

VISTEK'S VIBRATION ISOLATION BEARINGS: HOW THEY WORK

Vistek Vibration Isolation Bearings (VIBs) filter the transmission of micro-vibrations in six degrees of freedom. VIBs cut off the transmission of vibrations at extremely low frequencies (beginning as low as 1/2 Hz for the horizontal component). These bearings provide superior performance without the inconvenience, bulk and expense of air isolation or piezzo electric systems.

VIBs are passive and mechanical and do not require air hoses, maintenance or supporting hardware. They are scaleable and easily adapted for a wide range of applications. VIBs utilize a proprietary combination of two non-linear springs - - a horizontal WVF spring filter and a vertical spring filter.

Horizontal spring filter: Steel balls sandwiched between precision raceways form the plane of isolation. Micro-vibrations cause the balls to displace between the two raceways that cut off the transmission of vibrations. The balls that displace between the raceways are restored to the neutral position by a non-linear spring. Since the spring force (i.e., the restoring force) is non-linear, it is constant and independent of the frequency and amplitude of the input vibrations. As a result, the oscillating motion of the balls has no "natural" frequency. Rather the motion has an infinite number of frequencies, one for each increment of displacement. Consequently, resonance between the two halves of the plane of isolation is physically impossible. Therefore, the horizontal WVF spring filter whites out or filters out a broad band of input frequencies and insures a constant level of vibration transmission reduction.

Vertical spring filter: The isolated instrument is effectively levitated by a quasi-rigid body. They are proprietary, non-linear spring mechanisms with zero or near zero tangential stiffness for micro-vibrations. A spring mechanism with near zero tangential stiffness is a spring that has been compressed to the point that the spring back (restoring) force equals the compression force. At this point, the spring is levitating the instrument and the spring will not transmit micro-vibrations.

Vistek has several vertical filters. Which filter is used depends upon the bearing's use. Some bearings have high secant stiffness for large amplitude vibrations; in other applications, this attribute is not essential. A spring mechanism with high secant stiffness for large amplitude vibrations acts as a rigid body for micro-vibrations, and is not overly sensitive or lively to the touch. This unique combination of near zero tangential stiffness and high secant stiffness in a single spring mechanism creates a seemingly rigid body that does not transmit vibrations. Other bearing applications require isolation at lower frequency levels and for these applications, damping is added.

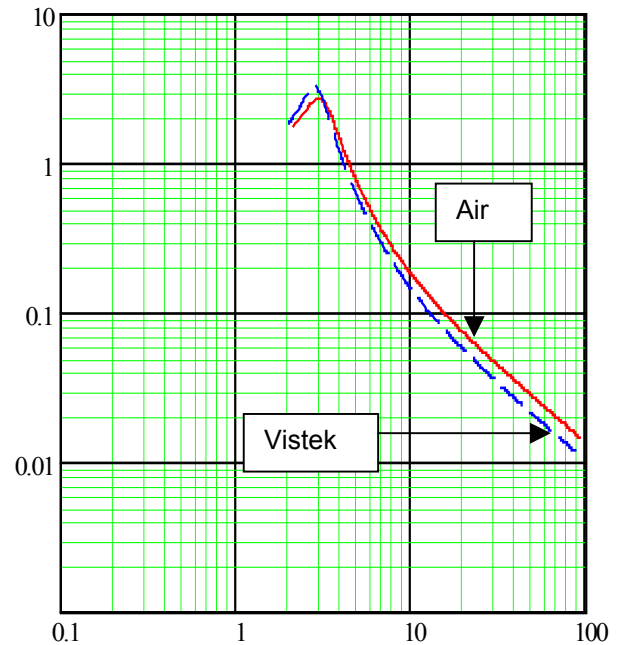
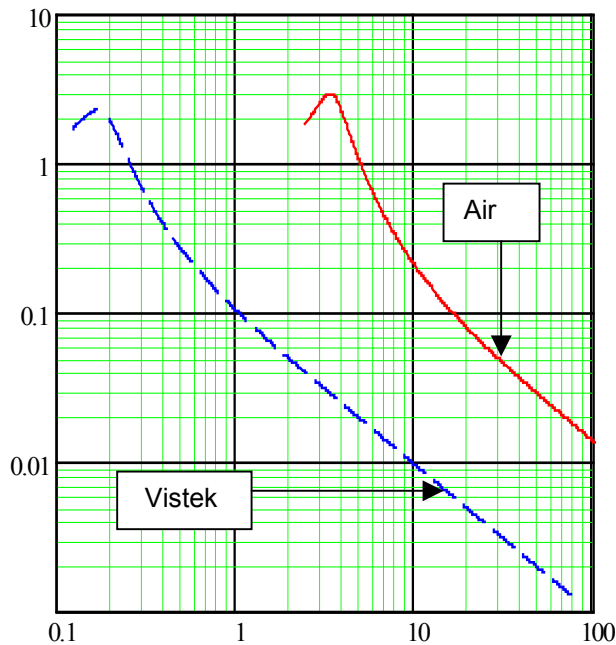
Series 320/3200

Isolation Performance Data

Horizontal Natural Frequency

Vertical Natural Frequency

Transmissibility (1 = 100%)



Frequency (Hz)

Comparison of Vistek VIP to Table Top Air Isolation Platform

Vistek isolation technology is superior to air isolation technology. First, Vistek vibration isolation platforms are passive, mechanical and maintenance free. There are no air hoses or supporting hardware required. Second, Vistek bearings isolate effectively for the horizontal and vertical vibration components. The superior performance of the Vistek bearings in all six degrees of freedom makes the Vistek isolation platform the best choice for eliminating unwanted vibrations.

	Isolation Efficiency	
	Vistek VIP	Air Platform
@ 5Hz		
Vertical	60%	25 to 50%
Horizontal	98%	0 to 30%
@ 10 Hz		
Vertical	85%	60 to 90%
Horizontal	99%	30 to 80%