BUILDINGS

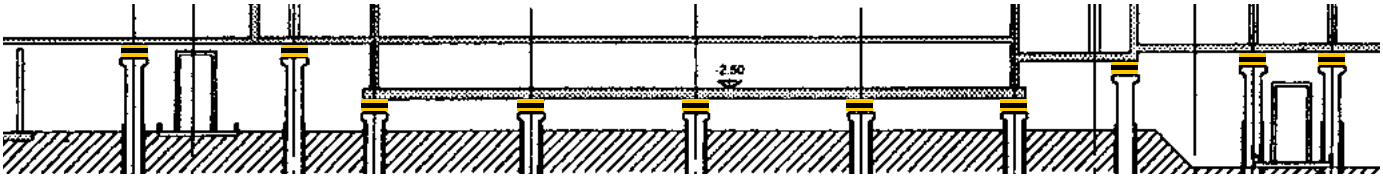
PREVENT EARTHQUAKES, SUBSIDENCES, VIBRATIONS AND GROUND-BORNE NOISE EFFECTIVELY – WITH GERB SOLUTIONS FOR ELASTICALLY SUPPORTED BUILDINGS

Your challenges

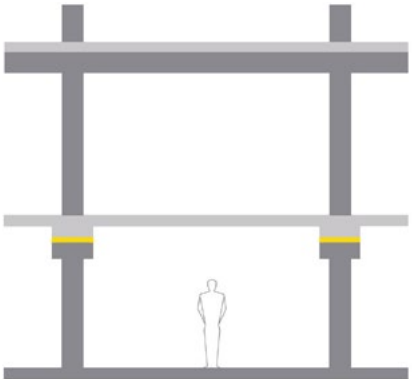
Attractive plots in central and convenient locations often come with a major disadvantage – specifically, vibration or structure-borne noise that might be caused by metro or other well used railway lines, heavy truck traffic passing by on uneven roads or nearby bridges, earthquakes, or heavy machinery 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.

Arrangement of spring elements
supporting Bridgewater Concert Hall, Manchester, GB



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 persons, machines or buildings, and to prevent follow-up costs, it is necessary to implement special measures to the building's foundations, whether it is an apartment or office building, a hotel or retirement home, a concert hall, a conference center or a modern facility with vibration-sensitive production.



Our Solutions

Adaptable to the specific requirements, GERB provides the base isolation by steel spring support or NOVODAMP®, an elastomeric bearing consisting of polyurethane. As a standard, GERB designs highly-elastic support systems for buildings to vertical system frequencies (spring support) of 3 – 6 Hz, and, in special cases, even as low as 1 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, and NOVODAMP® bearings, which are often adequate, depending on the requirements. Before using steel spring solutions for buildings, these systems have been used for many decades in the field of vibration isolation of heavy machinery with high static and dynamic loads throughout the world. Later on, since 1985, they have been installed in several hundred buildings for base isolation. As well prior to this as later, GERB spring systems had already been installed in numerous 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. And finally, in the field of earthquake protection, GERB spring elements combined with Viscodampers® are used in a number of different countries.

Polyurethane bearings have proven themselves as highly elastic building support. The NOVODAMP® solutions from GERB are extremely resistant – against both mechanical (e.g., fatigue and compression set) and chemical wheatering (e.g., water, oil, lubricants and ozone). The systems can be easily installed and are available in different thicknesses. They can be dimensioned and installed for required attenuation ranges. Different materials are available and by varying the thickness it can be adapted to all design loads typical for buildings.

Your challenges

» STEEL SPRING SYSTEMS

+ Highest performance
+ Also for very low frequencies (starting from 1 Hz)
+ For isolation from direct vibrations (e.g., from rail traffic)
+ Interchangeable with prestressed elements
+ Height adjustment possible

» ELASTOMER SYSTEMS NOVODAMP®

+ Cost-effective solution for standard requirements
+ Medium support frequency levels (> 8 Hz)
+ Full-surface or discrete bearings

