FAN LAWS

	RPM CHANGE	AIR DENSITY CHANGE
FLOW RATE	$Q_2 = Q_1\left(\frac{n_2}{n_1}\right)$	**CONSTANT**
PRESSURE	$P_2 = P_1\left(\frac{n_2}{n_1}\right)^2$	$P_2 = P_1\left(\frac{d_2}{d_1}\right)$
POWER	$N_2 = N_1\left(\frac{n_2}{n_1}\right)^3$	$N_2 = N_1\left(\frac{d_2}{d_1}\right)$

1: Present Condition 2: New Condition

BASIC FORMULAE

$P_t = P_{st} + P_{dy}$
$V = \frac{Q}{A}$ (m/sn) Q:m^3/s A:m^2
$P_{dy} = \left(\frac{V}{4{,}42}\right)^2 \times d$ (mmSS) V:m/s d:kg/m^3
$N_{fan} = \frac{Q.P_t}{270000.\eta_t}$ (HP)
Output: $\eta = \frac{N_{fan}}{N_{reted}}$

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FAN LAWS

3 Rated Power for Phase Motors= $\frac{V \times I \times P_f \times \eta_m \times \sqrt{3}}{1000}$ (kW)	**3 Effective Power for Phase Motors=** $\frac{V \times I \times P_f \times \sqrt{3}}{1000}$ (kW)
1 Rated Power for Phase Motors= $\frac{V \times I \times P_f \times \eta_m}{1000}$ (kW)	**1 Effective Power for Phase Motors=** $\frac{V \times I \times P_f}{1000}$ (kW)

*Active power is the one which the motor draws from the network and the rated power is the mechanical one in the motor shaft due to losses.

We can calculate the diameter of a duct with a rectangular cross-section (axb) equal to that of a channel with a circular cross-section with the same friction loss and volumetric capacity by the following formula.

D=1.265 $\sqrt[5]{\frac{(a \times b)^3}{a+b}}$ (mm) a:mm

b:mm

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