PLANT & MACHINERY

Isolation Solutions for a quieter world.

WHY CHOOSE TICO?

TICO has been designing anti-vibration and structural isolation solutions for over 75 years. We are a proud British manufacturer utilising raw materials from around the world to create engineered, high-performance elastomer isolation solutions.

With vast experience and an extensive range of elastomers at our disposal, TICO is able to design and manufacture solutions to suit all project types.

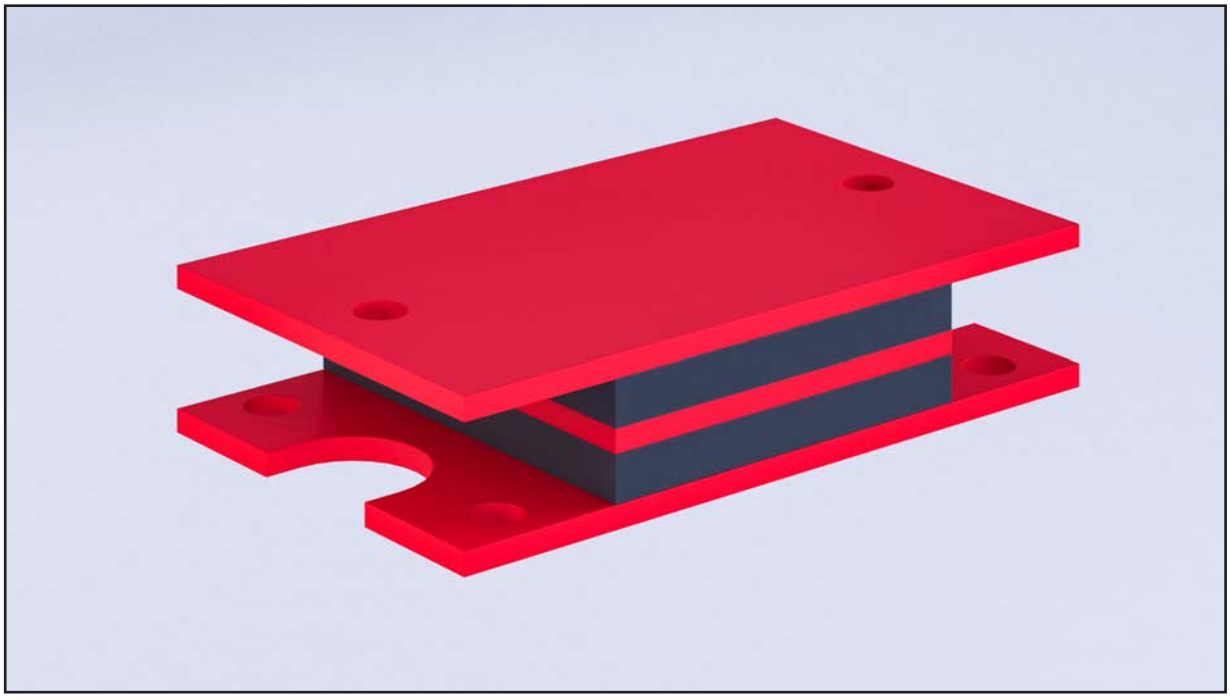
Modern structures, both residential and commercial, contain multiple sources of rotating & vibrating equipment, from air handling units and air-source heat pumps to various industrial equipment. Not only can vibration create imbalances and failure in mechanical devices but it can create noise that emanates far beyond their mounted location and into adjacent rooms and buildings.

TICO is the world-leader for machinery mounting solutions and our solutions are backed with decades of testing and expertise.

CONTENTS

TICO is the brand name of our range of elastomer based anti-vibration solutions. Our TICO range of engineered elastomers provide vastly superior strength and toughness compared to glued rubber crumb or air filled elastomers. Additionally, they are specifically designed for use in the most harsh environments and we have solutions providing resistance to ozone, oil and water absorption whilst maintaining desired performance across a wide temperature range.

TICO pads are engineered for low creep and high recovery post-compression to provide market-leading longevity and performance.



TICO Sandwich Mount

HOW VIBRATION ISOLATION WORKS

The basic principal of vibration isolation is that the machine is entirely isolated/separated from the floor by a resilient material that is 'tuned' in such a way that the main disturbing frequencies of vibration are not transmitted through it (or are greatly reduced).

