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List of Symbols and Abbreviations

a = Amplitude

A = cross sectional area of drying bin

Ar = dimensionless number known as the Archimedes number

ANOVA= Analysis of variance

$B_{im=}$ Biot mass transfer number

B_{ih}= Biot heat transfer number

C= spring index i.e. D_h /d_h

CCRD = Central Composite Rotatable Design

C.V. = Coefficient of Variation,

CI= confidence interval

db= Dry basis

d_e = Equivalent diameter of particle

d_h = Wire diameter, mm

D = Internal diameter of the duct, m

D = diameter of drying bin

D_0 = effective diffusion coefficient at M_o, m^2/s

D_{AB} = diffusion of gas A into B (for water-air system, $0.288x10^{-4}$ m^2/s at 42°C), m^2/s

DC = Direct current

D_{eff} = effective Moisture diffusivity

$(D_{eff-)\ Avg}$ = average moisture diffusivity in m^2/s.

D_h= Mean coil diameter, mm

DP = drying performance (g of water evaporated / J of supplied energy)

D_p = Equivalent diameter of the paddy grain,

DF= Degrees of freedom

EMC= Equilibrium moisture content

FAO =Food and Agricultural Organization

g = Acceleration due to gravity

G_a = Mass flow rate of the air, kg/s

G= Modulus of rigidity, N/mm^2

h` = convective heat transfer coefficients, kcal m^{-2} °$C^{-1}h^{-1}$

h_D=Convective mass transfer coefficient, kg $h^{-1}m^{-2}$

h_2 = energy consumed by motor, kJ

H= Height of drying bin

ho= Bed depth

i = initial,

I= Specific vibration power or vibration intensity

k = drying constant, sec^{-1} or h^{-1}

k'_c = Equimolar countercurrent mass transfer coefficient, m/s

L = Latent heat of vapourization, kJ/kg

L = Length of the grain bed (depth)

LSU =Louisiana State University

LOF Lack of fit.

M = moisture content, % wet basis

M = moisture content, dry basis

M_0 = initial moisture content, dry basis

M_d = equilibrium moisture content, dry basis

MR= moisture ratio

$\overline{M}$ = moisture content of grain, % db

N = Revolution per minute of the motor

N_t =Number of turns

N_{Sc}= Schmidt number, $\mu / \rho D_{AB}$ dimensionless

NMR Nuclear Magnetic Resonance

P = Axial force, N

P = vapour pressure, kg/cm^2

P_m = power of the motor, kW

$P_{v\,wb}$ = saturated vapour pressure at the wet bulb temperature

P_v = partial pre ssure of water vapour in ambient air, kPa

Prob = Probability

PRESS=Predicted Residual Error Sum of Squares

Q = power input

Q_a = Sensible heat gained by air,

Q_a = enthalpy of hot drying air, kJ/ s

r = particle co-ordinate,

r_o = particle diameter

r = diffusion path or length,m

r = radius of a small cylindrical segment

r= radius of sphere, m

R = universal gas constant, 8.314 J/ mole

Re_{mf} = Reynolds number at incipient fluidization,

RH = Relative humidity

s = Specific surface area of the grain mass

S_{ut} =Ultimate tensile strength, N/mm^2

Tc= Absolute temperature

T = Drying air temperature, ^{0} C

T_{wb} = wet bulb temperature

T_{abs} = Absolute temperature

T = absolute temperature, K

ΔT = Temperature rise of drying air

μm= micro meter

$U_{mf=}$ minimum fluidization velocity

$U_{mvf\ =}$ velocity of incipient vibro- fluidization

V = volume of the body m^3

V = Mean velocity of air, m/s

V_o = Superficial air velocity, m/s

VIF =Variance Inflation Factor

wb= wet basis

w = absolute humidity of air, kg water/ kg dry air

θ= Time

Ø = Time

Γ= dimensionless trajectory parameter

ω =Angular velocity

ΓVFB= extended trajectory parameter

μ = viscosity of air, Pa.s

ρ = Density of air, Kg/m^3

η = efficiency of electrical heaters

η=The energy efficiency

η_o = overall efficiency of blower and motor

ε = Porosity of the grain bed

ρ_f = density of drying fluid

ρ_p = Particle density of the parboiled paddy

ρ = Density of fluid (air) = 1.298 kg/m^3

ϕ_s = Sphericity of grain

τ_1 = Torsional shear stress, N/mm^2

τ_2 = Direct shear stress, N/mm^2

τ = Resultant shear stress, N/mm^2

δ = Axial defection of the spring, mm

τ_d = Standard the permissible shear stress =$0.5S_{ut}$

θ = product temperature, °C