3b. Standard Letter Symbols and Conversion Factors for Acoustical Quantities

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Symbols

T	absolute temperature, degrees Kelvin
a	absorption, energy, acoustic, total in a room
α	absorption coefficient, energy
$\bar{\alpha}$	absorption coefficient, energy, average
Y_A	acoustic admittance (complex)
C_A	acoustic compliance
G_A	acoustic conductance
Z_A	acoustic impedance (complex)
M_A	acoustic mass (inertance)
P_A	acoustic power
X_A	acoustic reactance
R_A	acoustic resistance
B_A	acoustic susceptance
Y_A	admittance, acoustic (complex)
Y_E	admittance, electric (complex)
Y_M	admittance, mechanical (complex)
Y_R	admittance, rotational (complex)
Y_S	admittance, specific acoustic (complex)
A	amplitude of velocity potential
Ω	angle, solid
ϕ	angular displacement
ω	angular frequency ($2\pi f$)
k	angular wave number
f_A	antiresonance frequency
S	area (diaphragm, tube, room, or radiator)
p_s	atmospheric (static) pressure
α	attenuation constant (coefficient)
$\bar{\alpha}$	average absorption coefficient, energy
k	Boltzmann constant
C_E	capacitance, electrical
$\rho_0 c$	characteristic impedance
Q	charge, electrical
k	circular wave number
α	coefficient of absorption
C_A	compliance, acoustic
C_S	compliance, specific acoustic

C_M	compliance, mechanical
C_R	compliance, rotational
$\xi, \eta, \zeta; \xi_x, \xi_y, \xi_z$	components of the particle displacement in the x, y, z directions
$u, v, w; u_x, u_y, u_z$	components of the particle velocity in x, y, z directions
s	condensation
G_A	conductance, acoustic
G_E	conductance, electric
G_M	conductance, mechanical
G_R	conductance, rotational
G_S	conductance, specific acoustic
κ	conductivity, thermal
i	current, electric
q, U	current, volume (volume per second) (volume velocity)
δ	decay constant (damping coefficient)
dB	decibel
E, w	density, energy
ρ	density of the medium (instantaneous)
ρ_0	density of the medium (static)
ϵ	dielectric coefficient
Δ	dilatation
D_i	directivity index
R_θ	directivity ratio
ϕ	displacement, angular
ξ_x, x	displacement, linear
ξ	displacement, particle
X	displacement, volume
δ	dissipation (damping) coefficient (energy)
r	distance from source
s	distance, linear
μ	elasticity, shear
Y_E	electric admittance (complex)
C_E, C	electric capacitance
Q	electric charge
G_E	electric conductance
i	electric current
Z_E	electric impedance (complex)
P_E	electric power
X_E	electric reactance
R_E	electric resistance
ρ	electric resistivity
B_E	electric susceptance
e	electromotive force, voltage
J	energy
E, w	energy density
T, E_K	energy, kinetic
V, E_P	energy, potential
H	field strength, magnetic
m	flare coefficient in a horn
B	flux density, magnetic
f_M, F	force

f	frequency
ω	frequency, angular ($2\pi f$)
f_R	frequency, resonance
Z_A	impedance, acoustic (complex)
$\rho_0 c$	impedance, characteristic acoustic
Z_E	impedance, electric (complex)
Z_M	impedance, mechanical (complex)
Z_R	impedance, rotational (complex)
Z_S	impedance, specific acoustic (complex)
n	index of refraction
L	inductance
M_A	inertance, (acoustic mass)
I	inertia, moment of
I, J	intensity, sound
L_I	intensity level, decibels
ν	kinematic viscosity
T, E_K	kinetic energy (inductive energy)
σ	leakage coefficient, magnetic
l	length of a vibrating string, pipe, or rod
L	level in decibels, general
x, ξ	linear displacement
s	linear distance
Λ	logarithmic decrement
N	loudness, sones
L_N	loudness level, decibels or phons
H	magnetic field strength
Φ	magnetic flux
B	magnetic flux density
σ	magnetic leakage coefficient
$\mathfrak{F}$	magnetomotive force
K	magnetostriction constant
m, M_M	mass
M_A	mass, acoustic
M_S	mass, specific acoustic
Y_M	mechanical admittance
C_M	mechanical compliance
G_M	mechanical conductance
Z_M	mechanical impedance (complex)
P_M	mechanical power
X_M	mechanical reactance
R_M	mechanical resistance
B_M	mechanical susceptance
Y, E	modulus of elasticity
I	moment of inertia
L_{NR}	noise reduction, decibels
N	number of turns
ξ	particle displacement
ξ, η, ζ: ξ_x, ξ_y, ξ_z	particle-displacement components in the x, y, z directions
u_a	particle velocity (average)

