

Shear and Tensile Strength Equations for Analysis of Grouted Masonry

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Abstract:

Partially grouted masonry walls subjected to cyclic loading tend to exhibit shear and tensile cracking along the bed joints where the bond beams intersect the vertically grouted cores. To model this behavior, the tensile and shear behavior of the grouted bed joints can be determined from shear tests and bond wrench tests of grouted assemblies. Unfortunately, these tests are difficult to conduct, and few tests on grouted assemblies can be found in the literature. Equations for shear strength of grouted masonry and for tensile bond strength of masonry are provided in TMS 402, but these equations are intended to provide the minimum strengths for design rather than the expected strength which is needed to calibrate models for analysis of existing structures. This paper proposes several equations to predict the expected shear and tensile strengths of grouted masonry bed joints as a function of the compressive strength of the grout. Preliminary validation of the proposed equations was achieved by conducting tests on a set of grouted masonry triplet push-off specimens and on a set of bond wrench specimens with the same masonry units, grout and mortar. The proposed equations showed a good fit to the shear and tensile behavior of the test specimens and had a closer match to the test data than the design shear strength equations from TMS 402.

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