



Materials Engineering Branch

TIP*



No. 011 Solithane 113 in High Voltage Applications

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Over the years, Solithane 113/C113-300 compound has been one of the more popular products used for space flight hardware for potting and/or conformally coating electronics and some non-structural adhesive applications. There are several variations available in the formulation of this material that make it quite versatile and rather forgiving to mistakes made in measuring the components of the mixture thus accounting for its great popularity.

Several years ago, the Materials Branch began to discourage the use of Solithane 113/C113-300 for high voltage (>200 volts) applications when it was discovered that the material has a tendency to develop cracks that provide a mechanism for arcing or corona discharge. More recently, Solithane has been found to have another potentially serious limitation in its usefulness for space applications. This limitation involves the embrittlement of the product at a temperature of about 0°C and below depending upon the formulation used.

This property of the material is called the T_g or the glass transition temperature. In cases where Solithane is used for potting, this fact is especially significant. In the case of conformal coatings, even though the potential for failure exists, it is generally not as great. In the majority of cases in which we have been involved, the temperatures experienced by the hardware in test and/or flight have been significantly below the T_g for Solithane. Under these conditions, the risk of failure is great, particularly if high voltage is involved. The result has been numerous failures in bench testing and even in flight where long-term fatigue becomes a significant factor.

Because polymer technology has expanded markedly in recent years, alternate materials have been developed which have T_g s well within the range necessary for many low temperature applications. In recent years we have had great success with the use of Uralane 5750LV and 5753LV for conformal coating and potting applications. Another product that has seen much use for potting and conformal coating applications is Conathane EN-

11. For very high voltage applications (>2.5 kV), we have had success with parylene chemical vapor deposition as a conformal coat.

In summation, one must determine the use profile of a material in test and flight to be sure the capabilities of that material will not be inadvertently exceeded.