

Diverging section of C-D nozzle

cp		0.24 Btu/lbm-R
	1	778.17 ft-lbf/Btu
	1	32.17 lbm-ft/lbf-sec ²
R		53.35 ft-lbf/lbm-R
k		1.4 <- for air

To		560 R
P1		14.028 psi
A1		2.4093 in ²
P2		54.233 psi
A2		3.9389 in ²
V2		456.233 ft/sec

T*		355.0064 R
V*		923.6159 ft/sec

$$AP/A^*Po = (A/A^*)(P/Po)$$

$$[PoA^*] = \text{constant}$$

Using V2, we can see if Po is a constant

T2		542.68 R
T2/To		0.96911 -> isentropic, B2, M = 0.39920
M2		0.3995

I will use the T2/To value of M

M2		0.39920
A2P2/A*Po		1.427
A*Po		149.69 lbf
P2/Po2		0.89601
Po2		60.527 psi

A1P1/A*Po		0.22578
M1		1.9372
P1/Po1		0.14088
Po1		99.574 psi
A1/A*1		1.6026
A*1		1.5034 in ²

Because M1 is supersonic and M2 is subsonic, a shock must have happened also, there is a drop in Po

$$[PoA^*]_x = [PoA^*]_y$$

Pox 99.574 psi

Poy 60.527 psi

A*x 1.5034 in²

Poy/Pox 0.60786

Ty/Tx 1.8967

Py/Px 5.7125

Mx 2.2448

Ax/A*x 2.0867

Ax 3.1371 in²

$$S_y - S_x = R \ln \left[\frac{(T_y/T_x)^{k/(k-1)}}{(P_y/P_x)} \right]$$

Sy - Sx 26.555 ft-lbf/lbm-R

854.27 ft²/sec²-R

Po in the converging nozzle is equal to the pre-shock Po, Pox

Po 99.574