

Definition of Jet fan efficiency according to ISO 13350

$$\eta = \dot{V} * \Delta p / P_{el} \quad [m^3/s] * [Pa] / [W] = [m^3/s] * \left[\frac{kg}{m*s^2} \right] / \left[\frac{kg*m^2}{s^3} \right] = [1]$$

and

$$\Delta p = \frac{1}{2} * \rho * v^2 \quad [Pa]$$

$$\dot{V} = v * A \quad [m^3/s] = [m/s * m^2]$$

$$T = A * \rho * v^2 \quad [N] = [m^2 * kg/m^3 * m^2/s^2] = [kg * m/s^2]$$

$$v = \sqrt{\frac{T}{A*\rho}} \quad [m/s]$$

$$\eta = \dot{V} * \Delta p / P_{el} = v * A * \frac{1}{2} * \rho * v^2 / P_{el} = \sqrt{\frac{T}{A*\rho}} * A * \frac{1}{2} * \rho * \frac{T}{A*\rho} / P_{el} =$$

$$\frac{1}{2} * \frac{T}{P_{el}} * \sqrt{\frac{T}{A*\rho}} \quad [1]$$

Where:

η = Efficiency

\dot{V} = Volume flow rate [m³/s]

Δp = Pressure increase [Pa] = $\left[\frac{kg}{m*s^2} \right] = [N/m^2]$

P_{el} = Power (electrical) [W] = $\left[\frac{kg*m^2}{s^3} \right]$

ρ = Density [$\frac{kg}{m^3}$]

v = Velocity [m/s]

A = Area [m²]

T = Thrust [N] = $\left[\frac{kg*m}{s^2} \right]$