NOMENCLATURES

A_1 = Impeller inlet area
A_2 = Impeller outlet area
AF = Airfoil backward curved
A_s = Area of shroud
A_v = Area of volute throat
BC = Backward curved
BI = Backward inclined
b_1 = Impeller inlet blade width
b_{1max} = Maximum width at impeller inlet
b_2 = Impeller outlet blade width
b_3 = Volute width
C_D = Discharge coefficient ≈ 0.5
cfm = Flow rate in cubic feet per minute
d_1 = Blade inside diameter
d_{1min} = Minimum impeller inlet diameter
d_2 = Impeller outside diameter or wheel diameter
d_3 = Volute tongue diameter
$d_{eye} = d_S$ = Eye or shroud diameter
FC = Forward curved
FRP = Fiberglass reinforced plastic.
f = Friction factor ≈ 0.005
g = Gravitational constant
HVAC = Heating Ventilating and Air Conditioning Applications
H_{ideal} = Ideal head according to Euler equation
H = Equivalent head
K_i = Loss factor ≈ 0.5 to 0.8 ≈ 0.15 to 0.25
K_{ii} = Loss factor ≈ 0.2-0.3 (for BC, BI design)
K_{iii} = Loss factor ≈ 0.4 (at design point)
N_S = Specific speed
N = blower speed in RPM
P_S = Static pressure
ΔP_{entry} = Pressure loss at impeller entry
$\Delta P_{passage}$ = Pressure loss in impeller blade passages
ΔP_{casing} = Pressure loss in casing due to turbulence and friction
$p = P_{St}$ = Fan total pressure
P_r = Pressure ratio
ΔP_{total} = Total pressure loss
P_{disc} = Power loss due to disc friction
P = Power required to run the blower
Q = Volume flow rate
Q_L = Leakage across impeller inlet and casing
Q_v = Volute exit flow rate
RT = Radial tipped

RB = Radial blade
r_2 = Impeller outlet radius
r_3 = Volute tongue radius
r_θ = Volute radius at various angles from tongue
RPM = Revolutions per minute
R = Gas constant = 287
T = Temperature
U_1 = Blade peripheral velocity at inlet
U_2 = Outlet blade velocity
V_1 = Absolute velocity at impeller inlet
V_2 = Absolute velocity at impeller outlet
V_2' = Actual absolute exit velocity
V_3 = Average volute velocity
V_{eye} = Velocity at impeller eye
$V_{m1} = V_{r1}$ = Meridional velocity component at inlet
$V_{m2} = V_{r2}$ = Meridional velocity component at outlet
V_{r2} = Radial component of outlet velocity
V_{u2} = Tangential component of outlet velocity
V_{u2}' = Actual exit velocity peripheral component due to slip
WC = Head of water column
W_1 = Relative velocity at impeller inlet
W_2 = Relative velocity at impeller outlet
W_2' = Actual relative velocity
Z = Number of blades
α_2' = Actual air exit angle
β_1 = Blade angle at impeller inlet
β_2 = Blade angle at impeller outlet
β_2' = Actual blade exit angle
2δ = Volute taper angle
δ = Radial clearance between impeller inlet and casing
ρ = Air density
τ = Torque due to disk friction
ω = Rotational velocity
μ = Slip factor
η_t = Total efficiency
η_v = Volumetric efficiency
η_h = Hydraulic efficiency
ϕ = Flow coefficient
ψ = Head coefficient
ϵ = Diameter ratio
ϵ_{limit} = Limiting diameter ratio
γ = Ratio of specific heats = 1.4