

DEFLECTION AS IT RELATES TO VIBRATION ISOLATION

The deflection of an isolator¹ is defined as the difference in the original unloaded height of the isolator and the final loaded height of the isolator. This deflection is equivalent to the inverse of the natural operating frequency of the isolation device.

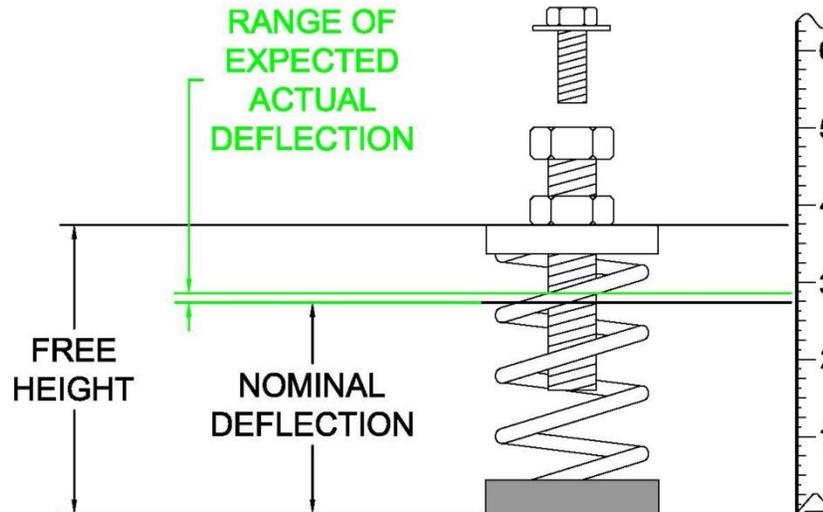
All motor driven rotating or reciprocating devices produce some amount of undesirable structure borne vibration at a primary and often multiple sub-frequencies. The deflection of an isolation device is chosen so that the corresponding natural frequency is a minimum of 1/3 the minimum primary disturbing frequency of the isolated component².

Vibration isolation manufacturers provide isolation devices at nominal deflections. The nominal deflection is defined as the deflection the isolator is expected to achieve when subjected to its rated nominal load; this is not the expected actual deflection under actual load. The actual deflection is defined as the deflection an isolation device achieves under actual loads.

For any given nominal deflection, the expected actual deflection is 75% or greater of the nominal. For example, if a nominal 1" deflection isolator was selected, an actual deflection of ¾" would be expected. For a nominal 2" deflection isolator, an actual deflection of 1-1/2" or greater would be expected. Specifying engineers and acoustical consultants are advised to select nominal deflection isolators accordingly or note if the deflections specified are nominal or required actual.

¹ Isolator is defined as the component that undergoes a measurable change in height as load is applied, typically in a linear fashion. Typical isolators consist of neoprene and/or compression springs. Note that deflection is not always equal to a change in operating height; restrained isolators often have internal compression and have no change in operating height.

² This is based on an infinitely stiff foundation and a single degree of freedom system. It is typically accurate for slab on grade installation; however, isolator deflections of 7 to 8 times the actual deflection of the supporting structure may be required to meet estimated isolator efficiency for upper story installations in lightweight structures. VISCMA recommends consulting an acoustical consultant rather than using published recommendations if structure born vibration is a concern.



1" NOMINAL DEFLECTION SPRING MOUNT

Note on Common Misconceptions:

Q: Our spring isolators are over-deflected, too compressed.

A: Since higher deflection is equivalent to a smaller natural frequency and a greater isolator efficiency, the more a spring isolator deflects, the better it works³.

Q: The springs have deflected but they are at all different heights.

A: If the weight distribution of a component is known, isolators with the same nominal deflection will be selected based on the expected actual load at each point. Actual deflections may vary but all should be at or above 75% of nominal deflection or at/above actual deflection requirements. Measure the deflection of the least deflected spring.

³ For a spring isolator this is true until the adjacent coils are in contact. At this point, the spring has short circuited. There are typically dead coils at the top and bottom of compression springs, as long as the active coils in the central part of the spring are not in contact the spring is not "short circuited".

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VISCMA is a non-profit association representing the manufacturers of seismic restraint, vibration isolation and noise control equipment. The primary objectives of the organization are to educate the construction industry on the proper use and application of vibration isolation and seismic restraint and to develop standards to continually improve the industry.

In partnership with FEMA and ASCE, VISCMA also publishes three Seismic Installation and Inspection Manuals designed to assist field personnel.

The association office is located at 994 Old Eagle School Road, Suite 1019, Wayne, PA 19087-1866 and can be reached at 610-971-4850 or info@viscma.com.

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