

## C535042 : MAJOR ARCHITECTURE

KEY WORD : EXTERIOR WALL - COOLING LOAD

KITTIPONG PETCHVARAPA : THE INVESTIGATION OF COOLING LOAD FOR EXTERIOR WALL SYSTEMS: A CASE STUDY OF HOT-HUMID CLIMATE IN THAILAND. THESIS ADVISOR : ASSO. PROF. SOONTORN BOONYATIKARN, Ph.D. 159 pp. ISBN 974-584-592-2

This thesis is a study of the performance of exterior wall systems to protect heat transfer the exterior environment into the building. The performance of exterior wall systems is used for selection of wall material that reduce the cooling load of the air-conditioning system, while maintain economical feasibility, practical in construction and suitability for hot-humid climate in Thailand.

Types of wall systems are categorized in four groups by two factors, heat transmission coefficient (U-Value) and mass. The four categories of wall systems are wall systems with low heat transmission coefficient and light construction, wall systems with low heat transmission coefficient and heavy construction, wall systems with high heat transmission coefficient and light construction and wall systems with high heat transmission coefficient and heavy construction. The experiment of the research is conducted by installing samples of those wall systems,  $2 \times 2 \text{ ft}^2$ , on the wall of a test building facing South. The air temperature inside the test building is controlled at  $21^\circ\text{C}$  by a mechanical system. Temperatures at various points of the experiment are monitored by scientific instruments consecutively for two weeks. Then, the data of the experiment are analyzed to compare the thermal performance and energy consumption of each sample.

The result of the research indicates that the wall systems that have  $0.10-0.20 \text{ Btu/Fft}^2 \cdot \text{H}$  U-value and that have mass below six pounds per square feet can reduces cooling load of wall conduction heat gain by 60 percent comparing with four inches thick brick wall, convention wall. Compared with annual energy consumption, that wall systems are appropriate for using in building in Thailand.