

Mortar Positioning Effects on Uniaxial Compression Behavior in Hollow Concrete Block Masonry

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Abstract : The uniaxial compressive strength and modulus of elasticity in hollow concrete block masonry (HCBM) represent key mechanical properties for structural design considerations. These properties are obtained through experimental tests conducted on prisms or wallettes and depend on various factors, with the HCB contributing significantly to overall strength. One influential factor in the compressive behaviour of masonry is the thickness and method of mortar placement. Mexican regulations stipulate mortar placement over the entire net area (full-shell) for strength computation based on the gross area. However, in professional practice, there's a growing trend to place mortar solely on the lateral faces. Conversely, the United States of America standard dictates mortar placement and computation over the net area of HCB. The Canadian standard specifies mortar placement solely on the lateral face (Face-Shell-Bedding), where computation necessitates the use of the effective load area, corresponding to the mortar's placement area. This research aims to evaluate the influence of different mortar placement methods on the axial compression behaviour of HCBM. To achieve this, an experimental campaign was conducted, including: (1) 10 HCB specimens with mortar on the entire net area, (2) 10 HCB specimens with mortar placed on the lateral faces, (3) 10 prisms of 2-course HCB under axial compression with mortar in full-shell, (4) 10 prisms of 2-course HCB under axial compression with mortar in face-shell-bedding, (5) 10 prisms of 3-course HCB under axial compression with mortar in full-shell, (6) 10 prisms of 3-course HCB under axial compression with mortar in face-shell-bedding, (7) 10 prisms of 4-course HCB under axial compression with mortar in full-shell, and, (8) 10 prisms of 4-course HCB under axial compression with mortar in face-shell-bedding. A combination of sulphur and fly ash in a 2:1 ratio was used for the capping material, meeting the average compressive strength requirement of over 35 MPa as per NMX-C-036 standards. Additionally, a mortar with a strength of over 17 MPa was utilized for the prisms. The results indicate that prisms with mortar placed over the full-shell exhibit higher strength compared to those with mortar over the face-shell-bedding. However, the elastic modulus was lower for prisms with mortar placement over the full-shell compared to face-shell bedding.

Keywords : masonry, hollow concrete blocks, mortar placement, prisms tests

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