

Tensile-Recoil-Compressional Behaviour of Kevlar Aramid Fibers

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ABSTRACT

The compressional behaviour of Kevlar type aramid fibres i.e. Kevlar 49, Kevlar 981, and Kevlar 149 has been studied by means of a single-fibre-recoil test method followed by scanning electron microscope (SEM) examination.

The poor compressive strengths of the fibres examined are considered due to the high degree of order and their inherent pleated sheet like structure which originate from the features of nematic liquid crystalline. SEM micrographs of compressed fibres show somewhat different types of failure depending on the variants of the fibres and the supporting environment around the fibres. Namely the fibres with a surrounding support exhibit essentially the formation of kink bands associated with classical shear failure. However the fibres free of a support show additional criss-crossed kink bands due to Euler bending. The difference in failure mechanisms is discussed in terms of the structural characteristics of fibre variants.