

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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KEVLAR FILLED ETHYLENE-PROPYLENE DIENE TER-MONOMER BASED INTERNAL
THERMAL INSULATION FOR SPACE VEHICLES

Abstract

Ethylene-propylene diene ter-monomer (EPDM) is widely used as base elastomer in the internal thermal insulation of space vehicles because of its lower density, longer shelf life and superior resistance to ozone and oxygen. Asbestos fibers are added to EPDM to improve its thermal, ablative and mechanical properties. In this research efforts have been made to replace asbestos in EPDM based thermal insulation for space vehicle by kevlar because asbestos is carcinogenic in nature. Various batches of kevlar filled EPDM base thermal insulation were prepared and evaluated for ablative, thermal and mechanical performance. Ballistic evolution motor (BEM) results showed that kevlar significantly enhanced ablative properties of EPDM by forming a tough uniform char layer on the surface. Experimental results revealed that mechanical properties such as tensile strength and hardness also increased with addition of Kevlar to EPDM. However, elongation at break of the EPDM drastically decreased with the addition of kevlar loading. Thermal gravimetric analysis showed that kevlar also enhanced thermal properties of EPDM. In comparison to asbestos filled EPDM, Kevlar filled EPDM exhibited more hardness and lower elongation which was the indication that kevlar would also give some structure integrity to space vehicle.