Tech Brief

Refractory Paints for High Voltage Insulators

Eltron Research & Development's flexible, ceramic coatings create a tough refractory layer that has shown excellent adherence to a variety of polymeric substrates. These coatings were developed for the Air Force Research Laboratory at Kirtland Air Force Base as refractory coatings for high voltage plastic insulators used in pulsed power applications. The coatings are applied as a paint which requires only a room temperature cure, is water-based, sprayable, and contains no volatile organic chemicals (VOCs).

Refractory coatings on polyethylene show higher breakdown strength than other ceramic insulator surfaces.

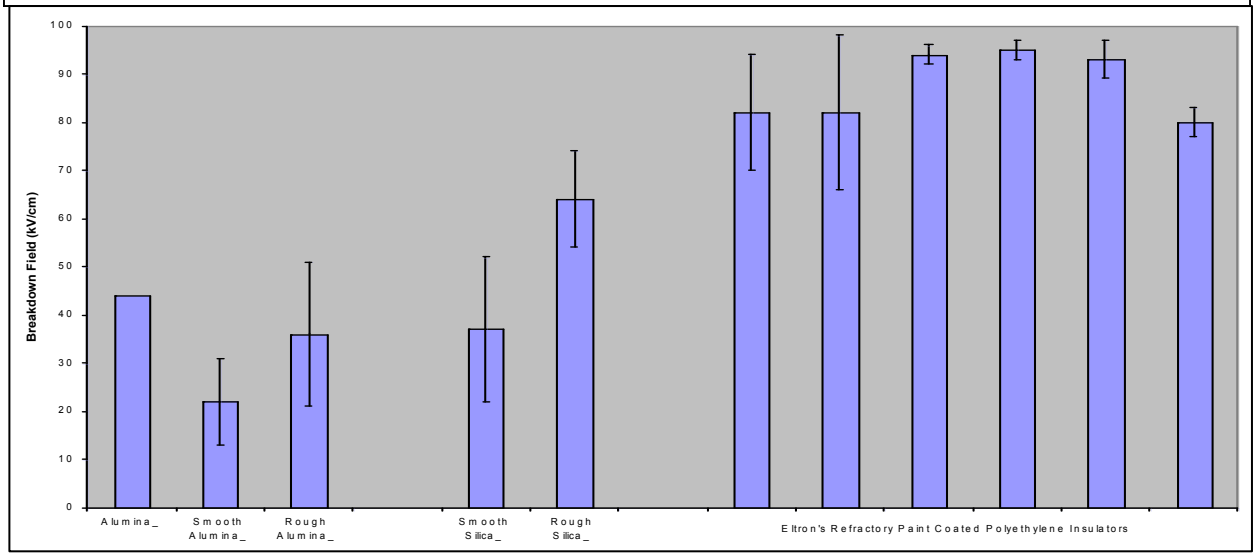

Figure 1. DC surface flashover fields for Eltron Research & Development's Refractory Coated HDPE insulators compared to literature values.

[1]Halverson, W., et al., IEEE Transactions on Dielectrics and Electrical Insulation (1996) **3**, 108.
[2]Yamamoto, O., et al., IEEE Transactions in Dielectrics and Electrical Insulation (2003) 10, 550.

Figure 1 shows the surface flashover performance in vacuum of Eltron's refractory coated plastic insulators, compared to insulators made of refractory ceramics such as alumina and silica. Eltron's coatings exceeded the surface flashover field of common electrically-insulating ceramics. In addition, the refractory coatings have excellent high-temperature resistance (>1000°C) compared to polyethylene (~120°C).

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When an insulator is placed under high voltage, surface breakdown or flashover can occur that causes a spark to travel across the surface of the insulator from one electrode to the other. This breakdown spark generates plasma which can exceed 10,000 K. With plastic insulators, this plasma causes tracking failure. When polyethylene and refractory coated polyethylene are exposed to high voltage conditions, refractory coated polyethylene is able to withstand over 1000 flashover events without delamination and has greatly exceeds the tracking resistance of uncoated plastic insulators (see **Figure 2**). In addition, refractory coated high density polyethylene cylinders have withstood surface flashovers of 43 MW, with minimal surface degradation.

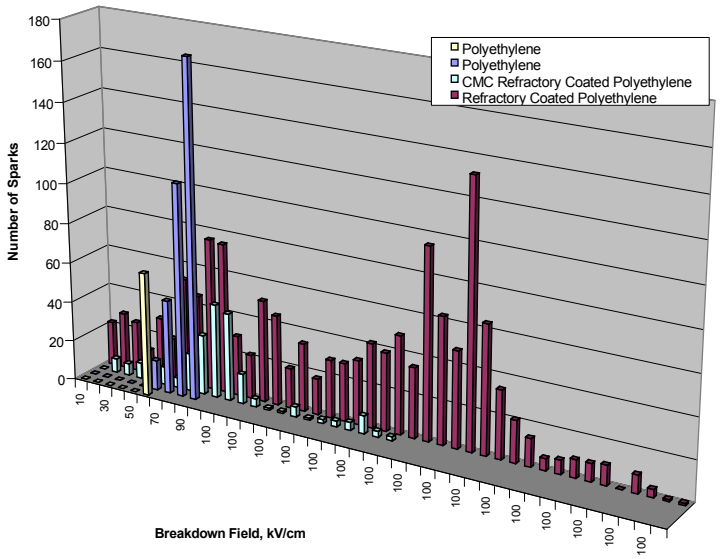

Figure 2. Tracking resistance of refractory coated HDPE cylindrical insulators compared to uncoated polyethylene. Refractory coated HDPE can with stand over 1000 more flash over sparks than uncoated polyethylene.

Stage of Development
Samples are available for 3rd party testing.

Contact Us

To discuss the possibility of entering into a business relationship with Eltron, contact the Business Development Group at business@eltronresearch.com.

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