# GERB Viscous Wall Dampers (GVWD)

## Protection of buildings & structures against earthquakes and wind-induced vibrations

# Seismic energy absorption through induced damping instead of intended damage

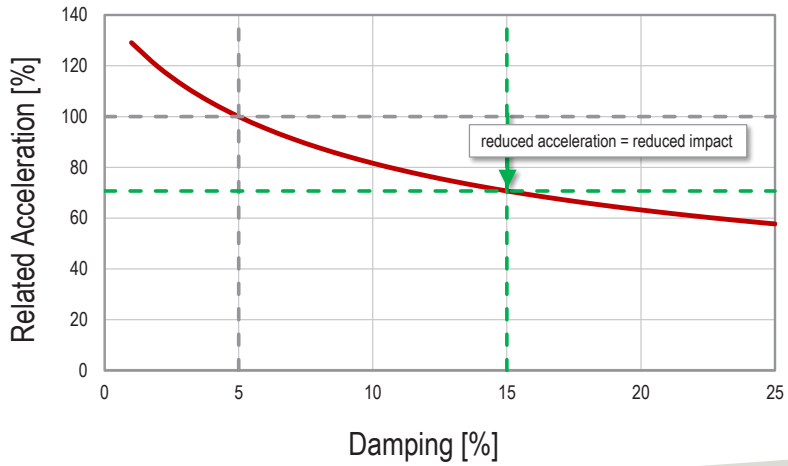
Earthquakes can have different effects on buildings depending on their duration, ground conditions and construction of the building. At the earth‘s surface, the earthquake waves cause the ground to move both horizontally and vertically. In particular, the horizontal forces released during earthquakes endanger the stability of structures. The consequences can be:

- Deformations and corresponding effects due to rapid movements from one direction to another
- Local damages (e.g. of non-structural elements like walls)
- Damaged doors and windows that can no longer be used
- Damage of important machinery where operation cannot be guaranteed
- No access to lifeline structures such as power or water
- Partial or complete collapse of the building

The main target of seismic construction standards is life safety. A safe evacuation of people must be guaranteed at all times. Appropriate construction measures help to significantly reduce the risk of collapse of a structure even during strong earthquakes. In addition, it is advisable to install seismic protection measures adapted to the conditions of structure and environment.

## Seismic protection due to increase of damping

A damping solution using the latest technology can provide additional protection for structures in the event of an earthquake. The reduction of the induced structural responses by the increase of viscous damping can be taken from different national and international standards. Like illustrated in the figure, an increase of structural damping causes the reduction of the acceleration and thus of the earthquake impact on the structure. Seismic stress decreases with increase of damping.



# Protection of buildings & structures against earthquakes with GERB Viscous Wall Dampers

GERB Viscous Wall Dampers (GVWD) are a special design of common Viscodampers®. They are installed in buildings and structures connecting different floors adressing shear deformation between them. In this position they are especially reducing inter-storey drift ratios during wind or seismic excitation. They act in one horizontal direction and increase the overall damping of the structure. Reduced inter-storey drifts result in lower internal forces and moments in all structural members improving comfort, safety and reliability.

GVWDs consist of a steel housing connected to the lower floor/structure, an inner piston connected to the upper floor, and viscous liquid inbetween. During seismic and strong wind excitation, the relative displacement between upper and lower structure causes the piston moving through the viscous liquid. Damping forces are induced and yield kinetic energy dissipation. Depending on the damping required and/or to achieve acceptable relative displacements between the floors, different damper sizes with suitable performance levels can be selected. Several dampers can work in parallel, if required.

GERB Viscous Wall Dampers have been developed and designed to meet the needs of architects and structural engineers. GVWDs come in various sizes and can be installed within the regular wall structures. They are suitable for new builds but also applicable for retrofitting measures.

Earthquake situation with integrated GVWDs

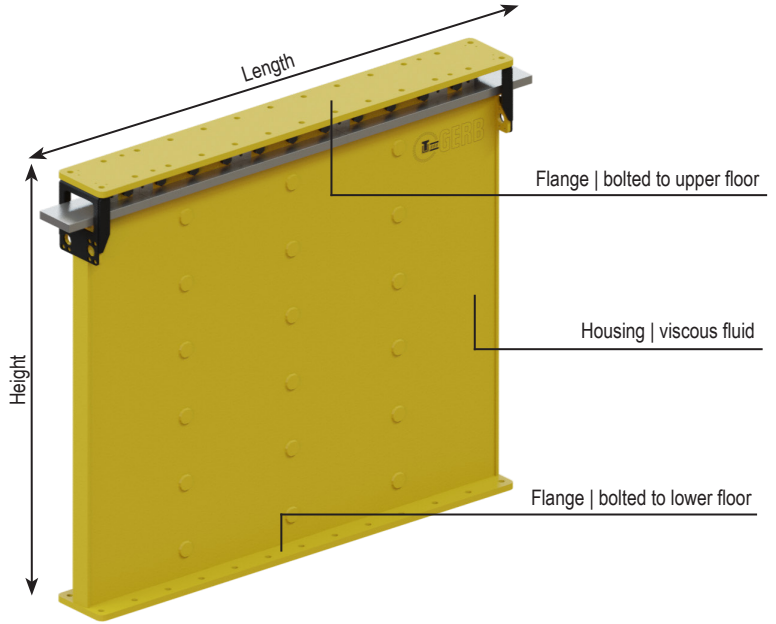
## Standard GVWD types

The table below shows standard sizes of GVWDs, which are available as single or double chamber dampers (SD, DD) at any time. DD types provide twice the dissipation performance of SD GVWDs.

