Seismic behavior of braced steel frames with pipe damper (PD)

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Abstract

Steel pipe dampers offer advantages such as a simple structure, low cost, high energy absorption and dissipation, consistent functionality under cyclic loading, and ductility. Dual-pipe dampers show improved performance over single pipe dampers in terms of strength. The current study focused on the structural performance of the dual-pipe system. The seismic performance of steel-framed structures having 4, 8, or 16 stories with either a simple moment frame or a braced frame equipped with pipe dampers were subjected to seismic loading and investigated using the finite element method. The performance of the models was examined by considering the base shear and lateral displacement of the roof as well as the von Mises distribution. The stress distribution caused by the plastic damage concentration increased in the pipe dampers in the 4- and 8-story models and the base shear decreased 50% in the 4-story models equipped with a pipe damper. The results showed that, in the 16-story models, the strength in the damping system should be designed in accordance with the other elements. In addition, the strength of the damping system can be increased by increasing the number of pipes and their thickness.

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