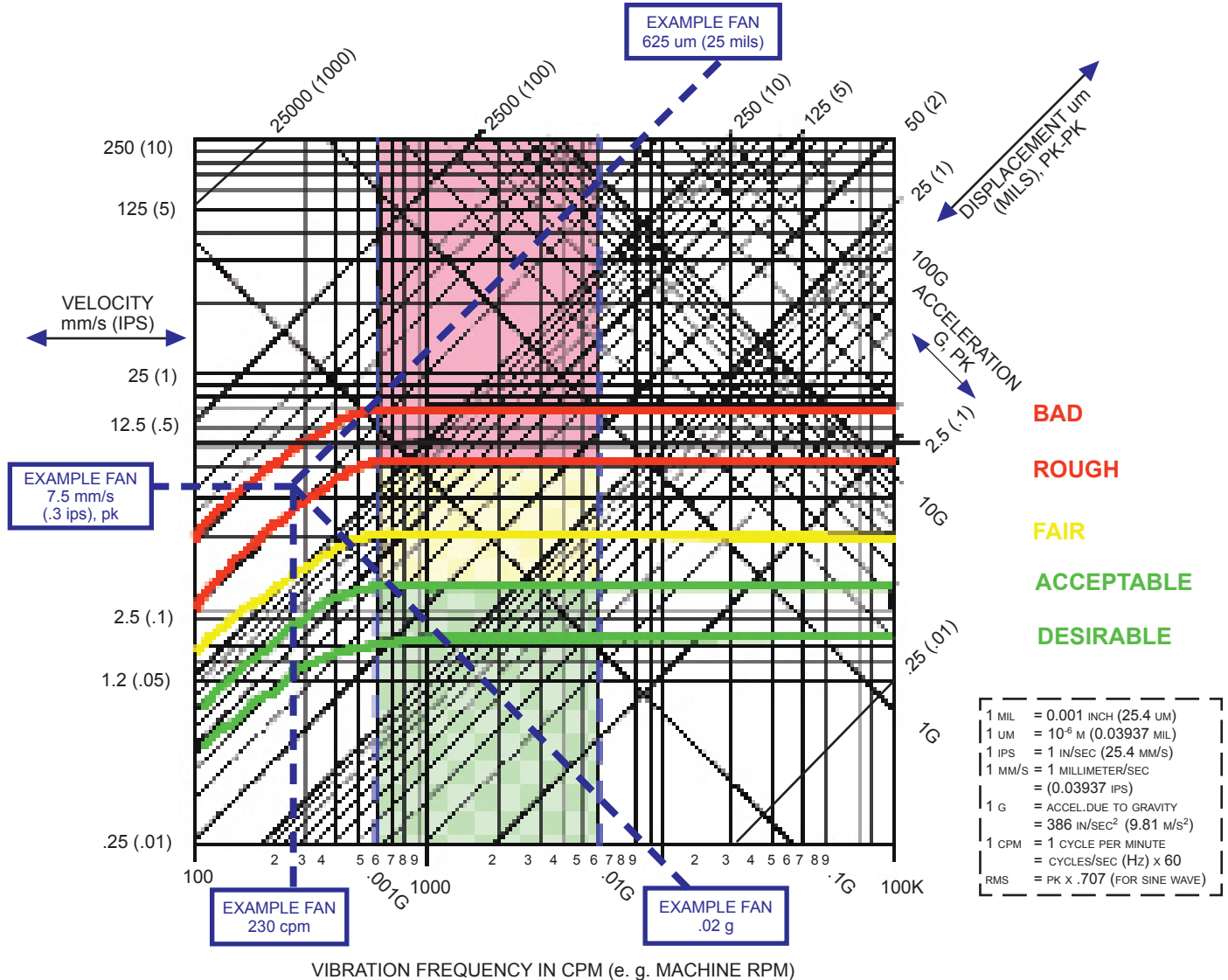


Vibration Severity Chart

How To Use This Severity Chart

- 1) **3-in-1 chart** plots vibration measure and levels for: **Acceleration vs. CPM, Velocity vs. CPM, and Displacement vs. CPM.**
- 2) Knowing a machine's RPM (i.e. CPM) and the vibration sensing technique (see table below), determine how the machine should perform when new (or rebuilt) and what level might warrant an ALERT or DANGER condition.
- 3) Simplified table below graph is offered for typical acceptance criteria for seismic (casing) and shaft proximity vibration.

REFERENCE MATERIAL



NOTES for determining a setpoint (e.g. alarm and/or danger limit) for machine protection monitoring:

- 1) Metrix Instrument Co. will not be held liable for setpoint determination.
- 2) Consult machinery manufacturer (OEM) for recommendations. They know their machinery best.
- 3) As a starting point only, the following is from over 30 years of company field experience and is offered free from charge.

