

**THERMAL AND ENVIRONMENTAL PERFORMANCE  
OF PRECAST BUILDING SYSTEM**

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Degree of Master Science

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Sri Lanka

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Thesis submitted in partial fulfillment of the requirements for the degree Master of  
Science

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## DECLARATION

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D.S. Munasinghe

The above candidate has carried out research for the Masters Dissertation under our supervision.

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Prof. M.T.R. Jayasinghe

..... Date:

Prof. (Mrs.) C. Jayasinghe

## **Abstract**

Buildings are the living spaces of human beings that usually get-to-gather for number of times and occasions during a day. Quality standard spaces create more secure, comfort and convenient spaces for its users and can provide many advantages in all processes of the building construction, users as well as other supplementary equipment designers. The precast building systems provide some advantage to design quality standard spaces with more secure, comfort and convenience.

This research had been conducted to study the thermal and environmental performance of buildings which were constructed using Expanded Polystyrene (EPS) based lightweight wall panels and these building performances had been evaluated through testing of thermal material properties and computer simulation of the buildings. ASHRAE standard for comfort condition is used to develop computer modelling.

Testing of small scale model and real scale model were developed under this research study and carried out in locations in Colombo and Tangalle, respectively. Testing is carried out over a two weeks period and observations are discussed in this research study. Another model house, which is located in Jaffna, was evaluated and identified significant variation due to EPS based light weight panel used as walling and ceiling material.

Building design strategies were considered for design of thermally comfortable houses and ECOTECT and Climate Consultant 6 software were used to simulate and generate the design strategies. Based on these strategies, a new house plan was created as a model house for dry zone of Sri Lanka to be located at Polonnaruwa. The ECOTECT simulation showed that building could achieve a reasonable thermal performance by applying the strategies identified based on Climate Consultant 6.

**Key words: EPS based light weight wall panels, Thermal Comfort, Building Performance**

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