DuPont™ Kapton® 200FWR919 & 150FWR019

Insulation Substrate

General

DuPont™ Kapton® 200FWR919 and 150FWR019 are polyimide-FEP fluoropolymer substrate materials that have a unique balance of electrical, thermal, and chemical resistance properties. Proper insulation design and application of these materials will provide a tough, high delectric strength insulation with improved hydrolysis resistance compared to other commonly used polyimide containing materials. Listed below are several recommendations that should be considered when insulating wire with the FWR materials.

Recommended Overlap

Laboratory testing indicate that the improved hydrolysis resistance of the FWR films is best realized when the tapes are used with greater than 50% overlap. DuPont recommends that these tapes should be applied with a minimum overlap of 64% in order to obtain significantly improved hydrolysis resistance over standard polyimide-fluoropolymer substrates. Multi-tape constructions have considerably better hydrolysis resistance compared to single tape insulation designs.

Taping to Conductor

The modulus of elasticity of the polyimide film used in the FWR materials is approximately twice as high as the modulus of elasticity of standard polyimide films. The resulting higher stiffness of the FWR films will require higher taping tension to make the tape conform to the shape of the conductor. A tension increase of approximately 2X should be expected over the tension used on equivalent Kapton® FN products.

Fusing the Tape to the Conductor

The melt point of the FEP used on the FWR materials is the same as the melt point of the FEP in the standard FN materials. An insulation fusing temperature of 315°C to 320°C is recommended for good tape-to-tape and tape-to-copper bonding. Infrared or induction heating techniques can both be used to fuse the FWR material.

The moisture permeability of the polyimide WR base material is much lower than the permeability of standard HN type polyimide. This lower permeability rate will reduce the ability of any expanded water vapor in the tape from escaping during the fusing operation. Therefore, in some cases, it may be necessary to pre-dry the FWR tape before the taping and fusing operation. Placing them in a low humidity environment for 72 hours can dry FWR materials. The FWR material can normally be dried by placing the roll of tape in a low humidity warm environment for 72 hours. The use of a once-through air convection oven is a reasonable way to dry the material. The humidity inside the oven should be less than 10% RH with temperatures ranging from 85°C to 100°C. The dried material should be taken directly from the drying oven and applied to the wire as soon as possible. Storing the dried film in an environment with relative humidity greater than 10% will allow the material to absorb additional moisture.

Forming Coils with Wire Insulated with FWR Materials

The level of stress in the insulation of a formed coil is dependent on many factors, including the stiffness of the insulation material. FWR products are stiffer materials than FN products and will have higher levels of stress than FN materials used in the same conditions. The higher stress in the FWR material makes it more difficult to prevent lifting of the tape edges in the curved sections of the coil. Care should be taken to use FWR insulated wire in coil designs where the tape lifting is minimized.

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