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The Effects of Surface Contaminants on Electrostatic Breakdown Testing MEGAN LOVELAND DEWAAL, JOSHUA BOMAN, JR DENNISON, Utah State University, USU MATERIALS PHYSICS GROUP TEAM — Electrostatic breakdown of baked and unbaked thin film polyether ether ketone (PEEK) was measured under vacuum to determine the effect of surface contaminants on the electrostatic field strength. To quantify these contamination effects which are often not accounted for, half of a sample set received a vacuum bake out to 375 K for 3 days to remove water and volatile surface contaminants, while control samples did not. Sample storage in dry nitrogen minimized recontamination from subsequent exposure to air. A voltage was applied across the samples, increasing at a rate of 20 V per 4 sec in a parallel plate geometry at room temperature, until breakdown was observed as an abrupt increase in conductivity. The absence of these contaminants was found to decrease electrostatic breakdown potential and to decrease frequency of surface flashover events which is crucial to collecting accurate and reproducible breakdown data. Electrostatic breakdown tests of uncontaminated samples demonstrate significant differences which impact how highly disordered insulating materials such as PEEK react in environments such as space where they may experience prolonged heating and outgassing under vacuum.

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