Vibration-Isolating Standard Elements

Guide to Selecting Vibration Damping Elements

For correct selection of a standard part used for vibration damping, it is first necessary to understand the terms listed below:

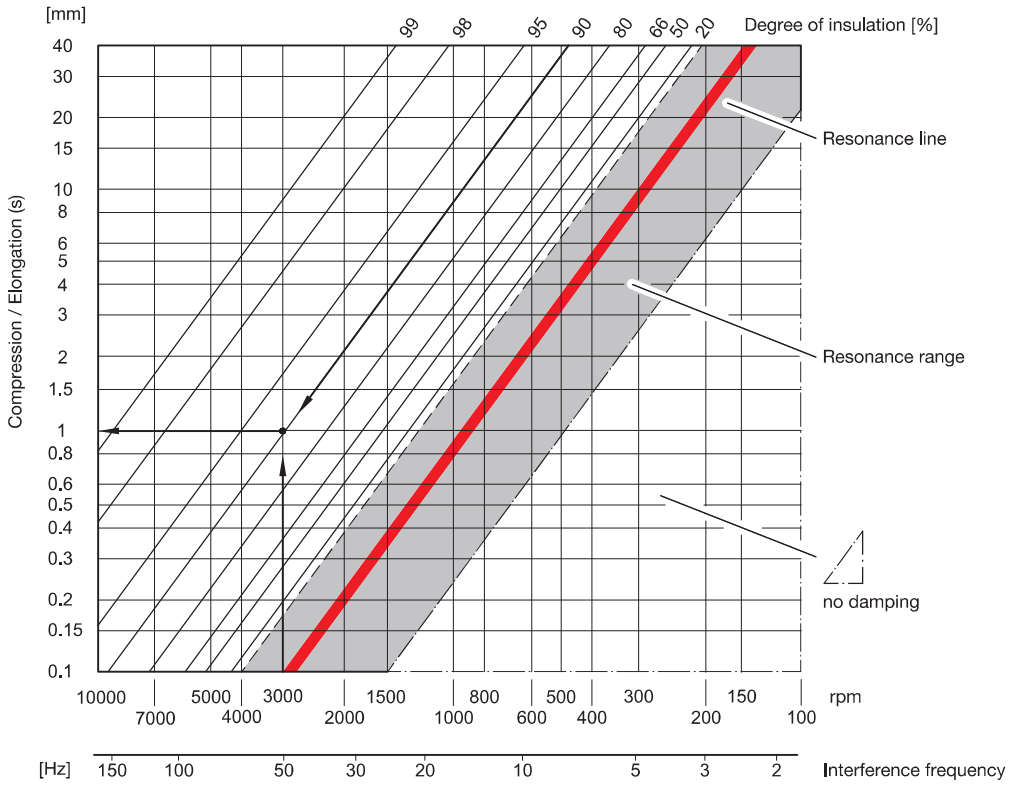
The **disturbing frequency** is the frequency emitted by the machine, e.g. the number of strokes per minute, measured in Hertz, or the main shaft rotation speed, measured in revolutions per minute.

The **static load** in Newtons is the load that acts on a single vibration damping element. The total weight of a machine is divided by the number of damping elements. In an optimal arrangement, each element bears the same load.

The **degree of isolation**, given in percent, is the measure of the absorption of the disturbing frequency, i.e. the damping.

The **compression** or the **spring travel** is the maximum change in the height of the damping element in mm.

The calculated **spring rate** in Newtons/millimeter is the load that causes a height change of 1 mm.



Example with the following assumptions: Disturbing frequency = 50 Hz; load = 120 N; desired degree of isolation = 90 %

The selection of a suitable vibration damping element begins with determining the required compression. This can be taken from the y-axis of the diagram at the intersection of a vertical line at 50 Hz (x-axis) and the characteristic curve of the desired degree of isolation of 90 %. The example values yield a compression of 1 mm.
With the compression determined in this way and the given static load, it is possible to calculate the required spring rate with the following formula:

$$\frac{\text{Static load F [N] per damping element}}{\text{Spring travel s [mm]}} = \text{Spring rate [N/mm]} \Rightarrow \frac{120\ \text{N}}{1\ \text{mm}} = 120\ \text{N/mm}$$

Based on the calculated spring rate and the desired shape, the appropriate damping element can then be selected. The respective spring rates are given in a table on the corresponding standard sheets. In making the selection, it is important to ensure that the spring rate at least satisfies the calculated value.
The example arrives at a vibration damping element with article number 148.3-46-M10-A-60-S and a spring rate of 138.3 N/mm.