

VIBRATION IDENTIFICATION GUIDE FOR ASSEMBLED UNIT

Cause	Frequency Relative To Machine RPM	Phase-Strobe Picture	Amplitude	Notes
Unbalance	1 x rpm	Single steady reference mark	Radial – steady proportional to unbalance	Common cause of vibration
Defective anti-friction bearing	10 to 100 x rpm	Unstable	Measure velocity 0.2 to 1.0 in/s (5 to 25 mm/s) radial	Velocity largest at defective bearing. As failure approaches velocity signal increases, frequency decreases.
Sleeve bearing	1 x rpm	Single reference mark	Not large	Shaft and bearing amplitudes about the same.
Misalignment of coupling or bearing	2 x rpm. Sometimes 1 or 3 rpm	Usually 2 steady reference marks. Sometimes 1 or 3.	High Axial	Axial vibration can be twice race. Use dial indicator as check.
Bent Shaft	1 or 2 x rpm	1 or 2	High Axial	---
Defective gears	High rpm x gear teeth	---	Radial	Use velocity measurement
Mechanical looseness	1 or 2 x rpm	1 or 2	Proportional to looseness	Radial vibration largest in direction of looseness
Defective belt	Belt rpm x 1 or 2	---	Erratic	Strobe light will freeze belt
Electrical	Power line frequency x 1 or 2 (3600 or 7200 rpm)	1 or 2 rotating marks	Usually low	Vibration stops instantly when power is turned off
Oil Whip	Less than rpm	Unstable	Radial – unsteady	Frequency may be as low as half rpm
Aerodynamic	1 x rpm or number of blades on fan x rpm	---	---	May cause trouble in case of resonance
Beat frequency	1 x rpm	Rotates at beat rate	Variable at beat rate	Caused by two machines running at close rpm
Resonance	Specific criticals	Single reference mark	High	Phase changes with speed. Amplitude decreases above and below resonant speed. Resonance can be removed from operative range by stiffening.