

# Abstract

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## **Parametric Investigation of Three Types of Brick Bonds for Thermal Performance in a Hot Arid Climate**

Bricks are significant building elements that are heavily utilized, whether for structural or ornamental purposes. Nevertheless, little has been published on the relationship between brick bonding, shape, and extrusion, and the impact on energy performance. This paper investigates the impact of different brick bond types and projections on building energy using a custom algorithm. This investigation was conducted in two phases on 24 cases for a south façade. The first phase investigated three different brick bonds for their thermal performance: Running, English and Flemish bonds. The second phase involves parametric simulations to evaluate energy consumption for three extrusion values [baseline "no extrusion",  $\frac{1}{4}$  brick extrusion, and  $\frac{1}{2}$  brick extrusion] and four different extrusion percentages (ranging from 15% to 60%). The first phase results show no significant differences in energy performance for the base case. The second phase results show that the performance achieved was 26% less than the base case. This was accomplished using the Flemish bond with either 30% wall area extruded with half brick length, 60% bricks extruded with quarter brick length. The preliminary findings indicate a relationship between extrusion and energy performance. Further studies should include in-situ testing and investigation of patterns under different climatic zones.