

Effect of Masonry Bond Pattern on Indoor Thermal Comfort

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1. Introduction

In order to make the houses aesthetically more appealing, different bond patterns are used in bonded masonry. This is mainly done in brick masonry. In some cases, walls are left unplastered to expose the brickwork bonded with different patterns. This paper presents a study on performance of commonly used bond patterns in Sri Lanka such as English, Flemish and Rat-trap. Indoor thermal performance of different bond patterns was assessed by measuring indoor and outdoor temperature using physical models. Rat-trap bond shows better thermal performance compared to the others. Computer models were validated with the results achieved from the experimental program. With all these findings, now the house builders, architects and engineers can select the masonry bond pattern suitable for their structures with the proper understanding of its performance.

2. Objectives and Methodology

This research was carried out with the main objective of determining the following:

- a. Influence of bond pattern on indoor thermal performance.

In order to achieve the above objective, the following methodology was adopted

- a. Wall panels were constructed with burnt clay bricks using English, Flemish and Rat-trap bond which can be used for the 225 mm thick walls.
- b. Three models were constructed with different masonry bond patterns [English, Flemish and Rat-trap] to monitor the temperature variation.
- c. Temperature variations were observed and graphically presented for the analysis.

3. Results and Conclusions

Different masonry bond patterns can be introduced to improve the aesthetic appearance of masonry structures. Since bond patterns can introduce different performance variables, it is important to study the effect of bond pattern on strength and building performance. This research has studied such important parameters on thermal comfort. Since compressive strength is the main parameter needed to perform

the structural design of walls, it was studied with three main bond patterns. Flemish and English bond patterns can be used as load bearing wall construction for two or three storey buildings where as the Rat- trap bond is ideal for infill walls or single storey construction. However, the indoor thermal comfort with the Rat-trap bond is much better than the other two bond types. Therefore these bond patterns can be now used in masonry structures with much confidence since the performance of each bond pattern is well established.