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Hugoniot-based equations of state for two filled EPDM rubbers ADAM H. PACHECO, DANA M. DATTELBAUM, Los Alamos National Laboratory, E. BRUCE ORLER¹, Virginia Tech, R.L. GUSTAVSEN, Los Alamos National Laboratory — The shock response of silica filled and Kevlar filled ethylenepropylene-diene (EPDM) rubbers was studied using gas gun-driven plate impact experiments. Both materials are proprietary formulations made by Kirkhill-TA, Brea CA USA, and are used for ablative internal rocket motor insulation. Two types of experiments were performed. In the first, the filled-EPDM sample was mounted on the front of the projectile and impacted a Lithium Fluoride (LiF) window. The Hugoniot state was determined from the measured projectile velocity, the EPDM/LiF interface velocity (measured using VISAR) and impedance matching to LiF. In the second type of experiment, electromagnetic particle velocity gauges were embedded between layers of filled-EPDM. These provided in situ particle velocity and shock velocity measurements. Experiments covered a pressure range of 0.34 - 14 GPa. Hugoniot-based equations of state were obtained for both materials, and will be compared to those of other filled elastomers such as silica-filled polydimethylsiloxane and adiprene.

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