

C 835162 : MAJOR ARCHITECTURE

KEY WORD: BRICK AND MORTAR WALL / HEAT TRANSMISSION / THERMAL INSULATION /
RETROFIT

SITHACHAI WUTHIVORAWONG : BUILDING ENVELOPE RETROFIT TO
REDUCE HEAT TRANSMISSION : A CASE STUDY OF CHULALONGKORN
UNIVERSITY BUILDING. THESIS ADVISOR : ASSIST. PROF.
THANIT CHINDAVINIG, ASSOCIATE. PROF. SOMSIT NITAYA . 144
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The objective of this research is to evaluate the efficiency and properties of proper thermal insulation used on a typical brick and mortar wall of Chulalongkorn University buildings. The retrofit of the building for energy conservation by utilizing thermal insulation on the wall in order to reduce heat transmission.

The Research was conducted in two parts. The first part is the investigation of the physical parts of the building envelope on the Charmchuree Building I , Replacement Educate Building III, Service of Educated Institute Building and The Office of Property Management Building. The second part is a comparative simulation study of thermal insulation installed on a typical brick and mortar wall on a test unit. There were eight types of installations ;three types on the outside and five types on the inside. The EIFS System are on the outside by three sizes of polystyrene foam; 1 ,2 and 3 inch thick. The other five types are gypsum wall with 1 ,2 and 3 inch thick polystyrene foam, Gypsum wall with aluminium foil and 1.5 inch air space, and gypsum wall with foil face glassfiber and 1.5 inch air space.

The result of the research indicates that the overall coefficient of heat transmission of 4 inch thick brick and mortar wall is higher than the value used by calculation method and the coefficient value is not constant. Thermal resistance is not proportional related to heat transmission. A 1 inch thick polystyrene foam insulation could reduces heat transmission by 50% but 2 and 3 inch thick polystyrene foam reduce heat transmission by 60% and 62% respectively. Also both of them has nearly the same payback period (TOU Rate cause faster payback period than TOD Rate by 70%). For the retrofit of building with brick wall, external thermal insulation with thermal resistance 8 hr.Sq.ft°F/BTU is preferred for energy conservation.

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