



Effect of Aging and Crosslink Distribution on Physical Properties of Rubber Compounds

Abstract

A new technique has been developed to evaluate the fatigue crack growth resistance of rubber compounds extracted from engineered components. Based on the standard DeMattia test, the "Mini" DeMattia test has proven to be very effective in determining the fatigue life of small samples extracted from engineered components before and after service. Its correlation with other fatigue life test methods has been evaluated. The method is particularly useful for studying the effects of aging. Oxidation resistance is a key factor governing fatigue life and is associated with crosslink formation. A range of natural rubber compounds with defined chemical crosslink structures were produced by designed aging experiments and their fatigue characterized via Mini DeMattia testing. This work elucidates the oxidative chemical crosslink structures and their effects on fatigue. The methodology is useful for engineered component development.

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