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Measurements of the effects of pure and salt water absorption on the rate-dependent response of an epoxy matrix

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Abstract

The study reports the measured effects of water absorption on epoxy resin. Epoxy samples were exposed to wet conditioning environments including pure water, NaCl-water solution, and pure water at boiling temperature, measuring absorption as a function of time. Vickers hardness and indentation creep tests were performed and the mechanical response of the material to uniaxial stress was also measured in both compression and tension, at imposed strain rates in the range $0.001\text{--}2500\text{ s}^{-1}$. It was found that the absorption of both pure and salt water caused decrease of stiffness, yield stress and hardness, but only mildly affected the sensitivity of the response to the imposed strain rate and the tensile ductility. Mechanical testing after re-drying of the samples revealed the permanent effects of water absorption.

Keywords: epoxy, strain rate sensitivity, diffusion, water absorption, salt water.

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