Type designation: GVWD-*SD(DD)-Length/Height*

customized sizes available upon request!

| **Length** (mm) | **Height** (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 750 | 1000 | 1500 | 1800 | 2100 | 2400 |
| 1500 | SD DD | SD DD | SD DD | SD DD | SD DD | SD DD |
| 1800 | SD DD | SD DD | SD DD | SD DD | SD DD | SD DD |
| 2100 | SD DD | SD DD | SD DD | SD DD | SD DD | SD DD |
| 2400 | SD DD | SD DD | SD DD | SD DD | SD DD | SD DD |




GVWD – basic assembly

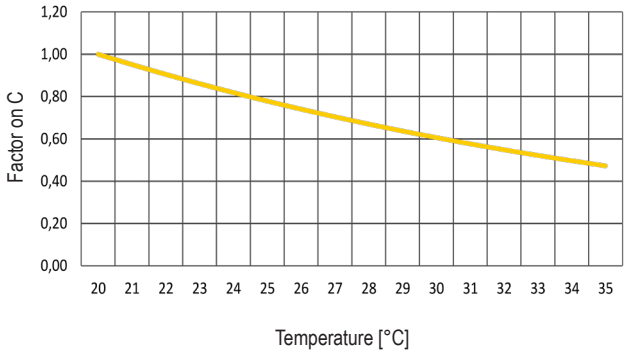
## Characteristics

- Technology well known and proven in all kind of structures worldwide
- Reliable technology as based on viscous shear forces
- Maintenance / abrasion free (no mechnical wear and tear)
- Working in horizontal direction of the wall
- High damping forces / increasing demands lead to increased damping forces

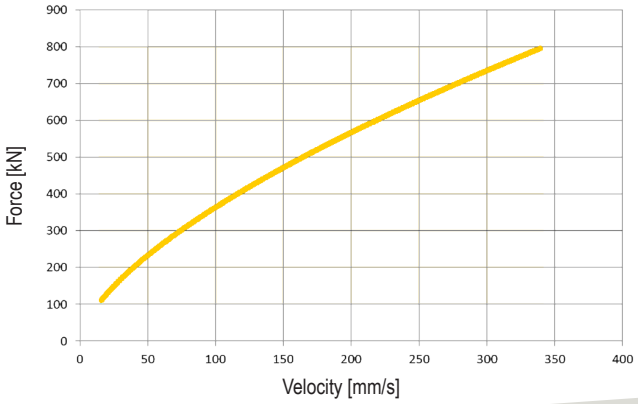
## Fields of application

- Tall and medium to large buildings
- Buildings potentially prone to high earthquakes
- Flexible buildings
- Buildings with a high utility value
- Buildings that require continuous operation
- Retrofitting measures

## Temperature Dependency




## Force vs. velocity




GVWD in a test rig

# Further seismic protection systems designed and delivered by GERB

## Base Control System (BCS)

The Base Control System (BCS) consists of helical steel springs and highly efficient Viscodamper®, which are arranged underneath the structure. The system is flexible in horizontal directions, but possesses also a vertical elasticity. Viscodamper® supply absorption forces in horizontal and vertical directions. In particular the resulting demands (e.g. accelerations, base shear etc.) of the structure can be significantly reduced by using the BCS - due to reduction of frequencies and increase of structural damping.


BCS | Mendoza, Argentinia

## Tuned Mass Control System (TMCS)

Tuned Mass Control Systems (TMCS) are additional mass-spring-damper systems. They provide passively working earthquake protection due to increase of structural damping. The Tuned Mass Control Systems absorb horizontal forces and are practically maintenance-free. Requiring no electrical power supply or any other form of drive or control mechanism they are immediately effective when an earthquake strikes.


TMCS | Bucharest, Romania

## Damper Systems

In addition to the 1-dimensional viscous wall dampers, viscous dampers are also available that generate damping forces in both horizontal directions and in the vertical direction. They provide passively working earthquake protection due to increase of structural damping.

# More than 80 years of GERB viscoelastic dampers (Viscodampers®)

## Performance and variability

- Damping fluids with different viscosities are available for different load and ambient conditions to achieve the requested damping values for given requirements and broad temperature ranges
- For applications in nuclear facilities high radiation resistance is often required whereas outside applications require damping fluids with low temperature dependency
- GERB always strives to use the optimal damping fluid for each application and tests its tailormade solutions on in-house shaking tables

## Certified solutions

- First patent for Viscodampers 1939
- TÜV certification since 1981
- Since then multiple design approvals from international certifing bodies
- Third party performance tests at facilities like BAM, MPA Karlsruhe, Fondazione Eucentre and UC San Diego

## Longlasting solutions

- Reversible damper systems
- GERB has significant project records for seismic protection systems, vibration control systems and tuned mass dampers
- These maintainance free components perform for more than 35 years at certain facilities

## Service and consulting

- Technical consulting measurements and tests
- Research & Development
- Quality Management
- Mounting, Installation & Supervising

GVWDs ready for delivery

**We support you in all areas!**
Contact us via **gerb.com** and together we will find the right damping solution for your project requirements.

# Vibrations can be controlled – wherever they occur


GERB

## Vibration Control
## Made in Germany. Since 1908. Worldwide.


**GERB Headquarters | GERB Schwingungsisolierungen GmbH & Co. KG**

GERB.COM | info@gerb.com

Roedernallee 174 – 176
13407 Berlin
Germany
+49 30 4191-0

Ruhrallee 311
45136 Essen
Germany
+49 201 26604-0


Interested in detailed information or
individual consulting service?
Please contact us!



Certified: DIN EN ISO 9001 et al.


GERB Viscous Wall Dampers (GVWD) | Brochure, EN | As of 2023-03