

9. Application of All-round Isolation System to Actual Structure (Part 2) - Effects of Viscous Dampers Based on Observational Records -

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Isolated buildings tend to be more susceptible to micro-vibrations generated by traffic and other vibrations than non-isolated buildings. In buildings in which precision machines are present, such vibrations may degrade measurement accuracy and productivity. In response, we developed a universal isolation system named “All-round Isolation System” that employs micro-vibration suppression dampers, combined with normal seismic isolation devices, and applied this to an actual building. To evaluate the effectiveness of this system, we performed forced vibration tests and microtremor measurements.

We found that the results of the forced vibration tests can be reproduced by analysis; this means that the effectiveness of this system can be evaluated at the design stage. The micro-vibration suppression damper can be modeled by a Maxwell model within the range of fluctuations in mechanical properties considered at the design stage.

The results of microtremor measurements of the building in operation showed that the two micro-vibration suppression dampers reduced the maximum spectral ratio of response velocity on the first floor to the pit floor by about 30% compared to the case without dampers. The velocity amplitudes in all frequency ranges were below the target values set at design time.

Key words: isolated building, micro-vibration suppression damper, forced vibration test, microtremor measurement