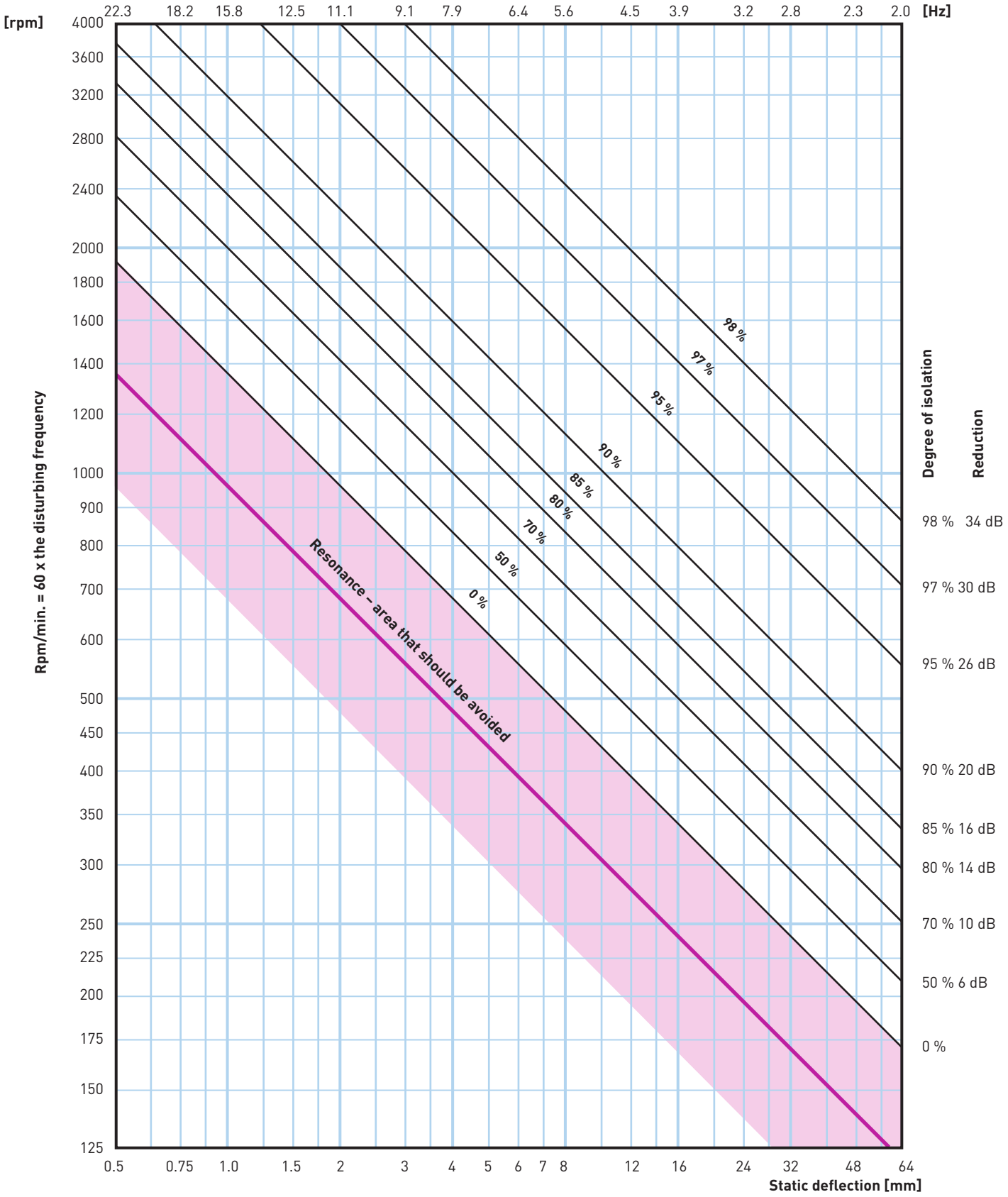
Determination of deflection and the degree of isolation



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Dimensioning rules

Prerequisites

The information contained in the following design procedure is a practical and useful tool, but is not complete. However, it is sufficient for use in the vast majority of designs, when:

- anti-vibration mounts are significantly softer than the underlay and the machine base.
- the vibratory force passes approximately through the centre of gravity.
- the distance between the anti-vibration mounts is greater than the vertical distance between the plane of the anti-vibration mount and the centre of gravity.
- the dimensioning does not readily take place at a degree of isolation lower than 70 %.

A low rpm requires a very large deflection to achieve high isolation, but as a large deflection may produce an unstable setup, hard VIKAS anti-vibration mounts are often chosen, as the resonance frequency becomes higher than the disturbing frequency. This provides no isolation of the fundamental frequency but dampens shock and high frequency vibrations, which are often the troublesome parts.

Foundations

If the machinery is made up of multiple devices, these should be mounted on a common base frame, after which the anti-vibration mounts are placed between the frame and the underlay. If each device has a different rpm, isolation must be done according to the lowest RPM.

A heavy base frame which significantly increases the weight of the machine acts to stabilise the setup. If the vibratory force is large and/or the RPM is low, an additional mass of the following size is recommended (m is the machine's mass in kg):

RPM	Weight of additional mass (kg)
<800	1.5–2.0 x m
800–1200	1.0–1.5 x m
>1200	0.0–1.0 x m

The underlay

A seemingly correct vibration isolation can fail if the underlay does not have sufficient mass and stiffness. The following table shows guiding values for the amount of machine mass that can be set up on a concrete deck of a given thickness. If the deck rests directly on the ground, twice the mass can be allowed.

Thickness of concrete (mm)	Max. permissible machine mass (kg)
150	1000
200	2000
300	5000
400	8000
600	10000

Impact forces

When selecting anti-vibration mounts for mobile equipment, the dimensioning must take into account shocks – i.e., the anti-vibration mounts must, in addition to the machine's mass and vibration forces, be able to absorb impact forces. It is recommended that you count on additional shock of 50–100 %. Furthermore, it is recommended to use an anti-vibration mount with a stop device or a custom design, such as the captive mounts.

Flexible connectors

When a machine is mounted on anti-vibration mounts, it must be ensured that the vibrations are not transferred via other rigid connections. Flexible connecting links (e.g. rubber hoses or compensators) are inserted in pipelines. Cables must be bendable and flexible couplings must be used for shaft connections.

Location of anti-vibration mounts

Ideally, the anti-vibration mounts should be placed symmetrically around, and on the same plane as, the centre of gravity.

If the load on the anti-vibration mounts is not equal, use different anti-vibration mounts so that the deflection is the same on all the mounts.

In practical terms it may be difficult to position the anti-vibration mounts on the same horizontal plane as the centre of gravity. If this is the case, the distance between the anti-vibration mounts should be greater than the vertical distance between the plane of the anti-vibration mounts and the centre of gravity.