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Number 19

TECHNICAL NOTE

Stabilant 22 – General Technical Data

Introduction

Stabilant 22 is a liquid polymer that is applied to electrical / electronic contacts – connectors, switches, socketed components, etc. It remains as a thin coating on the metal surfaces to enhance their conductivity, protecting the contacts from corrosion and mechanical wear. Here we explain some of the technical aspects of how this works.

Specifically, it is a block copolymer – polyoxyethylene / polyoxypropylene – basically described as a polyglycol, with a molecular weight of about 2800. It has low vapour pressure and high viscosity (about like a medium weight motor oil). It is stable in most chemical environments and does not react with the materials used for insulators or electrical contacts, including plating and base metals. It is safe to use due to very low toxicity and low flammability (it only burns when heated to over 200°C in fire and does not sustain combustion).

More data may be found in our Safety Data Sheets, available from D.W. Electrochemicals Ltd. by request. Some are also available on our website: <https://www.stabilant.com>, along with a variety of other Technical Notes and Application Notes.

How Stabilant 22 Works

The function of Stabilant 22 requires a brief review of the ways in which electrical contacts fail, whether in connectors or switches.

The surface of electronic connectors, smooth as they may look, are in fact highly irregular at the microscopic level. This is a virtual landscape of peaks and valleys, with real contact being made by the multitude of peaks. In this unavoidable reality, the irregularity worsens when corrosion and mechanical wear further degrade the availability of clean metal contact points in that landscape. Increased and unpredictable contact resistance results, which causes electronic noise, static, signal distortion and erratic electrical behavior (intermittence), leading to system failure.

Contacts coated with a thin film of Stabilant 22 are protected from these issues, making treated electrical connectors are then less likely to show up as the *weakest link* in complex electronic systems.

This works at several levels:

- Beginning with the peak and valley picture, a Stabilant film fills the spaces between the actual contacting points, sealing out contaminants that can cause corrosion. It does not interfere with that metal to metal contact.
- In the areas beside such contacting peaks, Stabilant enhances conduction by allowing current flow due to quantum effects. This has been classically described as a semiconductor behaviour, but it does not introduce unwanted rectification in the way corrosion films (oxides, sulfides, etc.) are known to do.
- In larger gaps, farther from the contacting peaks, Stabilant enhances the passing of A.C. signals (audio, radio, etc.) due to its high dielectric constant. The effect is that of placing a tiny capacitance in parallel with the very low resistance of those contact points. The net effect is lower impedance of the contact pair to all signals from direct current up to radio frequencies of many gigahertz.
- Contact surface damage (fretting wear) due to vibration and even insertion force is minimized by the lubricating property of Stabilant 22.
- The effect of temperature cycles and air pressure changes will also promote fretting wear and the entry of corrosive contaminants from the environment. Stabilant 22 always remains fluid, adapting to the tiny motions of contact elements, preventing such problems as it surrounds the actual metal to metal contact zone.

Stabilant 22 vs. Other Contact Treatments

- Many products are available to clean electrical contacts, but these do not prevent the eventual mechanical wear or the buildup of corrosion films.

Cleaning of connectors and switches is recommended, with the choice of methods depending on how much corrosion or grease must be removed. This should be followed by application of a thin Stabilant 22 film to maintain those clean surfaces.

In many cases this is all accomplished by using Stabilant 22A, which is diluted with isopropyl alcohol – an excellent general cleaning and degreasing solvent in its own right. This product contains 25% Stabilant concentrate and 75% alcohol. This thinned liquid allows easier application, especially in tight spaces like closed switches and for multipin connectors. The alcohol evaporates to leave an even film of the concentrate.

- Stabilant 22 was formulated to exceed the performance of dielectric greases; these are a popular solution for some electrical applications, and some are even based on polyglycols that are *somewhat related*. Stabilant 22 does not need the assortment of additives found in those products, such as thickeners.
- When using Stabilant 22, no additional treatment is required. Corrosion inhibitors and various other products are often dependent on matching the product to the type of contact plating and base, whereas Stabilant application requires no such concern.

Reliability and Safety of Stabilant 22

Common concerns about contact treatments include effects on the materials used for connectors and switches, long term stability, and – not least – safety during storage and use.

- Stabilant 22 is chemically stable and does not react with equipment materials or other chemicals commonly used in electronics service. This is in contrast to some older contact treatments that build up a ‘varnish’ due to polymer crosslinking.
- Due to this stability, Stabilant 22 has been found effective by customers who reported reliable equipment operation after more than 15 years, without the need to reapply Stabilant to the connectors.
- Stabilant will not short circuit between adjacent contacts, as its bulk resistance is very high. Cleaning of excess residues is advisable for the more usual reasons, however.
- Stabilant 22 has very low toxicity but should not be ingested. It does not cause skin sensitization. It is not a fire hazard, but if heated to above 200°C, the breakdown product will burn. Users of Stabilant 22A need only be aware of fire safety and other concerns for the isopropyl alcohol in that product. We advise that all users review our Safety Data Sheets for both Stabilant 22 and 22A for more information.

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

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