The resilient isolation layer may be in the form of a continuous mat, strips or discrete pads depending on the machine, mounting configuration and performance requirements.

The main design considerations when choosing a pad are:

- That under normal conditions of load that the material is not stressed beyond its recommended maximum load bearing capacity.
- That under normal working conditions the natural frequency of the pad is half or less of the disturbing frequency (or where this is not possible that the natural frequency of the pad is not close to the disturbing frequency to avoid a resonance condition).

Other considerations include the intended mounting arrangement (bonded/bolted), machine type and location and environmental conditions.

The following information is generally required to enable a full recommendation to be made:

- The type of machine.
- The weight of the machine (dead load).
- Indication of any additional loads or dynamic service loads (live load).
- The area available to place the pads, e.g., dimensions of mounting feet, size of skids etc., and any restrictions on mounting locations.
- An indication of the principal disturbing frequencies of vibration (see notes below).
- Is the machine bolted down? If the machine is to be bolted, how many bolts and what size are they.
- Will the pads be in contact with oils or any other fluids in service?
- Are there any environmental conditions that might affect the pad e.g., extremes of temperature, radiation etc.?
- Any limitations on bearing dimensions (size and height) or bearing deflection under load.

In most cases it is not possible to obtain information directly on the disturbing frequencies of vibration without physically measuring them. In such cases an estimate is usually made based on the machine type, operating conditions and general experience. In particular the following information should be sought:

- The speed or speeds of any rotating parts e.g., Fan speed in r.p.m.
- The type of machine.
- Any observations of particular problems in service (e.g. Is the main problem at a particular speed or point in the machine operating cycle?).

HOW TO MAKE A BASIC RECOMMENDATION FOR TICO PRODUCTS

In the following pages the process has been broken down into a series of steps which can be used as a model for most situations. This example is based around TICO S/PA, if the applied stress is greater than 0.5 MN/m^2, alternate TICO products would be required.

1. Static Deflection

The deflection of the pad under static load is measured in mm. This is important, as the extent of the pad compression changes its ability to absorb/reduce the range of transmission frequencies and their amplitude.

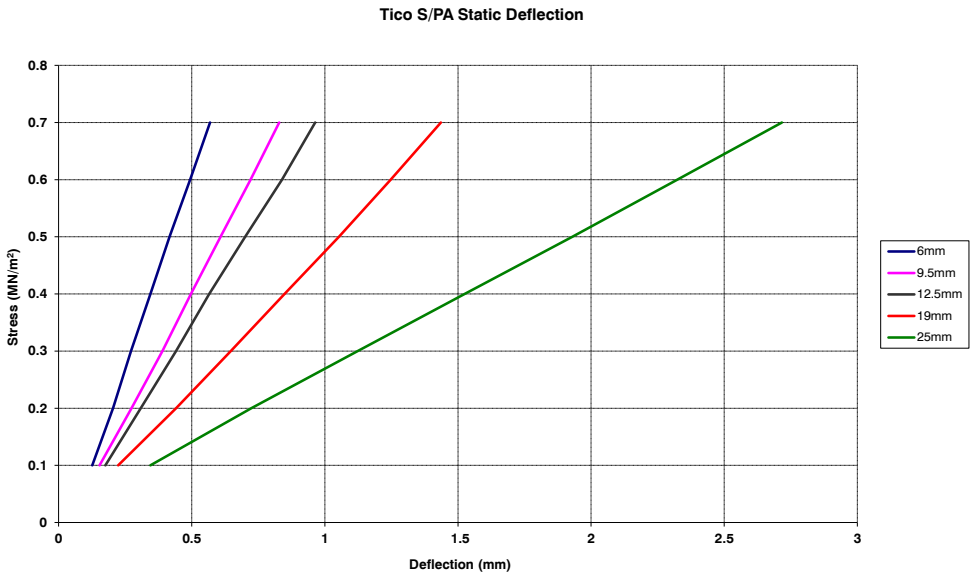
To use graph:

1.1 Calculate the stress on the pads in MN/m^2 using formula:

$$\text{Stress in MN/m}^2 = \frac{(\text{Weight of machine in kg} \times 9.81) \div 1{,}000{,}000}{\text{Area of pads in m}^2}$$

1.2 Project a horizontal line from the calculated stress to intercept the desired thickness. Read the deflection off the horizontal axis.

