EXPERIMENTAL DETERMINATION OF ABSORPTION PROPERTIES OF BUILDING MATERIALS

Bonnie K. Wiseman
Americhem Inc.
225 Broadway East
Cuyahoga Falls, Ohio 44221
&
Jamil A. Khan[1], Curtis A. Rhodes
Laboratory for Applied Heat Transfer Research
Department of Mechanical Engineering
University of South Carolina
Columbia, SC 29208

ABSTRACT. Most of the polymeric materials for construction and building products are exposed to direct solar energy. Much of this radiant energy is absorbed by the material and leads to an increase in temperature. The heat buildup of polymeric materials often leads to dimensional stability failures of the parts while in service. The premise of the present study is that the heat build up can be minimized by the incorporation of scattering particles into a typical building products material.

The reflectance and absorption properties of four compositions of scattering particles with varying densities and particles sizes were experimentally evaluated at 10, 20, and 30 volume percent. The heat buildup was determined using ASTM D4803. The heat buildup compared to the energy absorption properties as measured via an Integrating Sphere Spectrophotometer. Experimental studies found that none of the formulations provided a reduction in heat buildup. However, one composition of scattering particle caused significant increase in heat buildup. In addition, reflectance data for another composition showed a trend of increased infrared reflectivity, while the reflectivity in the visible region of the electromagnetic spectrum remained the same.