Vibration Isolation of Buildings
Attractive plots in central and convenient locations often come with a major disadvantage – specifically, vibration or structure-borne noise that might be caused by:
• Metro or other well used railway lines,
• heavy truck traffic passing by on uneven roads or nearby bridges,
• heavy machinery being operated in neighboring industrial facilities.

Noise and vibrations can significantly reduce the general value of properties. And quite often the extent of ground-borne vibration tends to be initially underestimated. Indeed, it is only once the building has been completed that the consequences are fully felt with floors vibrating, and walls and floors becoming the radiating surface of secondary noise.

Unfortunately, subsequent counter-measures are often difficult to implement or even outright impossible or – if there is a solution – it is likely to take up considerable amounts of time and money.

Therefore, to avoid costly problems in the future, it is imperative that both the building owners and architects consider this highly important issue at an early stage.

The reality is that conventional foundations cannot do much to prevent the transmission of disturbing vibrations onto the building. Measures at the vibration source are often not possible or insufficient. Furthermore, structural measures taken in the building seldom prove to be successful and may actually constrain the creativity of the architect or building owner, or alternatively the functionality of the building.

Eventually, to eliminate risks for people, machines or buildings, it might well become necessary to implement special measures to the building’s foundations, whether it be a residential or office building, a hotel or retirement home, a concert hall, conference center or a modern facility with vibration-sensitive production.

GERB base isolation by steel spring support gives you such an opportunity.

Protection of Buildings from Noise and Vibration

As a standard, GERB designs highly-elastic support systems for buildings to vertical system natural frequencies (support frequencies) of 3 to 5 Hz, and, in special cases, even as low as 2 Hz. Consequently, the vibration attenuation capability of such systems already starts at vibration frequencies as low as 5 Hz, or even lower.

This not only eliminates the transmission of ground-borne noise in a highly effective manner, but also mechanical vibrations with frequencies of 10-20 Hz, which are often found in the vicinity of railway lines, are reduced by 80% or more.

In particular, low-frequency ground-borne vibrations are amplified by building floor resonances and these in turn are especially notable on the higher floors of a construction. Meanwhile, for higher frequency vibrations, the isolation efficiency of the system is even higher.

Even under difficult conditions, the system allows to keep building vibration levels safely below the limits indicated in the respective standards.

The GERB base isolation systems make use of spring elements that feature helical steel springs. Such systems have been used throughout the world for many decades in the field of vibration isolation of heavy machinery with high static and dynamic loads.

Since 1985, GERB vibration isolation systems have also been very successfully and sustainably used for the base isolation of buildings. Prior to this GERB spring systems had already been installed in more than 500 instances to protect buildings from any subsidence damage caused by mining. In such scenarios they automatically compensate for any differential movements of the foundations in case of a fault.
GERB Spring Elements

GERB spring elements are comprised of high-quality helical steel springs that are made of spring steel. These are sandwiched between steel plates or welded steel housings. Stiffness and loading capacity of the elements are defined by the type and quantity of the springs included.

Helical steel springs show a linear load/deflection curve within their range of operation. Their wide deflection range makes them ideal for the elastic support of buildings, enabling the lowest support frequencies that guarantee the highest possible performance. Single spring elements take loads starting from 100 up to 2000 kN or even higher. Due to their high horizontal stiffness, these elements are also suitable to take wind loads. Horizontal restraints are usually not required. The single spring elements are simply fixed to the adjacent structure by means of adhesive resilient pads, which are part of the delivery. Fixing by bolts is not necessary.

Additional measures optionally applied to GERB spring elements include:
- elastic (noise-stop) pads and
- the GERB Coil Resonance Damping System (CRDS)

These measures ensure significant vibration attenuation improvements in the acoustic frequency range.

Steel springs and housings are provided with a special long-term anti-corrosion coating according to GERB work standards.

GERB spring elements are fatigue-proof and maintenance-free. And thanks to reserves in the stresses, they offer an almost unlimited service life.

GERB spring elements for building isolation are designed to international standards. They are produced in company-owned manufacturing plants that maintain a rigorous quality assurance system.
System Design and Installation

A base isolation system is usually designed based on the results of a preceding vibration survey.

GERB spring elements are commonly located either underneath buildings, or in pockets arranged within basement walls, or alternatively on top of walls and columns above ground level.

Types and the number of spring elements are determined in close cooperation between the architect, structural engineer, and GERB’s specialists. A wide range of standardized spring elements is available with closely graduated load capacities, which enable the engineer to adapt the spring system precisely and safely to the individual building loads. This ensures that the final static spring deflection will meet the required dynamic conditions at every support location. In addition, a wide range of elements of different design ensures reasonable wall and column head sizes to a great extent. As a result, GERB spring elements make possible optimized and reliable planning in regard to not only statical and dynamical terms, but also economic terms, which is the general basis of a long-term and effective protection from disturbing vibrations.
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GERB Services

- Worldwide consultancy
- Design of the base isolation system
- Manufacture and delivery of spring elements
- Installation or supervision of installation, fine tuning
- Inspections