Fig. 1

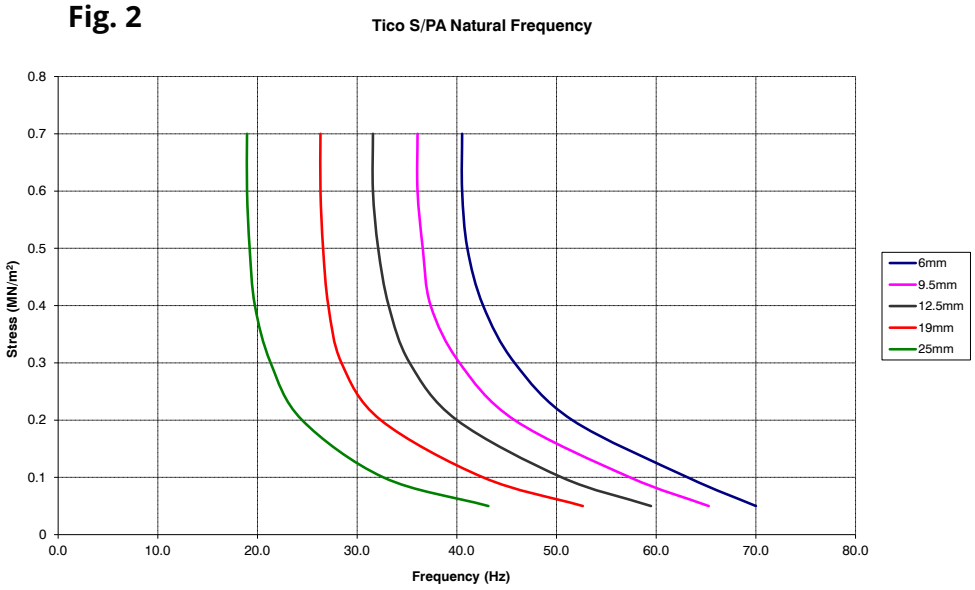


2. Natural Frequency of Pad

Any pad under load will have its own natural frequency, this figure will vary depending upon the load applied. It is important to ensure the system natural frequency and the pad natural frequency are not similar, to avoid resonance. If these figures are too close, the vibrations will be amplified rather than reduced.

2.1 Calculate the stress on pad in MN/m^2 (see 1.1).
2.2 Project a horizontal line from the calculated stress to intercept the desired thickness.
2.3 Read the natural frequency (fn) off horizontal axis.