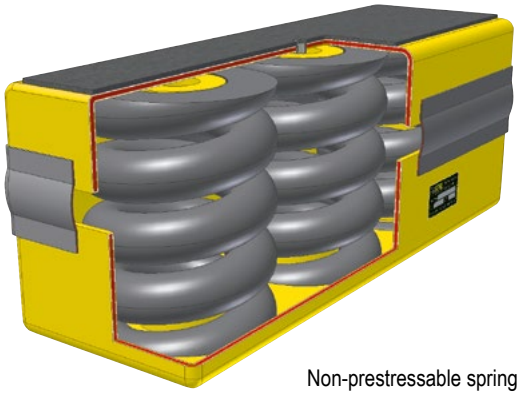
GERB spring elements are comprised of high-quality helical springs made of spring steel. Helical steel springs show a linear load/deflection curve within their range of operation. Their wide deflection range makes them ideal for the elastic support of buildings, enabling the lowest support frequencies that guarantee the highest possible performance. Single spring elements take loads starting from 100 up to 4,600 kN.

Due to their high horizontal stiffness, these elements are also suitable to take all kinds of horizontal loads, like, e.g., wind loads. Horizontal restraints are usually not required. The single spring elements are simply placed on the adjacent structure by means of adhesive resilient pads, which are part of the delivery. Fixing by bolts is typically not necessary.

Additional measures, optionally applied to GERB spring elements, include noise-stop pads and/or GERB Coil Resonance Damping System (CRDS). These measures ensure significant vibration attenuation 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 a long 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.

After definition of required attenuation levels, 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.



Non-prestressable spring element

Prestressable spring element

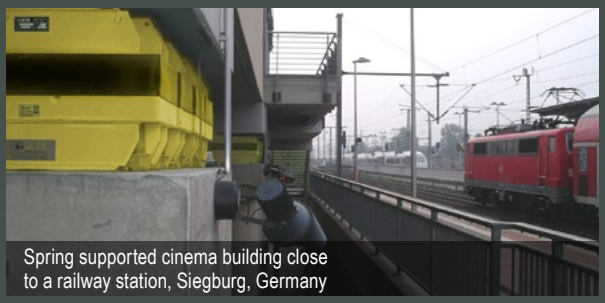
Adjustable spring element

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.

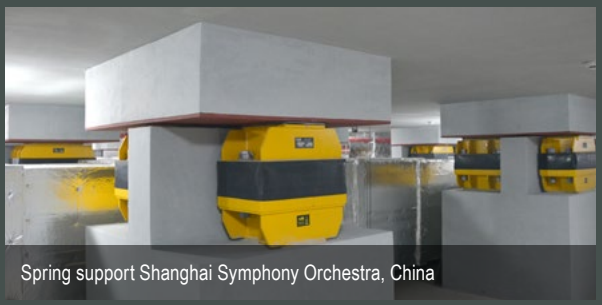
NOVODAMP® is a cost-effective solution. The bearings, discrete pads or full-surface mats can be applied for support frequencies > 8 Hz.

Our experts would provide you with the adequate method of resolution for your specific situation and requirements.


