

4. Development of Aseismic Ceiling by Strengthening Connecting Parts

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Ceilings were heavily damaged during the 2011 off the Pacific Coast of Tohoku Earthquake. Improving the seismic performance of ceilings is urgently required. Against the background, the authors conducted studies to improve the seismic performance of ceilings by upgrading ordinary suspended ceilings. First, it was verified that the clips that connected the ceiling joist and ceiling joist support created a weak point in ensuring the seismic performance of ceilings, and a metal was developed to reinforce the clip. Then, the clips of ordinary ceilings were reinforced and the bracing members were strengthened. It was verified that the reinforced ceiling did not fail even under an acceleration of 1.0 G on the surface of the ceiling, a criterion for ordinary ceilings, and that horizontal displacement did not exceed 5 cm. The fittings at both ends of bracing were also improved, and it was verified that no damage occurred under an acceleration of 2.2 G on the surface of the ceiling as proposed in the standards of the Ministry of Land, Infrastructure, Transport and Tourism and that the horizontal displacement did not exceed 5 cm.

Key words: aseismic ceilings, shaking table tests, acceleration on the surface of ceiling, clips, braces