3. If the engine is choked at the primary and secondary nozzles, then

$$\dot{m}_8 = \frac{\Gamma}{\sqrt{R}} \frac{A_8 P_{t8}}{\sqrt{T_{t8}}} = \dot{m}_c$$

$$\dot{m}_{8'} = \frac{\Gamma}{\sqrt{R}} \frac{A_{8'} P_{t8'}}{\sqrt{T_{t8'}}} = \dot{m}_F$$

where

$$\Gamma = \sqrt{\gamma} \left(\frac{2}{\gamma+1} \right)^{\frac{\gamma+1}{2(\gamma-1)}}$$

Then:

$$\dot{m}_c = \frac{\Gamma}{\sqrt{R}} A_8 \frac{\pi_n \pi_t \pi_b \pi_c \pi_d \pi_r P_0}{\sqrt{\gamma_n T_t \gamma_\lambda T_0}}$$

$$\boxed{\dot{m}_c = \frac{\Gamma}{\sqrt{R}} \frac{\pi_t \pi_c \pi_r}{\sqrt{\gamma_t \gamma_\lambda}} \frac{P_0}{\sqrt{T_0}} A_8}$$

and

$$\dot{m}_F = \frac{\Gamma}{\sqrt{R}} A_{8'} \frac{\pi_{n'} \pi_{c'} \pi_d \pi_r P_0}{\sqrt{\gamma_{n'} T_{c'} \gamma_d T_r T_0}}$$