halifax fan

FAN LAWS

FAN LAWS CAN APPLY TO ANY RANGE OF FANS OF GEOMETRIC SIMILARITY

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FOR CONSTANT FAN SIZE & DENSITY

I. Volume varies directly as the speed ratio: -	$V_2 = V_1$	$\left(\frac{N_2}{N_1}\right)$
II. Pressure varies as the square of the speed ratio: -	$P_2 = P_1$	$\left(\frac{N_2}{N_1}\right)^2$
III. Power Varies as the cube of the speed ratio: -	$kW_2 = kW_1$	$\left(\frac{N_2}{N_1}\right)^3$

FOR CONSTANT FAN SPEED & DENSITY

I. Volume varies as the cube of the ratio of fan sizes: -	$V_2 = V_1$	$\left(\frac{D_2}{D_1}\right)^3$
II. Pressure varies as the square of the ratio of fan size: -	$P_2 = P_1$	$\left(\frac{D_2}{D_1}\right)^2$
III. Power varies as the fifth power of the ratio of fan sizes: -	$kW_2 = kW_1$	$\left(\frac{D_2}{D_1}\right)^5$

FOR CONSTANT SIZE, SPEED & VOLUME

I. Pressure varies directly as the ratio of densities: -	$P_2 = P_1$	$\left(\frac{\rho_2}{\rho_1}\right)$
II. Power varies directly as the ratio of densities: -	$kW_2 = kW_1$	$\left(\frac{\rho_2}{\rho_1}\right)$
DENSITY CONVERSION FOR A GIVEN TEMPERATURE: - Where: ρ_1 is density at t_1ºC and ρ_2 is density at t_2ºC	$\rho_2 = \rho_1$	$\left(\frac{273 + t_1}{273 + t_2}\right)$

KEY

Volume = V

Pressure = P

Temperature = t

Fan size = D

Standard atmospheric pressure = 1.01325 bar

Standard air temp/density = 20ºC / 1.2kg/m³

Power absorbed = kW

Air density = ρ

Fan speed = N