Spring supported cinema building close to a railway station, Siegburg, Germany


NOVODAMP® to support a residential building Paris, France


Positioning of prestressed spring elements, Boston, USA


Spring support Shanghai Symphony Orchestra, China

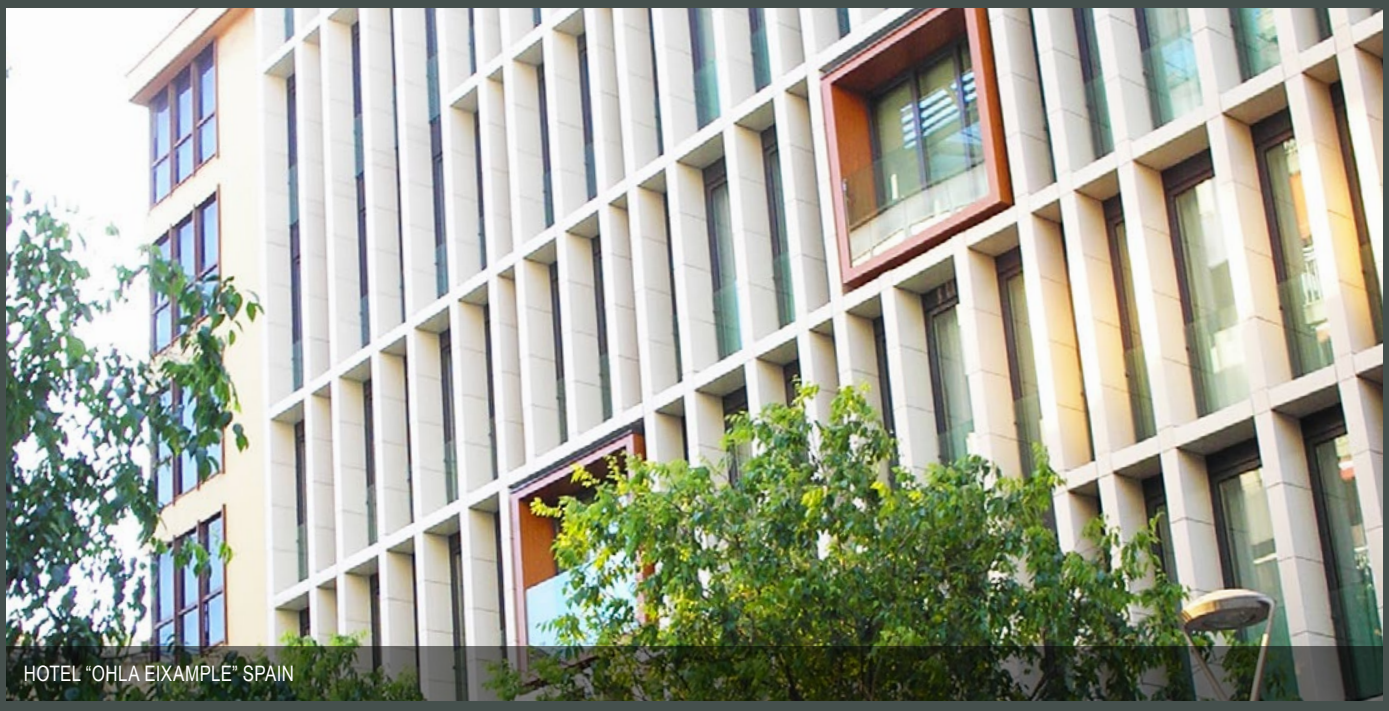

