Parallel Gas Pipe Loops: Flow Split and Equivalent Diameter

Flow through each of two parallel gas pipe loops of different length and bore, and the equivalent single-pipe diameter, from the general flow equation.

Method: Menon; Gas Pipeline Hydraulics (CRC Press, 2005); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Total flow (any basis)	2,831,685	m³/d
Length of loop 1	38.624	km
Inside diameter of loop 1	342.90	mm
Length of loop 2	25.750	km
Inside diameter of loop 2	311.15	mm

Calculated results

Parameter	Value	Unit
Flow through loop 1	1,444,281	m³/d
Flow through loop 2	1,387,404	m³/d
Equivalent diameter over length L_1	448.87	mm

Notes for this case

- Both loops start and end at the same points, so they share the pressure drop; the same transmission factor and gas temperature are assumed in both.

Formula and method

$$\frac{Q_1}{Q_2} = \left(\frac{L_2}{L_1}\right)^{0.5} \left(\frac{D_1}{D_2}\right)^{2.5}, \quad D_e = D_1 \left(\frac{Q}{Q_1}\right)^{0.4}$$

Variables

Q	Total flow (any basis)	m³/s
L_1	Length of loop 1	m
D_1	Inside diameter of loop 1	m
L_2	Length of loop 2	m
D_2	Inside diameter of loop 2	m
Q_1	Flow through loop 1	m³/s
Q_2	Flow through loop 2	m³/s
D_e	Equivalent diameter over length L_1	m

Method and standards

Equal pressure drop in both loops.

Assumptions and limits

- Same F and temperature in both loops.

References

- Menon
- Gas Pipeline Hydraulics (CRC Press, 2005)
- ch. 3.7
- eqs. 3.10–3.17

Report details

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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/oil-gas/gas-pipeline-parallel-loops

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.