Fig. 2

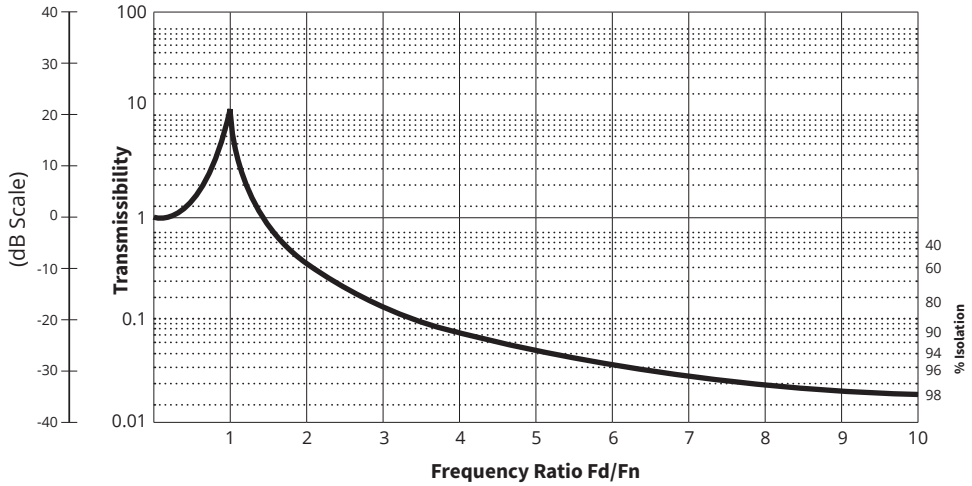


3. Isolation Efficiency

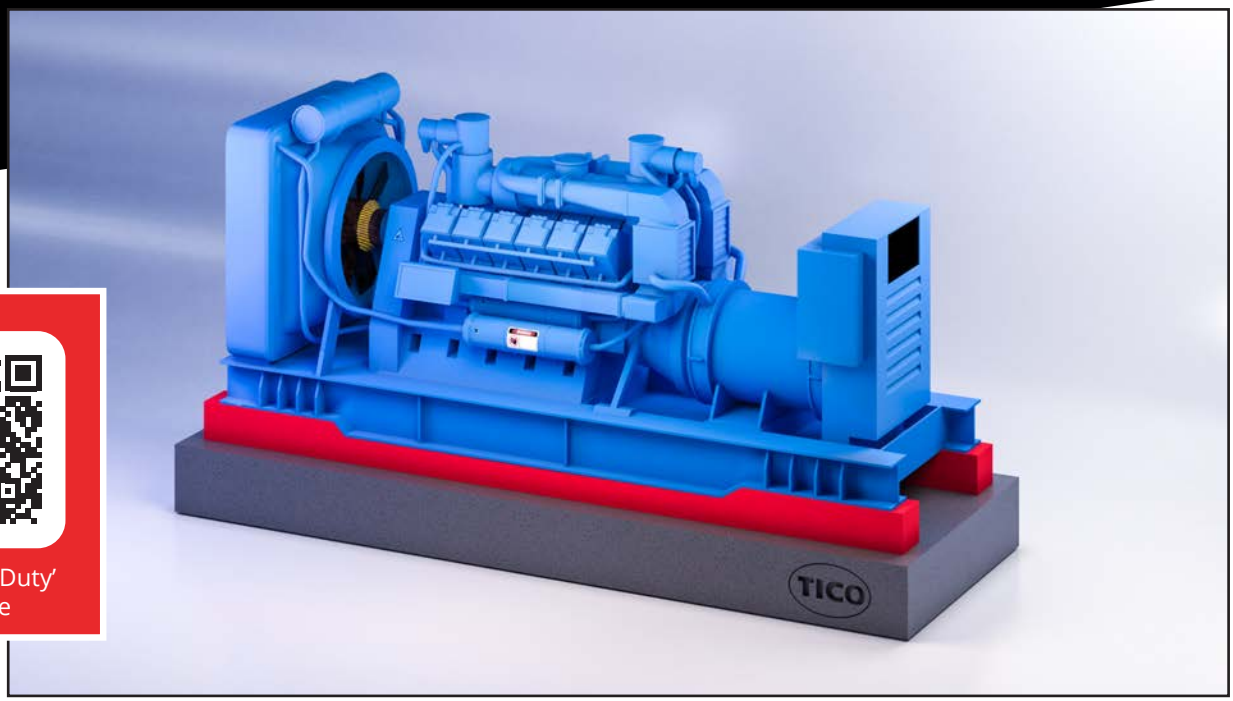
This is obtained by working out the ratio of the systems disturbing frequency (fd) to the pad's natural frequency (fn). The higher the ratio fd/fn, the greater the isolation efficiency. Each TICO grade will have its own transmissibility graph to show this.

3.1 Ascertain the disturbing frequency to be isolated (fd).
3.2 Calculate the frequency ratio fd ÷ fn.
3.3 From the horizontal axis project a line up to the curve of the graph and read off the isolation efficiency from the right-hand side vertical axis.

Fig. 3



MACHINE MOUNTING PADS



View 'Heavy Duty' Webpage

The most common reason for employing a TICO pad in a machinery mounting application is for the control of vibration. An un-isolated machine may transmit vibrations into the surrounding structure and cause annoyance, other problems, or be susceptible to vibrations being transmitted to itself from its surroundings (e.g., in the case of sensitive test equipment).

Vibration is known to cause:

- Problems with sensitive and accurate equipment
- Damage to floors
- Damage to machine parts
- Transmitted noise

The basic principal of vibration control is to ensure there is no rigid connection between the machine and its support (e.g., the floor) – this is achieved by introducing a TICO pad between the two.

