

Self-centering Aseismic System with Four Elastic Bearings and Frequency Converters

This system is based on the following principles:

- interruption of the continuity between the building and the foundation-soil complex;
- self-centering of the building after an earthquake.

Each bearing, by means of its elastic strain, and endowed with unique geometrical and elastic characteristics, can automatically compensate the rigid deflection variation relative to the support, which the building undergoes because of the horizontal component of the soil motion. In this way the building maintains the verticality of its own axis unchanged and remains motionless with respect to the foundation-soil complex, which moves. Conversely, the vertical motion, due to the sub-undulatory shock, changes the building behavior only partially during an earthquake. In fact it remains motionless to the horizontal translation, but it may undergo two phenomena:

- minor vertical translation;
- possible resonance.

In order to prevent the resonance danger, the system is equipped with frequency converters, which start up spontaneously in the proximity of an emergency, defined by:

$$\varphi^*_o = \varphi^*_r$$

where: φ^*_o is the natural vibration frequency of the building and φ^*_r is the vertical component of the earthquake frequency.