# Manufacturer of Insulating Gloves Switches to Vertrel® for High-Voltage Applications

## Synopsis

Because of superior materials compatibility and dielectric properties, Vertrel® XF was selected by a manufacturer of insulating sleeves and gloves for the quality assurance function in high voltage product testing.

## Electrical Testing

When technicians and linemen work around high voltages, it is crucial that they be completely insulated from the dangerous circuits upon which they are working. Importantly, the insulation must be prefect because even an invisible flaw in an insulating sleeve may be sufficient to serve as a path for a catastrophic accident.

One company which makes insulating sleeves and gloves needed to change their solvent in their sleeve testing equipment. The test involves submerging the sleeves in an insulating bath of solvent, running an electrical current through the materials and measuring any leakage, which would indicate a flaw in the sleeve. Until recently, CFC-113 was used for this critical task. Importantly, the plastic components must remain unaffected by the solvent.

Vertrel® XF showed superior performance when compared to CFC-113 and other solvent alternatives. During tests, the fluid held AC voltages in excess of 40,000 volts during testing of a sleeve at an immersion depth of 5.08 cm (2 in) with no flashover through the fluid. Based on these tests, DuPont recommends a minimum immersion depth of 7.62 cm (3 in) in commercial testing.

Other observations made during the testing included: no hang-up of water globules on the rubber, eliminating the need to time-delay the test or pre-coat the sleeves with vegetable oil. Also, there was no observed effect on the rubber sleeves after repeated exposures to the solvent.

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## Material Compatibility

Tesing showed most elastomers are compatible with Vertrel® XF. Table 1, below, summarizes test results on short-term exposures of unstressed elastomers. Compatibility was defined as a weight change of less than one percent after immersion for 15 minutes at room temperature.

It has been observed that some elastomers will swell upon exposure to the solvent and will, in most cases, shrink back to within a few percent of original size after air drying. Swell, shrinkage, and extractables are strongly affected by the compounding agents, plasticizers, and curing used in the manufacture of plastics and elastomers. Therefore, thorough testing prior to wide-scale deployment is particularly important in this application.

Additional long-term compatibility data simulating exposure of the most common components and materials is available from DuPont upon request.

### Table 1 -- Elastomer Compatibility Test Results on Insulating Sleeves

**Compatible:** Buna N, NBR, Nitrile Buna S, SBR, GRS, Butyl Rubber, IIR, Chlorosulfonated PE, EPM, EPDM, Nordel®, Polysulfide, Natural Rubber, Isoprene, Neoprene, Polyurethane

**Incompatible:** Viton® B, Silicone

**Notes:** Material composition varies depending upon compounding agents, plasticizers, processing, etc. Specific materials should be tested for compatibility with solvent.

**Test Procedure:** Immersion,15 Minutes at Room Temperature, weigh and measure.

## About the Solvent

Vertrel® XF is a proprietary hydrofluorocarbon fluid with zero ozone depletion and low global warming potential. Nonconductive, it is ideally suited for use in high voltage applications, particularly those in which the materials of construction may be vulnerable to stronger solvents. Vertrel® XF can replace chlorofluorocarbon (CFC-113 or Freon® TF) and the perfluorocarbon fluids (PFC-5052) currently used in this application.

Vertrel® XF is a clear, colorless liquid which dries very quickly with very little aroma. Unique physical properties include a higher boiling point and lower surface tension when compared to CFC-113. This, combined with high dielectric strength, nonflammability, chemical and thermal stability, low toxicity, and ease of recovery by distillation and filtration make Vertrel® XF ideal for this application.

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