

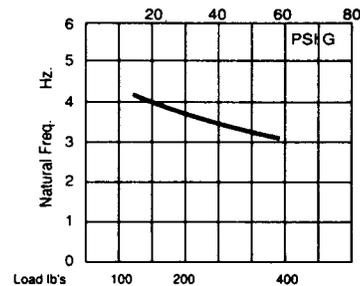
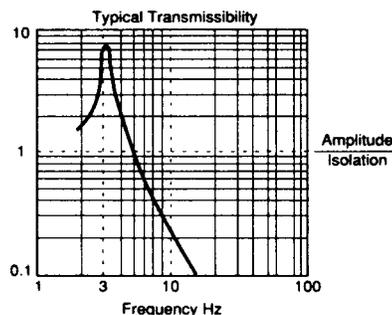
**Application Note****AN-2B****Vibration Isolation Units**

NTA provides various types of standard and custom Isolation Units. They are all provided in the form of a table, which has a suspended heavy pad upon which the isolated unit is placed. These units match two types of applications found in electronics, medical, biotech and laboratory applications today.

The first application is a traditional one in which a microscope and its equipment are to be isolated from vibration inputs within a building. Building vibration is typically in the range of 20-75 Hz and comes from internal HVAC and other mechanical equipment. Since this type of microscope is not automated, it may require operator hand contact during each inspection or viewing cycle. This may introduce additional disturbances to the isolated equipment. It is very difficult to isolate these types of disturbances since first, you are directly disturbing the isolated unit, second, the disturbance itself is usually a pulse or shock rather than a regularly occurring vibration and third, the inputs are normally at or below the resonant frequency of the isolated system.

The second type of application is when the equipment, which must be isolated, is a source of vibration or disturbance itself, in addition to the building inputs. This may be a result of a range of motion occurring during the operation or inspection or an automated load or unload operation, which can disturb the equipment. It turns out that both of these applications can be isolated using the same techniques.

NTA utilizes a combination of mass and damping in a simple economical way to achieve the desired isolation. Using passive, air-filled isolators under a one (1) inch thick stainless steel covered steel pad, the Isolation Units provide excellent isolation. The air supply is required to be regulated, dry air or nitrogen at 70 psig, minimum. The air is regulated to the isolators in such a way that the pad can be leveled after the equipment is in place. The isolators have a 3-6 Hz natural frequency. It is at or below this range that the isolator does not isolate but may, in fact, amplify the input vibration or pulse. The isolator's characteristics are defined in the two figures below.



Note that even though the natural frequency of the isolator is reduced when the load increases, there is little change in the transmissibility curve and the resulting isolation capability. In fact, the load is a function of the microscope or equipment weight and, thus, is not variable in any given application. NTA's Isolation Units will isolate close to 90% of input vibration amplitude within the 20-75 HZ frequency range, in all three axes.

Now let's evaluate the issue of disturbances in both types of applications. Regardless whether the disturbance is a hand disturbing a microscope during focus or an automated mechanism changing positions, the disturbance is a pulse. Pulses are essentially shocks, which include a range of frequencies. These disturbances are far beyond the capability of an isolator to perform properly, both in the .5 to 10 Hz resonance range and in the broader spectrum as well. These inputs cannot be isolated, but damping them is possible. While NTA's isolators have a good damping coefficient, they are not heavily damped when the inputs are in the resonant frequency range. Therefore, NTA's Isolation Units include additional damping in the form of restrictors in each of the air feed lines.

The heavy, isolated pad upon which the equipment is mounted limits movement for a given input. The restrictors then act to immediately damp pulses from the disturbances, when the input is from the equipment mounted on the isolation pad. These restrictors prevent air from being transferred between isolators and thus appear as a very stiff secondary damper to narrow width input pulses.

One note of caution, disturbances from external machinery, carts or even footsteps may cause disturbances, which are external pulses, or shocks. Mounting Isolation Units on raised floors can aggravate these pulse disturbances even more. NTA's Isolation units can provide some damping of these disturbances but cannot compensate completely. Mounting on a rigid floor or on raised floors with jacks or braces directly under may help. The only sure way is to understand your inputs to the table and provide proper control of those external disturbances.