Full-surface support NOVODAMP®, Beijing, China


Spring support in car parks

APARTMENT TOWER “BOSCO VERTICALE” ITALY

MILAN

BARCELONA

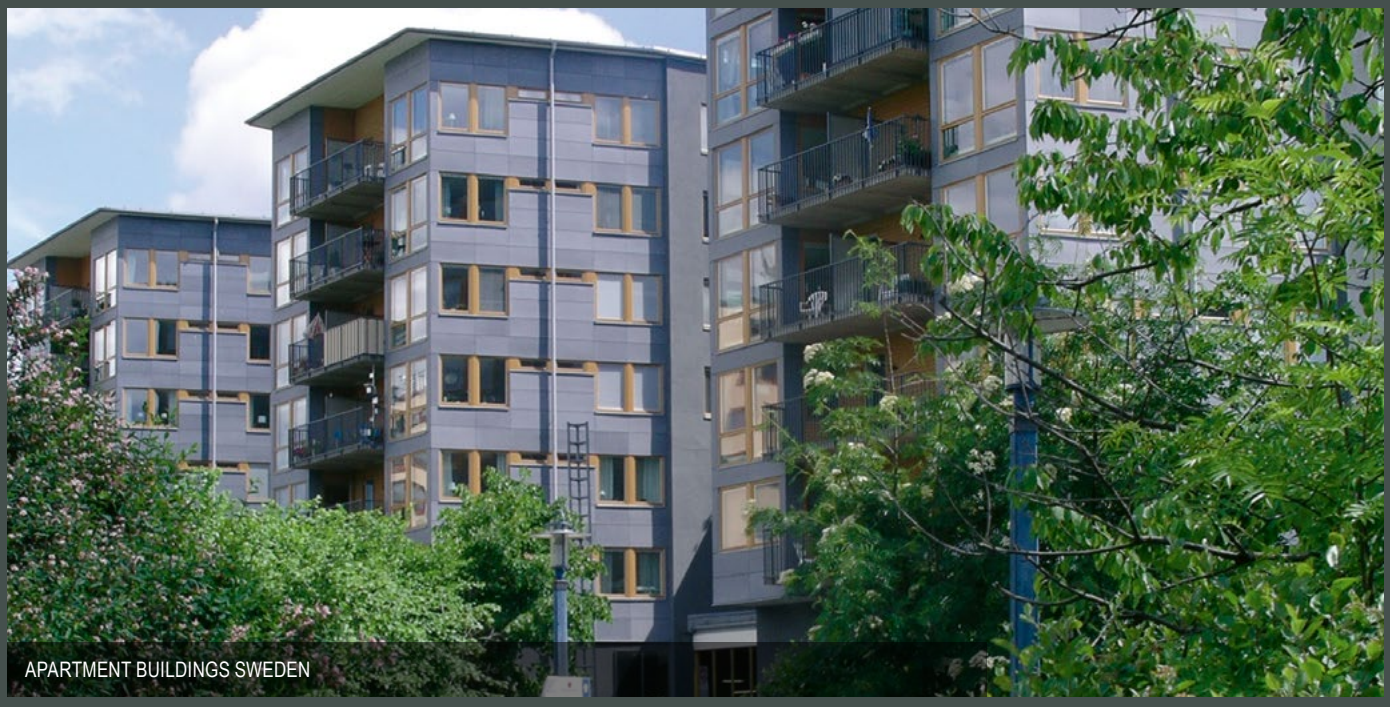


HOTEL “OHLA EIXAMPLE” SPAIN

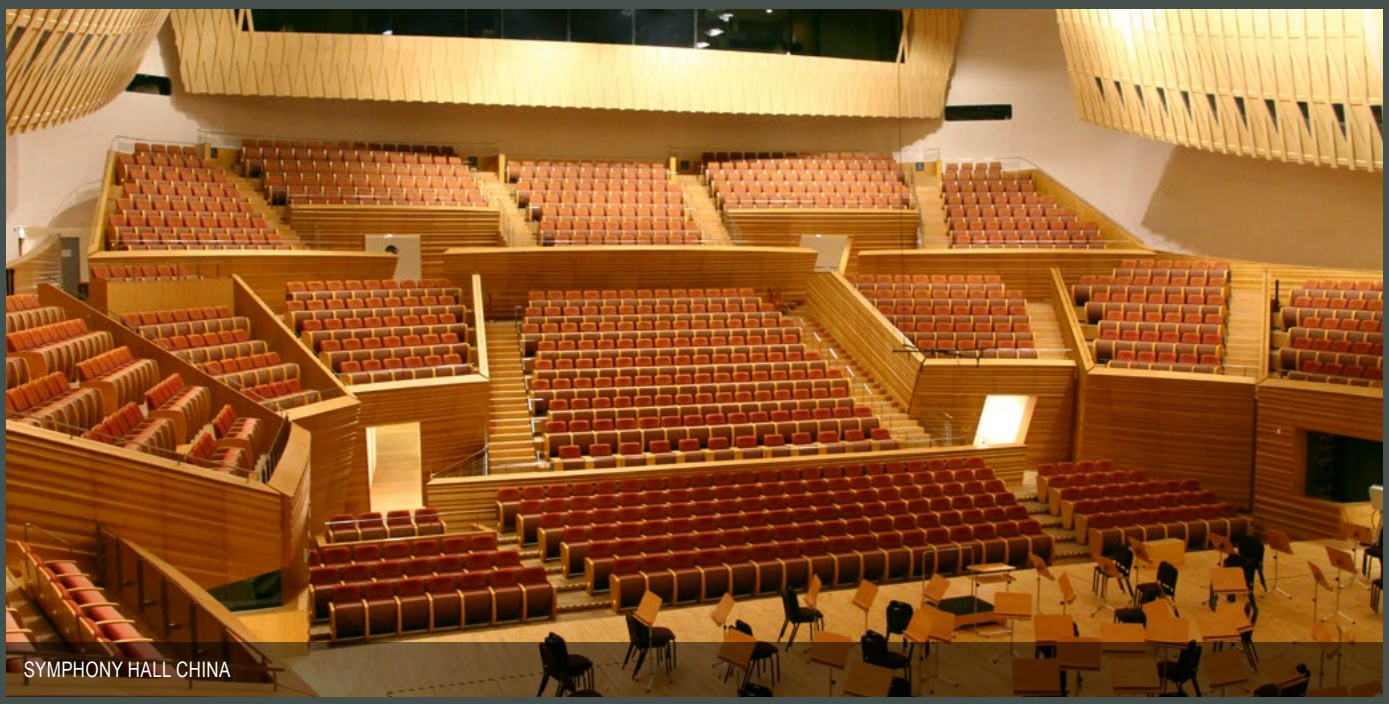
QUARTER "ZAC CLICHY-BATIGNOLLES" FRANCE

PARIS

STOCKHOLM



APARTMENT BUILDINGS SWEDEN



