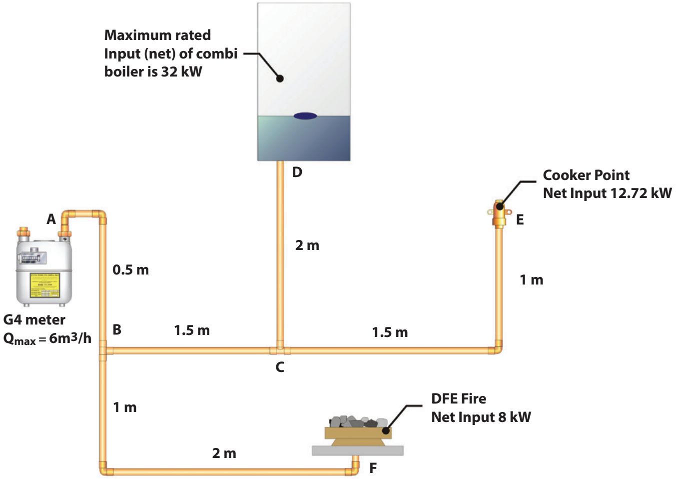
A GUIDE TO DOMESTIC PIPE SIZING (MULTIPLE APPLIANCES – NG)

This Pocket Guide **needs to be read in conjunction with PGG4(A).**

WHEN THE INSTALLATION consists of multiple appliances, the sizing exercise becomes slightly more involved. We still need to maintain our maximum pressure loss of 1.0 mbar (the table below, as with PGG 4A, is used to record the results of the exercise):



1	2	3	4	5	6	7	8
Pipe Section	Gas Flow (m³/hr)	Actual Length (m)	Allowance for fittings (m)	Equivalent Length (m)	Pipe Size (mm)	Pressure Loss (mbar/m)	Pressure Loss Total (mbar)
A-B	5.37	0.5	2 x 0.80	2.1	28	0.0593	0.13
B-C	4.56	1.5	2.3	3.8	22	0.1681	0.69
B-C	4.56	1.5	2.3	3.8	28	0.0462	0.18
C-D	3.26	2	1.8	3.8	22	0.0998	0.38
C-E	1.30	2.5	0.4	2.9	15	0.1414	0.41
B-F	0.82	3.0	2 x 0.40	3.8	15	0.0719	0.28

Step 1

As before in **PGG4(A)** we need to convert our maximum heat input into a gas rate (m³/h), but this time we have 3 x appliances to consider (not taking diversity into account) plus their heat inputs are expressed in net, which will need converting to gross as the Calorific Value (CV)* is a gross value.

**The gross CV used in this Pocket Guide is 38.9 MJ/m³.*

Throughout the remainder of the steps in this Pocket Guide, section A-B will be used to demonstrate the principles, but each pipe section in turn, in each step, should be calculated as shown in the table above.

A-B supplies the full gas load (boiler, cooker and fire), B-C supplies the boiler and cooker and B-F supplies the fire only.

- A-B = 52.72 kW (net) x 1.1 (conversion factor for NG) = 58 kW (gross) (58 kW x 3.6) ÷ 38.9 MJ/m^3 (used in Table 2 extract) = 5.37 m^3/h (rounded up) entered into column 2

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, therefore 28 mm copper for Section A-B is used [column 6]).

- A-B has 2 x 90° elbows (the Tee will be factored into B-C) (see Table 1 extract on **PGG4(A)**) = (2 x 0.80) + 0.5 m = 2.1 m

Step 3

Referring to Table 2 extract, a flow rate of 5.37 m^3/h isn't tabulated, so we need to take the next available size of 5.50 m^3/h. Reading across from 5.50 and down from 28 mm we get a pressure loss per meter of pipe of 0.0593 [column 7].

Step 4

Multiplying our equivalent length [column 5] by our pressure loss [column 7] provides our total theoretical pressure loss for that section; A-B has a pressure loss of 0.13 mbar.

Step 5

A run (i.e. from the meter outlet to the appliance) shouldn't exceed our 1 mbar pressure loss, so if we look at sections A-B-C-D we see a pressure loss of: 0.13 + 0.69 + 0.38 giving a total pressure loss for the run of 1.20 mbar, which is unacceptable.

If we increase section B-C to 28 mm copper (highlighted row on our table), our pressure loss per metre and therefore, our total pressure loss would be reduced to:

- 0.0462 (not shown in Table 2 extract) x 3.8 m = 0.18 mbar

If we now re-look at A-B-C-D, we see that our pressure loss for the run is: 0.13 + 0.69 + 0.18 = 1.0 mbar, which is acceptable (note that C-D would also require to be recalculated as the Tee has increased to 28 mm, not shown).

We can also confirm the remaining 2 x runs as being acceptable:

- A-B-C-E = 0.13 + 0.18 + 0.41 = 0.72 mbar
- A-B-F = 0.13 + 0.28 = 0.41 mbar.

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)	28 (25)
0.25	2.70	2.46	0.2675	0.0710	0.0255	0.0077	0.0014	0.0004
5.50	59.43	54.03					0.2162	0.0593
5.75	62.13	56.48					0.2334	0.0640