

***Thermal Conductivity Characteristics of Modified Concrete  
Based on Polyurethane Foams***

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**ABSTRACT.** Thermal conductivity characteristics of modified concrete based on foamed polyurethane were investigated. Two types of polyurethane foams were incorporated in the concrete mix, flexible and rigid foams. The new material classified as (PCC). It was produced by adding the polyurethane components to fresh cement concrete and subsequently curing and polymerizing the material in place. Unguarded hot plate apparatus was designed and fabricated to determine the thermal conductivity characteristics. The experimental program was designed first to choose the optimum curing condition and the best type of foam for modification the concrete mix. It was found that better insulating properties were obtained with rigid foams. Thermal conductivity coefficient (k) was evaluated for mixes with different (P/C) ratios at various temperatures (50-100 0C). It has been found that (k) increased with increasing temperature and decreased with increasing P/C ratio. The reduction in k was about 17 % and 30 % for the studied mixes containing flexible and rigid polyurethane foams respectively compared with that of conventional concrete.

**INTRODUCTION**

Buildings in countries of extreme climate in summer and winter as Iraq need to be cooled in summer and heated in winter, therefore, for the economy scope the heating and cooling loads should be reduced, this aim is nearby when the building materials such as concrete are with low thermal conductivity.

Good thermal insulating properties are attended with concrete of high porosities. Porosity is contained within the aggregates light weight aggregates such as expanded shale or centered fly ash (1) or with paste aerated concretes or cellular concrete (2) in which the aggregate is a uniform cellular structure of air voids distributed throughout a mixture