

Intake and Exhaust Port Sizing of Equiv. Circular Diameter

Assumptions:

The calculation is performed based on a simple slug flow model. The ports are sized for the RPM at the horse power peak. For "horse power" applications the exhaust is sized to give 80% the flow rate of the intake; ie. The velocity increases by 125%.

Inputs:

	No constraints		45mm intake size
intake port velocity (vmax):	100	m/s	100
exhaust to intake velocity ratio:	1.25		1.25
RPM at HP peak:	5750		5750
RPM at peak torque	4250		4250
Mean Piston Speed at HP peak:	15.1	m/s	15.1
Bore diameter:	100	mm	100
Stroke:	78.9	mm	78.9
Air charge temperature	110	F	110
Above in degrees Rankin	570	deg R	570
Compression ratio	8		8

Calculations:

Cylinder volume:	619.6792	cc	619.6792
	0.619679	L	0.619679
	0.00062	m ³	0.00062
Time for Intake stroke:	0.005217	s	0.005217
Average vol. flow rate during intake stroke	0.118772	m ³ /s	0.118772

2 Valve

Intake port cross sectional area at vmax:	0.001188	m ²	0.001227
	11.87718	cm ²	12.26895
Intake port equiv circular diameter:	3.888766	cm	3.952381
Intake valve size	44.33204	mm	45
Exhaust port equiv. circular diameter:	3.478218	cm	3.478218
Intake port equiv circular diameter:	1.53	inches	1.56
Exhaust port equiv. circular diameter:	1.37	inches	1.37
Compression Ratio	8		8

Engine quarter revolutions	283.3333	1/s	283.3333
Speed of sound	345.9769	m/s	345.9769
	1134.804	ft/sec	1134.804
	13617.65	in/sec	13617.65

Resonant tuned length	40.71819 cm	45.01176	42.06128 cm	46.49647
Assumes Helmholtz resonance	16.03078 inches	17.72116	16.55956 inches	18.3057