SYMPHONY HALL CHINA

SHANGHAI

BERLIN

FIRST SPRING SUPPORTED BUILDING (1986) GERMANY

"KING'S CROSS ART HOUSE" GREAT BRITAIN

LONDON

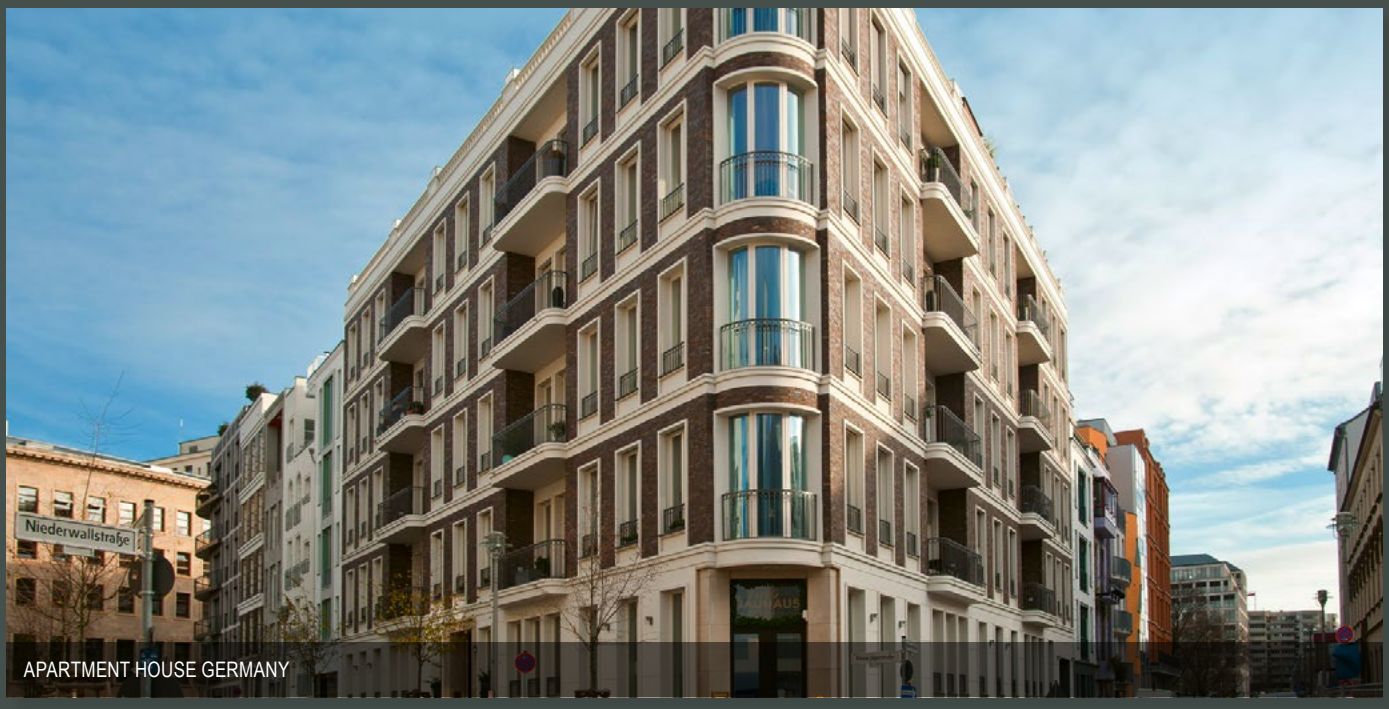
PARIS

OFFICE BUILDING FRANCE

"IMAX" CINEMA GREAT BRITAIN

LONDON

BERLIN



APARTMENT HOUSE GERMANY

Reference List (Selection)

