

Development of Fiber-Reinforced Plastic Wall Ties for Cavity Wall Construction

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Abstract:

Existing steel ties for masonry walls typically have a galvanic protection that may not provide adequate resistance to the corrosive forces experienced by wall ties. In contrast, fiber-reinforced plastic (FRP) materials exhibit high corrosion resistance and can thus provide an enhanced durability and a longer service life. Three types of wall ties constructed of FRP were developed: a unit tie, called a Strip Tie; and two adjustable ties; an Adjustable Angle Tie and an Adjustable Slide Tie. Two criteria were used to develop the FRP ties: compliance with current masonry design and construction code requirements and adaptation of readily available FRP products with little modification. Several tests were performed on the FRP ties: tension and compression tests on the ties themselves and bond tests of the ties embedded in the mortar joints of brick and concrete block prisms. Two different cavity widths (2 and 4 in.) were simulated in the tests. The tests performed reflect possible failure modes experienced by wall ties.

Results indicate that the Strip Tie and Adjustable Slide Tie may be feasible alternatives as wall ties, while the Adjustable Angle Tie did not meet the target load requirements set forth in the program. A recommendation has been made to abandon the Adjustable Angle Tie design and to further pursue the Strip and Adjustable Slide Ties.

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