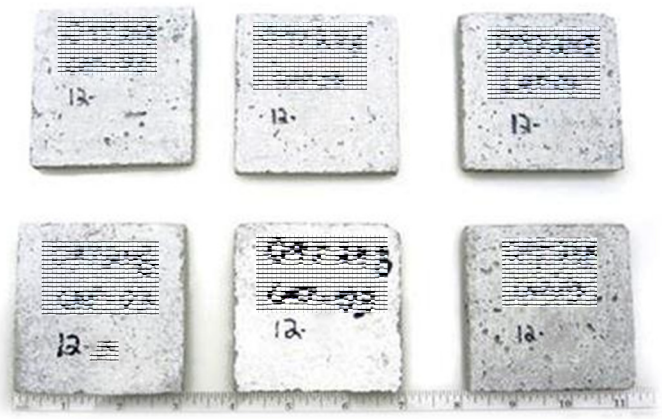
INTRODUCTION

360° Test Labs has been retained to test a supplied ceramic sample for Volume Resistivity and Dielectric Breakdown capability (six, similar samples were provided and are pictured). The following presents test results.



Volume Resistivity

Volume resistivity was determined by utilizing an AEMC 6505 megohmmeter and a Tektronics/Keithley 8008 resistivity test fixture to perform a procedure based upon a method described in ASTM D257.

In this ASTM based method, electrodes on either side of a precisely measured sample are charged with a voltage sufficient to cause current flow. The volume resistance can then be read directly or determined by dividing the applied voltage by the current. Volume resistivity is then calculated from the volume resistance, effective electrode area and the thickness of the sample.

Figure 1: AEMC Megohmmeter and Keithley resistivity test fixture

Image 1: Test Being Setup for Measurement

Sample thickness variation was quite evident, therefore a series of precision measurements around the perimeter of the sample were averaged to obtain an estimated thickness for calculating the volume resistivity.

The measured resistivity of the sample was much lower than had been expected. An insulating material had been assumed due its ceramic nature, yet this material was found to be moderately conductive. Safeguards within the AMEC instrument prevent higher voltage application with the experienced level of conductivity.

Thick (cm)	Voltage (DC)	Current (μ)	V/Current	MΩ-cm
8.2008	510	18.93	26.94	75.23

Table 1: Volume Resistivity Test Data

Dielectric Breakdown

Dielectric breakdown applies to poorly conductive, insulating, materials and as noted above the sample material had been found to be moderately conductive. Moderately conductive materials are not dielectric, therefore cannot breakdown, and instead typically fuse due to heat generated by current flow.

Using an AEMC instrument setup with only 40 volts DC, current flow through the sample was measureable. When 250 volts DC was applied, the current flow through the sample was sufficient to be considered potentially lethal.

To confirm the above finding, an L-Rod M100AVS5 Hipot tester was setup, and that tester failed the sample at less than 300 volts AC. Normally 2800 volts AC would be applied to a device under test with the utilized L-Rod tester.

Figure 2: Hipot tester and test fixture

Note that known samples of Kydex, PVC, Teflon and Wood were also concurrently tested to ensure validity of test configurations.