Benefits of using TICO materials:

+ Improves plant and cost efficiency, by increasing time between maintenance
+ Reduces installation time
+ Improves the working environment
+ Reduces damaging vibrations and transmitted noise
+ Extends the working life of equipment

Key Features:

Load range from 0.1 to 15.5 MN/m²

Natural Frequency down to 6Hz

Ease Of Installation

Maintenance Free

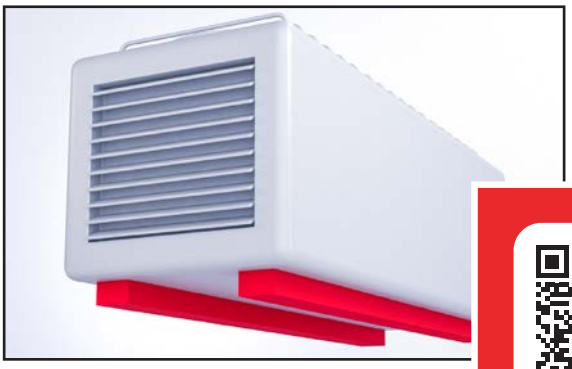
Suitable for indoor/outdoor installations

View 'General' Webpage

Common Applications

General

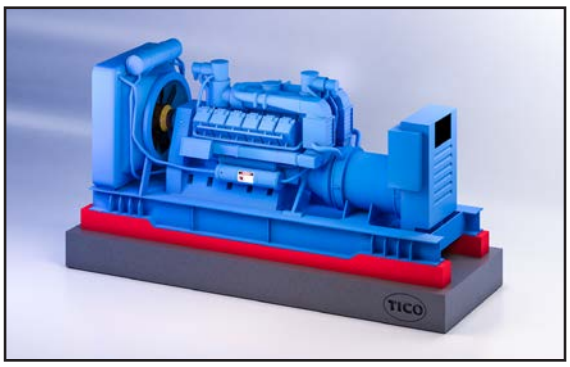
General mounting pads provide vibration damping and a conformable surface for machinery to sit on. Our TICO solutions will provide decades of maintenance-free and vibration-free isolation



Low Frequency

There are certain applications where a very high degree of isolation is required – in particular, applications where the frequency of the disturbing vibration is very low.

View Low Frequency Webpage



Heavy Duty

TICO heavy duty materials are designed to reduce shock, impact loads and vibration in a wide range of applications in heavy industries where arduous conditions prevail.

Sandwich Mounts

Designed for applications requiring high compressive strength, coupled with good resilience and low shear stiffness. This modular design allows for a bespoke, tailored machine mounting solution.

View Sandwich Mount Webpage

Spring Isolators

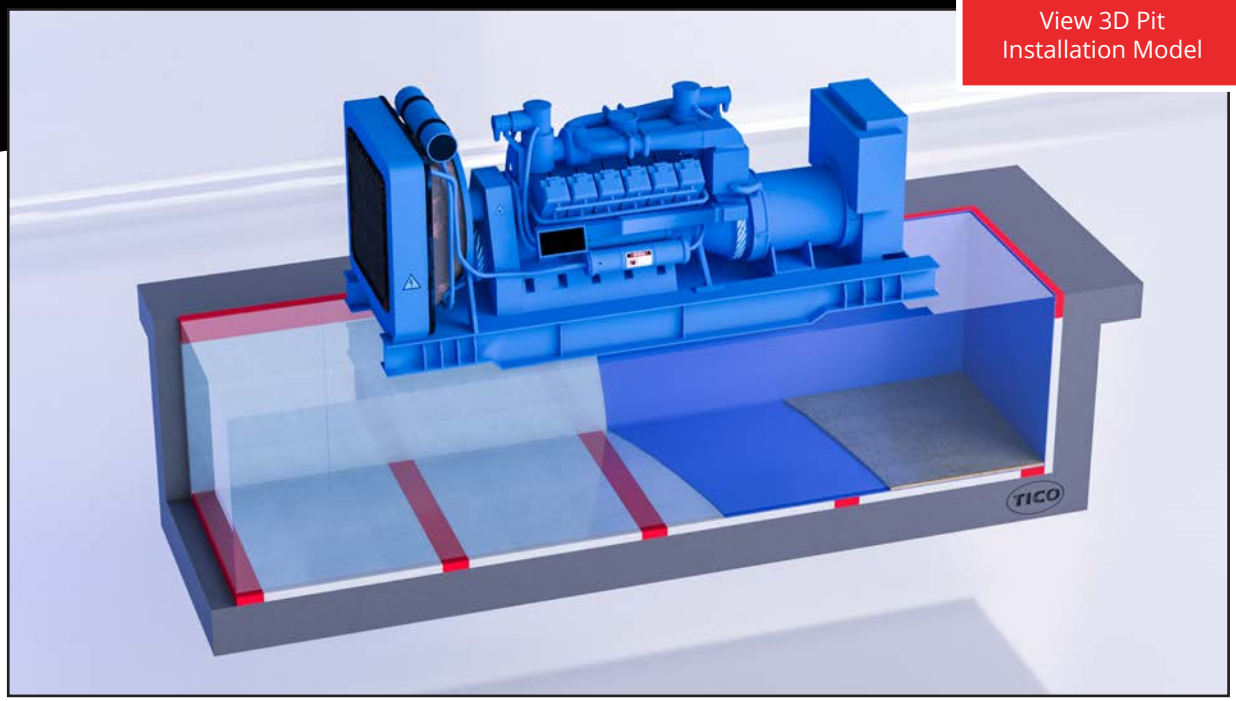
Sometimes, very low-frequency isolation is required to achieve specific performance parameters. While elastomers typically operate as low as 6Hz, spring isolators can reach much lower frequencies, around 2-3 Hz.

