

TEMPERATURE-DEPENDENT THERMAL DIFFUSIVITY OF GLASS/VINYL ESTER COMPOSITE

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Abstract

This study examines thermal parameters, namely diffusivity, specific heat, and conductivity, in a glass/vinyl ester polymer composite over a range of temperatures from 20°C to 150°C. Testing determined thermal properties through the thickness and in the 0° and 90° in-plane dimensions of the E-glass/Derakane 510-A-40 VARTM composite. Transient thermal conditions were generated through pulse heating of the 0.203 m by 0.203 m (8 in by 8 in) specimen. Diffusivity values were determined from temperature response histories using Fick's Second Law of Diffusion, specific heat by Kubicar's method based on energy input and a temperature peak, and conductivity through a relation of diffusivity, specific heat, and density. Diffusivity was found to decrease with increased temperature, while the behavior of specific heat was tied the glass transition temperature of the material. Conductivity exhibited a less evident trend over the range studied.