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Vibration Terms

F = force
m = mass
a = acceleration
g_{rms} = the rms value of acceleration in units of gravity
D = peak to peak displacement
Δf = bandwidth in Hertz
V = velocity
g^2/Hz = acceleration density
f = frequency in Hertz (Hz)
g = the acceleration of gravity

Vibration Equations

Sinusoidal Vibration

Velocity, Acceleration and Displacement Relationships					
English			Metric		
$V = \pi fD$			$V = \pi fD$		
$V = 61.48 \times g \div f$	D = inches peak to peak		$V = 1.56 \times g \div f$	D = meters peak to peak	
$g = 0.0511 f^2 D$	V = inches per second		$g = 2.013 f^2 D$	V = meters per second	
$g = 0.016266Vf$	f = frequency in Hertz (Hz)		$g = 0.641 Vf$	f = frequency in Hertz (Hz)	
$a = 0.102Df^2$	g = 386.1 inches/second^2		$a = 4.026Df^2$	g = 9.80665 meters/second^2	
$D = 0.3183 \times V \div f$	a= inches/second^2		$D = 0.3183 \times V \div f$	a = meters/second^2	
$D = 19.57 \times g \div f^2$			$D = 0.4968 \times g \div f^2$		

Constants for True Sine Waves	
rms value = 0.707 X peak value	peak value = 1.414 X rms value
rms value = 1.11 average value	peak value = 1.57 X average value
average value = 0.637 X peak value	peak to peak = 2 X peak value
average value = 0.90 X rms value	crest factor = peak value ÷ rms value

Random Vibration

Acceleration, Acceleration Density and Displacement Relationships (For a flat or white noise spectrum)
$g_{rms} = SQR [\Delta f (g^2/Hz)]$
$g^2/Hz = (D \div 42.8)^2 \times f^3$
$D = 42.8 [SQR (g^2/Hz \div f^3)]$