

Greetings

Development of Seismic Isolation Structures and Activities of the Japan Seismic Isolation Laboratory.

Aiming to develop reliable seismic isolation and vibration control technology that contributes to global safety, the history of seismic isolation structures in Japan dates back to 1983. For the first time, a seismic isolation structure was adopted for a two-story house built in Yachiyodai, Chiba Prefecture. Later, in the 1995 Hyogo Prefecture Southern Earthquake, the excellent performance of seismic isolation structures was confirmed and rapidly spread.

Japan's seismic isolation structures are about 40 years old, and the number of vibration control structures have been increasing since around 1995 are 30 years. The advantages of seismic isolation and damping structures are recognized by society, and at the same time, many technological developments are being promoted.

The superstructure of the seismic isolation structure rests on top of the seismic isolation member that deforms greatly in both directions horizontally while supporting this weight, causing a large movement. However, this movement is slow, and the horizontal force generated in the superstructure is small, and columns, beams, and seismic walls are limited to elastic behavior. By subjecting a limited number of seismic isolation members to a large horizontal deformation, it protects hundreds or thousands of other members of the superstructure. Result in protecting the people living in the building and protects social and economic activities. The vibration controlled damping structure incorporates steel dampers, oil dampers, vibration damping walls, etc. into the entire frame to suppress shaking during earthquakes and to keep the frame in elastic behavior.

In such way, the functions of buildings, towns, and cities can continue even after an earthquake. In order to achieve this, each seismic isolation and vibration control member must have reliable performance. Regarding the verification and understanding of the dynamic characteristics of seismic isolation and vibration damping members, many people involved understood the need for a full-scale dynamic test that reproduced the situation that full-size components are subjected to during actual earthquakes. However, since there is no "large-scale dynamic testing machine" in Japan that can verify the dynamic properties of full-size members. Therefore, it was not possible to conduct experiments that gave actual speeds and deformations to full-scale seismic isolation and vibration control members. On the other hand, in other countries, "large-scale dynamic testing machines" have been installed in the United States, Italy, Turkey, China, and Taiwan, and dynamic experimental verification of full-size components is being conducted.

Finally, the long-awaited "full-scale seismic isolation device testing machine" has been installed and has been in operation since 2023. We must clarify the true performance of seismic isolation and damping members and further develop seismic isolation and vibration control technologies. This technology not only provides high performance in the event of an earthquake, but also reduces the amount

of steel and concrete used in the initial construction of the structure. This alone contributes to the SDGs, but when these structures are hit by a major earthquake, they will be able to continue to be used without being damaged. Furthermore, there will be no need to "unusable, demolish, or rebuild" as before, making a significant contribution to the achievement of the SDGs. This is an important ESG investment for each company that takes into account the environment, society, and corporate governance. I would be happy if we could work with you to create a next era where not only people's lives but also social activities can continue without damage even if they are hit by a major earthquake.

Japan Seismic Isolation Laboratory
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