

# MEASUREMENT OF ENERGY EFFICIENCY OF BUILDING ENVELOPES

Dr. Bing Chen, Dr. David Salmon, Mr. Ed Hancock  
and  
Herbert Detloff

Passive Solar Research Group  
University of Nebraska-Lincoln  
Omaha Campus  
Engineering 236  
Omaha, Nebraska 68182-0181

## ABSTRACT

This report summarizes the work completed measuring and comparing the energy efficiency of highly insulated precast concrete sandwich panels. The work has been performed under a Demonstration of Energy-Efficient Developments (DEED) grant by the American Public Power Association. The project uses an adaptation of ASTM C177-85 and ASTM C976-85, *Standard Test Method: Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box*. Two five-walled test chambers are constructed, tested, and an analytical thermal model developed.

Test data is collected using the two chambers and a 96 channel data acquisition system to monitor system performance and test progress. Two samples of extruded polystyrene, with different R-values, are tested and submitted to the National Institute of Standards and Technology, (N.I.S.T.), for calibration traceability. A test procedure is developed and described for test result repeatability and verification. Results include thermal resistance values for the several panels tested. The measured thermal resistance values were less than expected and explanations explored. Suggestions are made for further study investigating improvements in testing methods and panel construction.