

# Earthquake-proof fixings



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Many regions in the world are regularly affected by earthquakes. Engineers have developed a variety of methods so that houses, bridges and other structures withstand these stresses up to a certain magnitude. A category of importance is assigned to the buildings depending on their function. The potential stresses caused by earthquakes are thus multiplied by a factor varying between 0.8 for low and 1.4 for high importance (e.g. hospitals).

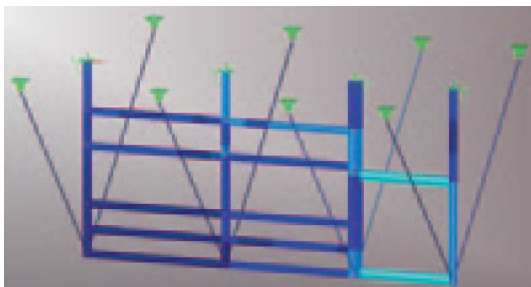
Earthquake loads are based on motion of the ground caused by seismic waves. When they impact a building's foundations, they trigger vertical and horizontal vibrations in the building which are transferred to fixings and media systems. The transferred effects/stresses depend on a variety of parameters:

- ◆ **ground acceleration**
- ◆ **geological subsurface**
- ◆ **ground conditions**
- ◆ **type and construction of the structural system.**

The aim of earthquake-proof construction is to measure structures so that in the event of an earthquake

- ◆ **human lives are protected,**
- ◆ **damage is limited and**
- ◆ **important functions (e.g. the sprinkler system) remain intact.**

Proof of the ultimate limit state design is based on the classification of the design as either **structural** or **non-structural**. The method of detection distinguishes whether it is carried out using an "elastic response spectrum" or simplified with horizontal dummy loads. A structural system comprises various components and plays a significant role in maintaining the stability of a building. A malfunction would generally cause a collapse.



The proof, i.e. the structural analysis and documentation, is determined by means of RStab8.

Over 80% of Sikla fixings are classified as non-structural. Exceptions are "very important non-structural supports and those that are particularly dangerous". They are treated as a structural design to ensure a higher level of safety. However, whether and which of the fixings fall into this category is determined by the project. Although secondary steel constructions are included.



Earthquake-proof fixings should be designed significantly more rigid and/or braced horizontally.

We are often asked whether there are specially approved anchors for earthquake loads. The answer is that this is currently only the case in the USA in conjunction with the ICC approval. In Europe, anchors are approved based on ETAG 001 annex E. Initial approvals, e.g. for chemical anchors are already available.

## Sikla products for earthquake-proof fixings

- ◆ **Stabil D and Stabil D-3G pipe clamps**
- ◆ **Universal joints UG M10 – M16 in conjunction with Mounting kids A/B**
- ◆ **Support Cone SMD 1 in conjunction with Threaded Tubes GR**
- ◆ **Bolt Anchor AN BZ plus**