$u, v, w; u_x, u_y, u_z$	particle-velocity components in the x, y, z directions
u_i	particle velocity (instantaneous)
u_m	particle velocity (maximum)
u_p	particle velocity (peak)
u	particle velocity (rms)
P	perimeter
T	period $T = 1/f$
θ	phase angle
β	phase constant (coefficient)
f_{ij}, g_{ij}, d_{ij}	piezoelectric constants
σ	Poisson's ratio
Y, P	porosity (of an acoustical material)
V, E_P	potential energy (capacitive energy)
ϕ	potential velocity
P	power
P_A, W_A	power, acoustic
P_E	power, electric
P_M	power, mechanical
P_R	power, rotational
p_s	pressure, atmospheric (static)
p_a	pressure, sound (average)
p_i	pressure, sound (instantaneous)
p_m	pressure, sound (maximum)
p_p	pressure, sound (peak)
p	pressure, sound (rms)
$\gamma = \alpha + j\beta$	propagation constant (coefficient)
Q	quality factor
a	radius of a diaphragm, tube, or radiator
Q	ratio of reactance to resistance
γ	ratio of specific heats
X_A	reactance, acoustic
X_E	reactance, electric
X_M	reactance, mechanical
X_R	reactance, rotational
X_S	reactance, specific acoustic
r	reflection coefficient, energy
n	refraction, index of
τ	relaxation time
$\mathfrak{R}$	reluctance
R_A	resistance, acoustic
R_E	resistance, electric
R_M	resistance, mechanical
R_R	resistance, rotational
R_S	resistance, specific acoustic
ρ	resistivity, electrical
f_R	resonance frequency
T	reverberation time
R	room constant $\bar{\alpha}S/(1 - \bar{\alpha})$
Y_R	rotational admittance
C_R	rotational compliance
G_R	rotational conductance

Z_R	rotational impedance (complex)
P_R	rotational power
X_R	rotational reactance
R_R	rotational resistance
B_R	rotational susceptance
L_S	sensation level, decibels
μ	shear elasticity, shear modulus (modulus of rigidity)
A	simple source strength
Ω	solid angle
I, J	sound intensity
L_P, L_W	sound power level, decibels
p_a	sound pressure (average)
p_i	sound pressure (instantaneous)
p_M	sound pressure (maximum)
p_p	sound pressure (peak)
p	sound pressure (rms)
L_p	sound pressure level, decibels
A	source, simple, strength of
r	source, distance from
Y_S	specific acoustic admittance
C_S	specific acoustic compliance
G_S	specific acoustic conductance
Z_S	specific acoustic impedance (complex)
M_S	specific acoustic mass
X_S	specific acoustic reactance
R_S	specific acoustic resistance
γ	specific heats, ratio of
c	speed of sound
s	stiffness
A, U_0	strength of a simple source
B_A	susceptance, acoustic
B_E	susceptance, electric
B_M	susceptance, mechanical
B_R	susceptance, rotational
B_S	susceptance, specific acoustic
T	temperature, absolute, kelvins
F	tension (force) in a membrane or string
κ	thermal conductivity
t	thickness
t	time
τ	time, relaxation
T	time, reverberation
T	torque
a	total acoustical (energy) absorption in a room
τ	transmission coefficient, energy, barriers
L_{TL}	transmission loss
R	transmission loss of building structures, decibels
N	turns, number of
u	velocity
c	velocity of sound

ω	velocity, angular
u_a	velocity, particle (average)
u_i	velocity, particle (instantaneous)
u_m	velocity, particle (maximum)
u_p	velocity, particle (peak)
u	velocity, particle (rms)
ϕ	velocity potential
A	velocity potential amplitude
q, U	velocity, volume
η	viscosity, dissipative or frictional
ν	viscosity, kinematic
e	voltage, electromotive force
V	volume
q, U	volume current; volume velocity
X	volume displacement
q, U	volume velocity; volume current
λ	wavelength
k	wave number (phase constant), $\frac{\omega}{c} = \frac{2\pi f}{c} = \frac{2\pi}{\lambda} = k$
w	width
J	work
Y, E	Young's modulus

TABLE 3b-1. CONVERSION FACTORS FOR ACOUSTICAL QUANTITIES

Multiply the number of	By	To obtain the number of	Conversely multiply by
Acoustic ohms	10^5	Mks acoustic ohms	10^{-5}
Atmospheres	406.80	Inches of water at 4°C	2.458×10^{-3}
Centimeters	10^{-2}	Meters	10^2
Cubic centimeters	10^{-6}	Cubic meters	10^6
Dynes	10^{-5}	Newtons	10^5
Dynes/cm^2	10^{-1}	Newtons per square meter	10
Ergs	10^{-7}	Joules	10^7
Ergs per second	10^{-7}	Watts	10^7
Ergs per second/cm^2	10^{-3}	Watts per square meter	10^3
Gauss	10^{-4}	Webers per square meter	10^4
Kilograms	10^3	Grams	10^{-3}
Mechanical ohms	10^{-3}	Mks mechanical ohms	10^3
Meters	10^2	Centimeters	10^{-2}
Microbars	10^{-1}	Newtons per square meter	10
Newtons	10^5	Dynes	10^{-5}
Newtons per square meter	10	Dynes per square centimeter	10^{-1}
Pounds per square foot	0.4882	Grams per square centimeter	2.0482
Rayls	10	Mks rayls	10^{-1}
Watts per square meter	10^{-4}	Watts per square centimeter	10^4
Webers per square centimeter	10^4	Gauss	10^{-4}