



## High Performance Connections to Mitigate Seismic Damage in Cross Laminated Timber (CLT) Structures

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Walls

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Seismic

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### Summary:

The present study proposes a new connection system for Cross Laminated Timber (CLT) structures in earthquake prone areas. The system is suitable for creating wall-floor-wall and wall-foundation connections, where each connection device can transfer both shear and tension forces, thus replacing the role of traditional “hold downs” and “angle brackets”, and eliminating possible uncertainty on the load paths and on the force-transfer mechanism. For design earthquakes intensity, the proposed system is designed to remain elastic without accessing the inelastic resources, avoiding in this way permanent deformations in both structural and non-structural elements. However, in case of unforeseen events of exceptional intensity, the system exhibits a pseudo-ductile behaviour, with significant deformation capacity. Furthermore, in the proposed system the vertical forces are directly transferred through the contact between wall panels, avoiding compressions orthogonal to the grain of the floor panels. In this research, the connection system was analysed via finite element modelling based on numerical strategies with different levels of refinements. Nonlinear analyses were performed in order to investigate the response of the connection to shear, tension and a combination of such forces. The numerical responses were compared with those of full-scale experimental tests performed on the proposed connection subjected to different kind of loading configuration. The results appear as promising, suggesting that the proposed connection system could represent a viable solution to build medium-rise seismic-resistant CLT structures, that minimise damage to structural and non-structural elements and the cost of repair.

Online Access: Free

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