Country	Power Plant / Plant
Argentinia	Mendoza | Student Apartment | Apartment building | 2003
Australia	Sydney | Conservatorium of Music | 2 recital halls | 2001
China	Beijing | Beijing University | University building, base isolation | 2018 Shenzen | Shenzhen Wanke Deep Bay Huiyn Center | Apartment buildings | 2018
Czech Republic	Prague | Czech Broadcasting | Broadcasting building | 2000 Prague | Mrstikova | Apartment building | 2018 Prague | K Rybnickum | Apartment building | 2018
Finland	Lahti | Residential Homes | 4 apartment buildings | 2015
France	Issy-les-moulineaux | Issy cœur de ville | Residential building | 2020 Nice | Iconic | Mixed tertiary | 2020 Nanterre | L'archipel – Vinci Headquarters | Office building | 2020 Paris / NewG | Residential building | 2020 Paris | Maison de l'ordre des avocats | Office building | 2017 Paris | Saussure Rezo & Strato | Office building | 2012 Torcy | Police station | 2021 Nort-sur-Erdre | Residential care home | 2021 Epinay-sur-Seine | Residential building | 2021 Sceaux | Residential building | 2021
Germany	Nuremberg-Fuerth | Gebhardtstraße | Hotel | 2018 Hamburg | Intelligent Quarters | Apartment building | 2017 Munich | Occamstraße | Detached house | 2016 Munich | Klinikum Grosshadern | Hospital | 2014 Berlin | Hausvogteiplatz | Apartment and office building (5 floors) | 2011 Cologne | Cologne-Nippes | 12 apartment buildings (4 floors) | 2007 Berlin | Gendarmenmarkt | Partial isolation of apartment and office buildings | 1996
Great Britain	London | Nr. 1 Grosvenor Square | Apartment building | Under construction Glasgow | Royal Concert Hall | Auditorium (600 Seats) | 2014 London | BBC W1 Egton House | Broadcasting house | 2005 London | 100 New Bridge Street | Office building (9 floors) | 1992
Italy	Milan | Porta Nuova Isola | Apartment building (83 m / 20 Floors) | 2014
Spain	Barcelona | C/ Pujades 279 | Apartment building | 2018 Madrid | Nanotechnology laboratory | Research building | 2011 Barcelona | Torre de Sants | Apartment building (11 floors) | 2008 Barcelona | Hotel AC Sants | Hotel building | 2007 Madrid | Juan XXII | Apartment building | 2006 Castellón | Vall d`Uxo Building | Apartment building | 2006 Madrid | Clinica Aravaca | Hospital | 2006 Barcelona | Cements Molins | Factory building | 2003 Madrid | Las Rozas - Jardin de Nice | Apartment building | 2002 Barcelona | Hospital de la Santa Creu i Sant Pau | Hospital building | 2002 Barcelona | Gran Teatre del Liceu | Opera building | 1998
Sweden	Stockholm | KV Skattsedeln | Building, partial isolation | 2000
Switzerland	Freienbach | Postmatte | Apartment building | 2018
USA	Washington | Washington, DC 401 3rd Street | Office building (partial isolation) | 2007 Dallas/Texas | Dallas Convention Center | Event center | 2003

GERB WORLDWIDE

» Made in Germany. Since 1908. Worldwide.

Interested in detailed information or individual consulting service?

Please contact us!

GERB Schwingungsisolierungen GmbH & Co. KG

Roedernallee 174 – 176
13407 Berlin, Germany

+49 30 4191-0
info@gerb.com

Ruhrallee 311
45136 Essen, Germany

+49 201 26604-0
info@gerb.com

GERB.COM

Certified to: ISO 9001 ISO 14001 DIN EN 1090 BS OHSAS 18001

VIBRATIONS CAN BE CONTROLLED – WHEREVER THEY OCCUR

GERB BUILDINGS | 2022-08