TICO has partnered with ALPHA ACOUSTIKI Ltd, one of the world's leading manufacturers of spring isolators in noise and vibration control. Under its brand name VIBRO, we offer low-frequency spring isolating solutions to complement our elastomer technology. VIBRO spring isolators are ideal for very low-frequency vibration control (low-speed rotation of 250 rpm upwards). These isolators incorporate multi-directional vibration restraint, adjustable height, and comply with ISO EN 10270 requirements.

Please contact us at to discuss your requirements

INERTIA BASES

View 3D Pit Installation Model



TICO have, for many years, supplied anti-vibration material for use in Foundation Inertia Block (pit and plinth) installations across a wide variety of industries and applications. The main reasons for using a foundation block are to provide additional mass to improve the rigidity of the machine structure and to aid in providing dampening of problem vibrations. A plinth is usually used in lighter machinery and where it is possible and practical to raise the equipment and associated piping / cabling. A pit is generally used for heavier machines.

Key Features:

Customisable design

Natural Frequency down to 6Hz

Long design life

Maintenance Free

TICO can assist with the design and recommendation of both pit and plinth installations. By understanding the project specifics, we can tailor the pit and plinth installations to maximise vibration isolation, reduce installation costs and supply lay-down plans to improve the ease of installation.

View 3D Plinth Installation Model

Plinth Installations

Plinth installations are employed for a number of reasons.

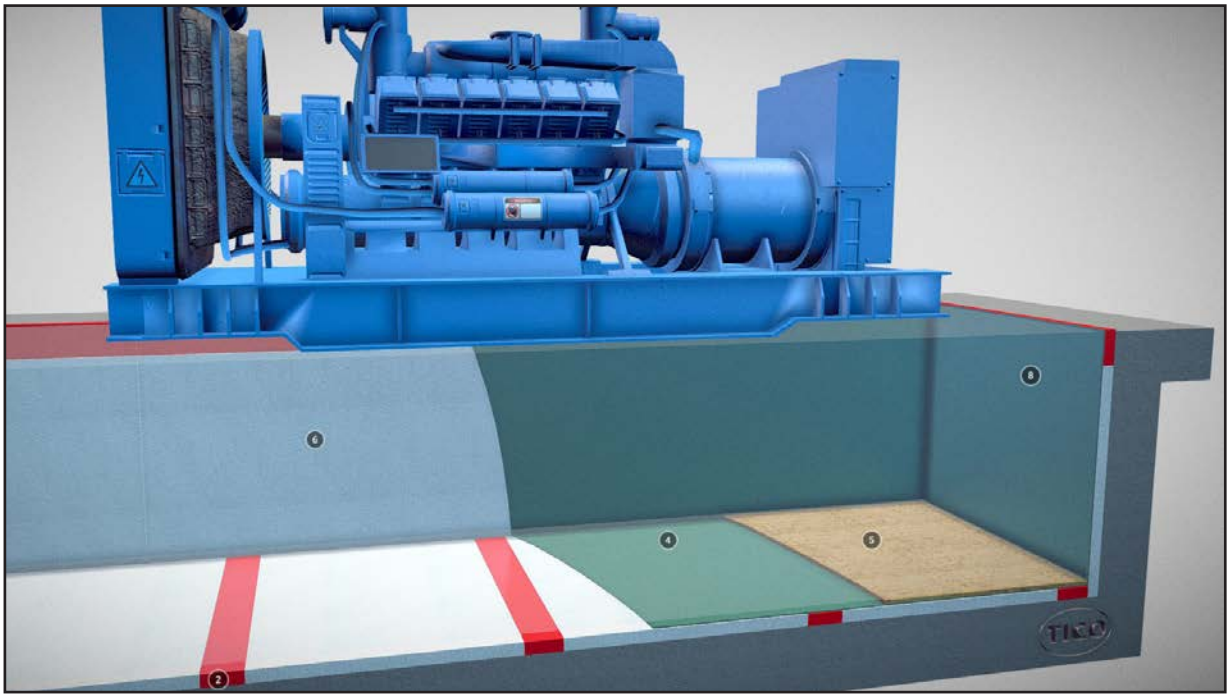
1. When a stabilising inertia block will assist in the damping of troublesome vibrations, in situations where a pit installation may not be used e.g., on floors above ground level.
2. Where a large mass is essential to provide additional stability to the machine.
3. To avoid floor damage to expensive tiled or waterproof surfaces.
4. To provide level surfaces on drainage floors, irrespective of slope or camber.
5. Where additional height is required for a particular machine or structure.

