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TECHNICAL NOTE

Stabilant 22 in Military Applications

Introduction

Stabilant 22 is an *initially non-conductive* liquid semiconductive block polymer that when used in thin films within contacts under the effect of the electric field switches to a conductive state. The electric field gradient at which this occurs is established during its manufacture to happen only in the microscopic spaces within metal contact pairs. The material remains nonconductive between adjacent contacts in multiple pin connectors that do not regularly experience extreme voltages.

Thus, when applied to electromechanical contacts, Stabilant 22 provides the connection reliability of a soldered joint without bonding the contacting surfaces together.

Chemically, Stabilant 22 is a polyoxyethylene-polyoxypropylene block polymer with molecular weight of about 2800. It has a very low vapor pressure and therefore there is no appreciable loss of material from evaporation. In its undiluted form at room temperature, Stabilant 22 has the viscosity of a medium weight motor oil, although it thins out with increasing temperature. At temperatures exceeding 200°C, it begins to decompose into the monomer units it is formed from. Further physical/chemical data can be obtained from our Safety Data Sheets.

Military Equipment – Special Requirements

Electronic and electrical contacts, like other related equipment, must be rated for more demanding environments for use in military equipment. Temperature ranges are wider than those required for commercial or even automotive use. We at D.W. Electrochemicals Ltd. have provided Stabilant 22 contact treatment solutions for several decades. Evaluation for critical applications began with field testing at the Canadian Forces Establishment at Cold Lake, Alberta. Subsequently, we were issued NATO supplier number (CAGE) and NATO Stock Numbers are in place for several of our most used products (these are listed at the bottom of this note).

Stabilant 22 products are currently used for service/installation in aviation, marine and land transportation equipment, where long term performance under harsh conditions is needed.

Service Life and Reliability

Stabilant 22 has a declared shelf life of 15 years, a conservative figure backed up by testing. However, some customers have reported improved equipment reliability over much longer times. In many cases, the equipment on which it is used will be retired for obsolescence before the Stabilant must be renewed. The long-lasting effect of the Stabilant film on contact surfaces begins with preventing corrosion from initiating or progressing. Finally, the lubricating effect reduces contact fretting wear – avoiding the need for additional products like dielectric greases.

These properties mitigate the effects of temperature extremes and cycles. The effect of air pressure changes is likewise prevented from causing corrosion or mechanical wear of the type suffered by untreated contacts. Tenfold to one-hundred-fold increases in the service life of connectors are not unusual – even high quality gold plated contacts last longer due to wear reduction.

Convenience and Speed of Application

Stabilant products are used in manufacturing, in service facilities and in the field.

Ease of application is the goal of our product variants: *Stabilant 22* is the concentrated product. *Stabilant 22A* is diluted with isopropanol (75% alcohol by volume) and *Stabilant 22E* is diluted with ethanol (also 75% alcohol). We generally sell the 22A formulation for ease of use in multipin connector cases and for enclosed units such as many types of switches. *Stabilant 22E* is preferred in many military uses, as its boiling and freezing points differ from isopropanol (about -114°C vs -88 and 78 vs 80 for BP).

All of these are available in the form of a Service Kit, which contains a bottle of Stabilant (either 22, 22A or 22E) along with several microbrush applicators and an instruction sheet, all in a capped cardboard tube – ideal to include in any toolbox.

Reliability and Security of Supply

Many users of Stabilant 22, finding it indispensable as a regular service item, wish to be assured of the relevant supply chain considerations. The application of this product on connectors in aircraft and other critical equipment makes it, by definition, a *strategic material*. D.W. Electrochemicals Ltd. has always sought to comply with all regulations regarding manufacturing quality and import/export. From time to time, new regulatory frameworks are implemented, and we strive to provide updates to all of our customers, whether by correspondence or in our published documents.

Information and Confidentiality

We provide Safety Data Sheets, Technical Notes and Application Notes to every customer and distributor with each shipment. These are also available from us directly by request, on paper or digital form, with many downloadable from our website. We have company policies respecting the confidentiality of all entities we deal with. All customers - even prospective customers - can be assured that no information about companies or individuals will ever be disclosed unless demanded by *written legal order*. While many customers can obtain Stabilant products through our distributors, any military organization or contractor may choose to deal with D.W.E. directly.

Safety and Environmental Concerns

Even in military use, the safety concerns of all chemical products must be quantified. Stabilant 22, when used as directed, is very safe. It has very low toxicity although ingestion should be avoided. Externally, no skin reactions (including sensitization) have ever been observed. In its undiluted form, it has very low flammability, although it will decompose and burn in a fire. Safety concerns are largely due to the presence of the alcohol content of the diluted products (22A / 22E).

In the United States, Stabilant 22 is not subject to the Toxic Substance Control Act (TSCA) nor reportable under SARA Title III. Our alcohol diluted products are shipped with respect to the relevant regulations for hazardous goods.

NATO Identification for military procurement

CAGE (NATO Supplier Code) for D.W. Electrochemicals Ltd: 38948

5ml Stabilant 22 (Concentrate)	NATO Stock Number 5999-20-002-1112
15ml Stabilant 22 (Concentrate)	NATO Stock Number 5999-21-909-9981
15ml Stabilant 22A (Isopropanol Diluted)	NATO Stock Number 5999-21-900-6937
15ml Stabilant 22E (Ethanol Diluted)	NATO Stock Number 5999-21-909-9984

Stabilant products are patented. Because the patents cover contacts treated with the material a Point-of-Sale license is granted with each sale of the material.

SAFETY DATA SHEETS ARE AVAILABLE ON REQUEST

NOTICE

This data has been supplied for information purposes only. While to our knowledge it is accurate, users should determine the suitability of the material for their application by running their own tests. Neither D.W. Electrochemicals Ltd., their distributors, or their dealers assume any responsibility or liability for damages to equipment and/or consequent damages, howsoever caused, based on the use of this information.

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