Operating Speed*	Application	Sensing Technique	Common Measurand	Typical Vibration Reading/Setpoints					
				NEW		ALERT		DANGER	
All < 4000 RPM	Rolling element brgs.	Seismic - on bearing case	Velocity	.05 - .08 ips,pk	1-2 mm/s,RMS	.2 - .3 ips,pk	4-6 mm/s,RMS	.3 - .4 ips,pk	5-7 mm/s,RMS
				.08 - .12 ips,pk	2-3 mm/s,RMS	.3 - .4 ips,pk	5-7 mm/s,RMS	.4 - .6 ips,pk	7-10 mm/s,RMS
4K < RPM < 80K	Hydrodynamic, Journal Bearings	Non-contact Proximity (thru case)	Displacement	.8 - 1.2 mil, pk-pk	20 - 30 um, pk-pk	2.0 - 2.5 mil, pk-pk	50 - 75 um, pk-pk	3.0 - 4.0 mil, pk-pk	75 - 100 um, pk-pk
				.2 - .3 mil, pk-pk	5 - 8 um, pk-pk	.8 - 1.2 mil, pk-pk	20 - 30 um, pk-pk	1.0 - 1.5 mil, pk-pk	25 - 40 um, pk-pk
> 100,000 CPM	Gearmesh	Acoustic atop gears	Acceleration	3 - 8 g,pk	2 - 6 g,RMS	10 - 25 g,pk	7 - 18 g,RMS	15 - 40 g,pk	10-28 g,RMS

*Refers to constant speed machines. For variable speed machines, velocity severity is constant. Note from the chart that the displacement and acceleration measureands vary with speed and are not normally used due to complex severity determination.



Vibration - Condition Monitoring and Protection

www.metrix1.com • info@metrix1.com
 Sales & Service Tel: 281-940-1802 • Fax: 281-940-1799 • 05/07

Conversion Between °F and °C

°C ← °F			°C ← °F		
°C → °F			°C → °F		
- 273.15	- 459.67	-	- 15.9	+5	41.0
- 268	- 450	-	- 12.2	10	50.0
- 262	- 440	-	- 6.67	20	68.0
- 251	- 420	-	- 1.11	30	86.0
			0.00	32	89.6
- 240	- 400	-	+ 4.44	40	104.0
- 212	- 350	-	10.0	50	122.0
- 184	- 300	-	15.6	60	140.0
- 169	- 273	- 459.7	21.1	70	158.0
- 157	- 250	- 418	26.7	80	176.0
- 129	- 200	- 328	32.2	90	194.0
- 101	- 150	- 238	37.8	100	212.0
- 73.3	- 100	- 148	93.3	200	392
			121	250	482
- 62.2	- 80	- 112	149	300	572
- 53.9	- 65	- 85	204	400	752
- 51.1	- 60	- 76	160	500	932
- 40.0	- 40	- 40.0	316	600	1112
- 28.9	- 20	- 4.0	399	750	1382
			427	800	1472
- 23.3	- 10	+ 14.0	538	1000	1832
- 20.6	- 5	23.0	649	1200	2192
- 17.8	0	32.0	760	1400	2552

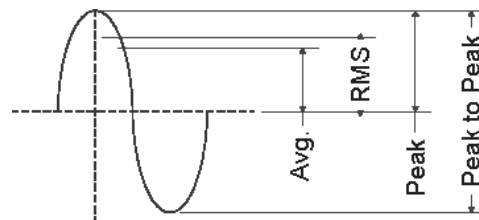
Relationships of Sinusoidal Velocity, Acceleration, Displacement

ENGLISH	
$V = \pi f D$	D = Inches pk-to-pk V = Inches/second f = Hz (cps) or RPM/60 g = 386.1 In/sec ²
$V = 61.44 \text{ g/f}$	
$g = 0.0511 \text{ f}^2 D$	
$g = 0.0162 \text{ Vf}$	
$D = 0.3183 \text{ V/f}$	
$D = 19.57 \text{ g/f}^2$	

METRIC	
$V = \pi f D$	D = meters pk-to-pk V = meters/second f = Hz (cps) or RPM/60 g = 9.807 m/sec ²
$V = 1.56 \text{ g/f}$	
$g = 2.013 \text{ f}^2 D$	
$g = 0.641 \text{ Vf}$	
$D = 0.3183 \text{ V/f}$	
$D = 0.4968 \text{ g/f}^2$	

Constants for True Sine Waves Only

rms value	= 0.707	x peak value
rms value	= 1.11	x average value
peak value	= 1.414	x rms value
peak value	= 1.57	x average value
average value	= 0.637	x peak value
average value	= 0.90	x rms value
peak-to-peak	= 2.0	x peak value



Vibration Warning Level Guide