Pit Installations

Pit installations are used for two main reasons.

1. Where a large mass is essential to provide additional stability and rigidity to the machine.
2. When a stabilising inertia block will assist in the damping of troublesome vibrations.

In the past, pit installations have been employed for machinery mounting in conjunction with agglomerated cork, as an antivibration material. This is prone to compression set and will absorb any liquids falling into the pit. TICO S/PA combines high resilience with minimal creep and good resistance to oils and water.



LEVELLING

View TICO Adjustamount

Where accuracy of plant height, gradient or level is important, TICO Adjustamounts and S/SH Shimming provide efficient precision mounting.

Adjustamounts

TICO Adjustamounts are specially designed for mounting machines and structures where accurate levelling is of prime importance, and where slight additional height is required. They have been found especially suitable for certain tool room machinery such as long bed lathes, precision grinders as well as for conveyors and light structures mounted on varying floor levels. They provide a rapid and efficient method of machinery mounting, without recourse to other methods which can damage floors.

Shimming

TICO S/SH Shimming is commonly used in conjunction with other TICO pads (e.g., TICO S/PA) to provide a quick and efficient way of levelling plant without compromising the vibration isolating properties of the main pads.

View 'Shimming' Webpage

Key Features:

- **Customisable design**
- **Conformable interface**
- **Long design life**
- **Maintenance Free**

BOLT ISOLATION

View TICO
Bolt Isolation

A bolt provides a direct transmission path for vibration from the machine to the floor, effectively short-circuiting the TICO pad. To prevent this, it is essential that the bolts are isolated from the machine base. This is achieved using TICO Collars and Washers. Although the vast majority of machinery plant can be secured by TICO Pads and Adhesive, cases where bolts might be employed are where the centre of gravity falls outside the machine base as with an inclinable power press, radial drill, or where the centre of gravity is high.

Adhesives

These products have been specifically formulated for TICO pads and are the only adhesives which we have tested, and recommend. We cannot guarantee that any other bonding products will not degrade the TICO pads.

Contact Adhesive S

A special polychloroprene based adhesive for bonding TICO products to concrete, brick or ceramic surfaces.

Marine Epoxy Adhesive

Marine 2 Part Epoxy Adhesive 600g. This two pack epoxy adhesive is designed to provide excellent bonding properties, particularly in applications with large lateral movements such as TICO Bondslip Pipe Supports.

TICO

PLANT & MACHINERY SOLUTIONS

Tiflex house, Liskeard, Cornwall. PL14 4NB UK

tico@tico-solutions.com | +44 (0) 1579 320808 | www.tico-solutions.com

TIFLEX ISO 9001 CERTIFIED

TIFLEX ISO 14001 CERTIFIED

TIFLEX ISO 45001 CERTIFIED

James Walker Group

TREADMASTER

treadmaster flooring

TRACKELAST

A division of Tiflex