

Comparison Between Two Systems of Base Earthquake Isolation

One of the proposed systems has four rigid movable bearings and the other one has four elastic bearings. The two systems share the following features:

- self-centering of the building after an earthquake;
- extreme economical competitiveness with all the existing anti-seismic systems, due to the considerable decrease in the seismic energy in the building, making it possible to use slenderer load-bearing structures.

The differences between the above systems are:

- a pendulous effect in the building during an earthquake, in the system with rigid bearings. It is characterized by a very slight vertical rotation of the building, which varies on average from a few seconds to some minutes with soil displacements between a few millimeters and about 150 mm. Moreover, this effect is extremely limited and has no psycho-physical repercussions for the inhabitants of the building;
- the verticality and the immobility of the building with respect to the horizontal translation of the foundation-soil complex, in the system with elastic bearings. The vertical elastic strain of the springs compensates for the variations in the rigid deflection relative to the bearings, due to the inclination of their sliding surfaces. The vertical component of the motion, caused by the sub-undulatory shock, changes building behavior only partially, on account of two phenomena: minor vertical translation of the building and resonance potentiality. In order to prevent the resonance danger, each bearing is equipped with two or four frequency converters automatically started up when an emergency situation (defined by the equality between the vertical component of the earthquake frequency and the building vertical natural frequency) becomes imminent.