Frictional Force

for **CSP trainings**, please contact : **Vishnu Rajendran** (CMIOSH, CSP, IDIP NEBOSH)
+91 6282809443

$F = \mu N$

μ = Coefficient of friction

N = Normal force (weight on horizontal surface)

Specific Gravity

$$SG = \frac{\text{Density of Substance}}{\text{Density of water}}$$

Absolute Temperature Scale

$$760\ \text{mm Hg} = 1\ \text{atm} = 14.7\ \text{psi}$$

Normal Temperature

25 C = 77 F = 298 K = 537 R

Time Weighted Average

$$\frac{T_1C1 + T2C2 + \cdots + TnCn}{T_1 + T_2 + \cdots Tn}$$

T = Sampling time

C = Concentration

Atomic Number

The number of protons in the nucleus defines the element

Prefix pico-

$1/1,000,000,000,000 = 0.000000000001$

$= 10^{-12}$ as in picometer (pm)

Hertz (Hz)

Per second = sec^{-1} = 1/sec

Liters in a $meter^3$

1000

Electron

Negatively charged subatomic particle orbiting the nucleus of an atom

BOYLE'S Law

P1V1 = P2V2

At constant temperature(Kelvin or Rankine)

and Pressure is absolute

Noise Reduction Calculation

$$NR = \frac{12.6P\alpha^{1.4}}{A}$$

Terms and Units

NR = noise reduction (dB/ft)

P = perimeter of duct (in)

α = absorption coefficient of the lining material at frequency of interest

A = cross-sectional area of duct (in^2)

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Used to predict noise reduction resulting when ducts are lined with acoustical material.

Sound Intensity to Decibels

$$L_I = 10 \log \frac{I}{I_0} \, dB$$

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Terms and Units

L_1 = sound pressure level (dB)

I = sound intensity (W/m^2)

I_0 = reference sound intensity (10^{-12} W/m^2)

~

Used to measure sound pressure level, using a measured sound intensity and corresponding reference intensity.

Noise Allowable Time Calculation

$$T = \frac{8}{2^{\left[\frac{L-90}{5}\right]}}$$

Terms and Units

T = allowed exposure time (hours)

L = TWA exposure (dBA)

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Used to determine allowed noise exposure time based on a predefined exposure limit.

Noise Inverse Square Law

$$dB_1 = dB_0 + 20 \log \frac{d_0}{d_1}$$

Terms and Units

dB_0 = noise level at distance d_0 (dB)

dB_1 = noise level at distance d_1 (dB)

d_0, d_1 = distance

(any consistent units, e.g. m)

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Used to demonstrate the relationship between noise level and distance, an inverse square.

Noise Dose

$$D = 100\left[\sum_{i=1}^{N} \frac{C_i}{T_i}\right]$$

Terms and Units

$\%D$ = noise dose in percent

$C_{1 \ldots i}$ = exposure duration of i^{th} sound level (hr)

$T_{1 \ldots i}$ = corresponding allowed noise exposure duration

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Used to calculate the percent noise dose based on samples taken over the course of the work period, compared with the corresponding allowed noise exposure duration.

Pascals to Decibels

$$L_p = 20 \log \frac{P}{P_0}$$

Terms and Units

L_p = sound pressure level (dB)

P = measured sound level (Pa)

P_0 = reference sound pressure ($20x10^{-6}$ Pa)

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Used to calculate sound pressure level, based on measured sound pressure and a reference pressure of the same unit.

Radiation
Inverse Square Law

$$I_2 = I_1 \frac{(d_1)^2}{(d_2)^2}$$

Terms and Units

I_1 = radiation intensity at distance d_1

I_2 = radiation intensity at distance d_2

d_1, d_2 = distance from source (cm)

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Used to describe how radiation intensity changes as distance from a point source increases or decreases.

$$1 \text{ radian} = \frac{180^{\circ}}{\pi}$$

Terms and Units

radian = an angular measurement term (rad)

180° = number of degrees in one-half circle

π = the constant, pi (3.14159)

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Used to describe the relationship between radian, angular measurement and degrees.

$$P = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$$

Terms and Units

P = present value ($)

A = annual investment or payment ($)

I = interest rate

n = number of years

~

Used to calculate the present value of a series of equal annual amounts.

$$F = A\left[\frac{(1+i)^n - 1}{i}\right]$$

Terms and Units

A = annual investment or payment ($)

F = future value ($)

I = interest rate

n = number of years

~

Used to determine the future value of an investment based on an annual investment.

$$F = P(1 + i)^n$$

Terms and Units

F = future value ($)

P = present value ($)

I = interest rate

n = number of years

~

Used to calculate the future value of a present amount of money.

NIOSH LIFTING EQUATION

RWL = LC x HM x VM x DM x AM x FM x CM

Terms and Units

RWL = recommended weight limit

DM = distance multiplier

LC = load constant

AM = asymmetric multiplier

HM = horizontal multiplier

FM = frequency multiplier

VM = vertical multiplier

CM = coupling multiplier

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Used to determine the recommended weight limit, or the load that can be tolerated by a healthy worker, over a long period of time, without causing injury to the worker's lower back.

$$C = 0.65\, v^{0.6}\, (t_{\alpha} - 95)$$

Terms and Units

T_a = air temperature (°F)

v = air velocity (fpm)

C = convective heat loss/gain from air movement (kcal/hr; BTU/hr)

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Used to determine convective heat gain/loss in body heat.

$$t_K = t_C + 273.15$$

Terms and Units

t_K = temperature in degrees Kelvin (K)

t_c = temperature in degrees Celsius (°C)

273.15 = conversion term for Celcius to Kelvin

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Used to convert between the Kelvin and Celsius temperature scales.