Capacity of Masonry Loaded by Through-Bolts in Double Shear

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Abstract:

Tests were performed to determine local failure mechanisms in masonry caused by point load transfer at through-bolts. The tests were a part of the Hybrid Masonry Seismic Structural Systems project supported by National Science Foundation under Grant No. CMMI 0936464, as part of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). In addition to the hybrid masonry application, through-bolts can be used for many other applications such as hold down restraint for uplift induced by wind at wall to roof connections, floor and roof diaphragm connections to masonry, etc.

The parameters investigated include distance of bolts from the free edge, positions of bolts relative to the top course of masonry, un-grouted top masonry course, and presence of reinforcement in courses. Test results were compared to current masonry code provisions and ACI code provisions. The authors conclude that the existing masonry code does not adequately address the limit states involved in the local failure of masonry walls when loaded by through-bolts. They recommend modifications of the code based on an analysis of the limit states observed during the limited number of tests performed, comparison with current provisions in TMS 402-13 and an analysis based on ACI 318-14 Chapter 17 provisions.

DOI: 10.70803/001c.138107

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