Effect of Properties of Steel on the Flexural Behavior of Joint Reinforced Concrete Masonry Walls

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Abstract:

Wire bed joint reinforcement has been widely used over the years for control of cracks due to temperature and shrinkage, for continuity in multiple wythe walls and to satisfy arbitrary minimum code requirements in the horizontal direction. However, the structural significance of joint reinforcement in block masonry walls, particularly in seismic areas, is not well established. A comprehensive test program, sponsored by the National Science Foundation, was conducted at Drexel University to study the behavior of joint reinforced block masonry walls built with normal galvanized cold-drawn wires. The walls showed post-peak unstable behavior with very little inelastic deformation and energy absorption capabilities. It was concluded that, due to its brittle characteristics, cold-drawn joint reinforcement is limited in its ability to provide a desirable ductile behavior of masonry walls. A follow-up study, sponsored by Dur-O-Wal, Inc., was conducted to examine the contribution of hot-dipping and stress-relieving on enhancing the properties of joint reinforcement from a ductility standpoint and the effect on the post-peak behavior of the walls. This paper presents the results of testing two walls built with hot-dipped stress-relieved wires under monotonic and cyclic loading along with the previously reported results of similar walls built with normal galvanized cold-drawn wires for comparison purposes. The walls built with hot-dipped stress relieved wires showed a much better inelastic behavior with a post-peak stable response. It is concluded that hot-dipped stress-relieved wires, due to their ductile characteristics, are capable of providing adequate ductility levels and energy absorption capabilities for joint reinforced walls.

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