Performance of Lap Splices in Concrete Masonry Shear Walls

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Abstract:

This research investigated the performance of lap splices of deformed reinforcing bars in concrete masonry shear walls. Variables investigated in this study include length of lap, size of bar, concentrated versus distributed flexural reinforcement, reduced cover resulting from bars offset in the cells, and method of testing. Nine concrete masonry shear walls incorporating flexural reinforcement lap splices at the bases of the walls were constructed and subjected to in-plane cyclic loading. Additionally, nine concrete masonry panels incorporating identical lap splices were constructed and subjected to direct tension loading. Results from this study indicate no significant differences in the performance of a lap splice tested in direct tension and in-plane flexure. This finding supports the validity of the large amount of data and resulting code design equation based on direct tension loading of lap splices.

Results show that reduced masonry cover significantly affects lap performance, supporting the need to address cover for lap splice design. Walls containing No. 6 (M#19) bars offset in the cells performed poorly with respect to ultimate load resistance, displacement capacity, and peak longitudinal reinforcement stresses compared to walls with similar amounts of reinforcement distributed in the center of the cells, even when provided with lap lengths of 60 bar diameters.

For the parameters considered in this study, the current MSJC lap splice provisions predicted the performance of lap splices for No. 6 (M#19) bars centered and offset in the cells with reasonable accuracy. However, the provisions appear to be overly conservative for lap splices of No. 8 (M#25) bars by roughly 20%, possibly as a result of confinement provided by transverse reinforcement present in the walls. In contrast, test results indicate little or no benefit was provided by the transverse reinforcement for walls containing lap splices of No. 6 (M#19) bars.

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