VIBRATION ISOLATION

To isolate unwanted fan vibration, it was once sufficient to mount the offending equipment on a piece of cork or felt. However, with higher standards and better knowledge today, this old method is generally inadequate in large building structures and in the general industrial environment.

In building construction, lighter and more flexible structures are now possible due to improved design. At the same time, increasingly powerful equipment is needed and may often be installed in upper level plantrooms. Fan vibration, therefore, can be a major problem in such structures.

IMPORTANCE OF STATIC DEFLECTION

Isolation of vibration is accomplished by supporting the equipment on resilient mounting elements such as springs or rubber, which compress under the equipment's weight. The degree of isolation achieved is directly related to the amount of compression (i.e. static deflection) of the mounting.

The greater the static deflection which can be achieved (without compressing to solid) the better the resulting vibration isolation.

When determining the level of isolation efficiency which might be acceptable in any situation, consideration must be given to the following:-

- Fan type and operating weight.
- Magnitude and nature of the vibrating forces.
- Restrictions on fan motion.
- Location of the fan in the building structure.

For example, an isolation efficiency of 80% is normally satisfactory for a 5kW machine located in the basement but totally inadequate for a 100kW machine installed on a flexible upper level floor, particularly when adjacent to valuable office or residential accommodation. In this case an isolation efficiency close to 97% would be recommended.

USING VIBRATION MOUNTINGS

Some simple guidelines for successful vibration control:

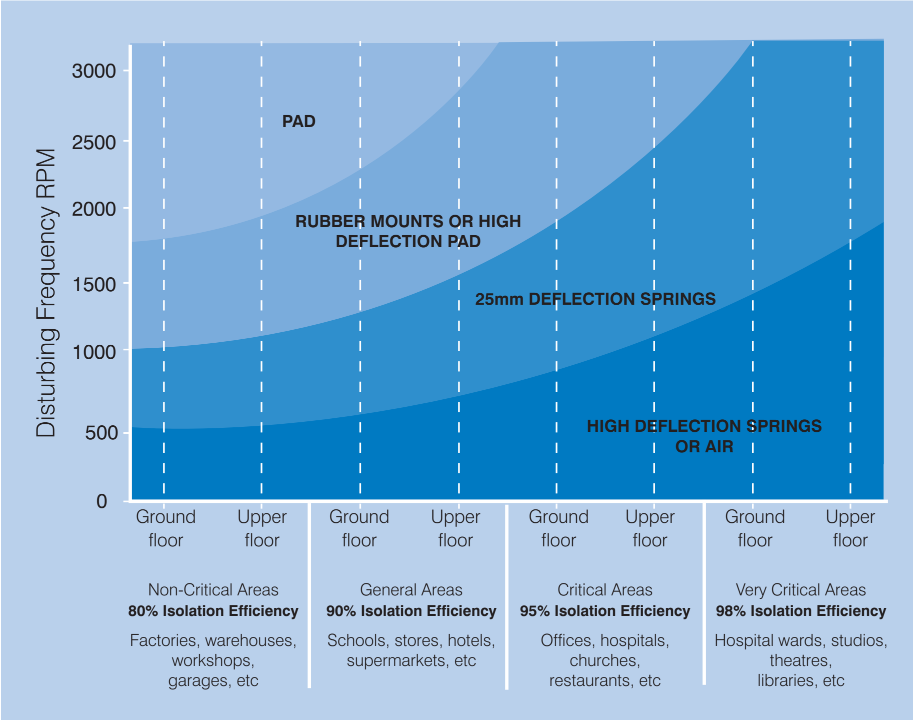
1. Mounting support points and load ratings should be selected so that the static deflections of all mountings are as uniform as possible.
2. Unrestricted movement of resiliently mounted equipment is essential for effective isolation.
   a) Ensure that adequate clearance is maintained around the installed equipment, particularly underneath it, to permit free movement - especially where high deflection mountings are used.
   b) All connections to resiliently supported equipment should themselves be flexible. As well as restricting equipment motion, any fixed connection can offer a direct path for transmission of vibration to the surrounding structure, bypassing the isolation system.
3. Top-heavy machinery, especially when mounted on a narrow base, can become unstable if mountings are located too close to each other beneath the equipment. Such instability can be avoided by use of outrigger brackets which space the mountings further apart and raise the mounting location points closer to the vertical centre of gravity of the equipment.
4. A rigid base is essential for resiliently supported equipment to avoid misalignment of drive components. Any flexibility in the machine base should be eliminated by the addition of steel stiffeners or use of a concrete inertia base.
5. Ductwork and ancillary equipment should not impose dead loads on the resiliently mounted equipment (such as attenuators). Where this is not possible, their weight should be separately supported or allowed for when calculating the total weight.

STATIC DEFLECTION GUIDE

This chart provides a selection guide for isolator type according to given values of operating speed, and suggested levels of isolation efficiency in certain operating locations.

Two values for each isolation efficiency are given, one for basement or on-grade installations,the other for upper level installations where some allowance is made for flexibility of the supporting structure.

This chart is meant as a general guide only and selections should be made based on the properties listed in the following pages.



ISOLATION EFFICIENCY CHART

This chart illustrates the theoretical relationship between isolation efficiency, disturbing frequency, static deflection (or dynamic natural frequency) for a simple isolation system on a rigid foundation. It is also grouped into zones suggesting isolation efficiency ranges appropriate to different applications.

To use the chart, determine the lowest rotational speed of the equipment and consider this to be the disturbing frequency. Move vertically to intersect the diagonal line corresponding to the percentage isolation required; then move horizontally left and read the dynamic natural frequency, or right to read the static deflection required of the mount.

It is sufficient to use static deflection to select the correct isolator for spring mounted systems; but for rubber and pad mounts, selection should be made on the basis of dynamic natural frequency.