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Number 006

APPLICATION NOTE

Use of Stabilant 22 for Biomedical Electronics

Introducing Stabilant 22

Stabilant 22 is an initially non-conductive block polymer which when used in a thin film between metal contacts becomes conductive under the effect of an electrical field. This occurs at an electric field gradient such that the material will remain nonconductive between adjacent contacts in a multiple pin environment. In addition, Stabilant 22 exhibits surfactant action as well as lubrication ability, providing a single component resident solution to virtually all contact problems. Stabilant 22A features the Stabilant 22 concentrate diluted with isopropyl alcohol for easy application.

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

In this note we discuss applications of Stabilant products by biomedical technicians. Please also see Application Note #001 for more information on Stabilant 22/22A and their methods of use and availability.

General notes on biomedical equipment

With the steady increase in the level of sophistication of biomedical electronic equipment there is a greater reliance on plug in modules and the use of microprocessor control in that equipment. While the reliability of the individual components such as IC's, transistors, resistors, and capacitors has improved, the connectors used in the equipment still represent the weakest link in the design. The use of plugin cards and/or modules does allow defective units to be replaced quickly, but at the expense of introducing additional sources of unreliability - the connectors. With modern medical electronics, a single marginal contact among the hundreds often employed can cause the system to crash and often it is next to impossible to find out which contact is responsible.

The cost of biomedical electronics and service contract prices have risen rapidly and with a general tightening of hospital budgets the service of the equipment is often done under some pressure. Caregivers are ever more dependent on a constellation of device types in a modern hospital.

Technology uptime is important to caregivers, patients, and the hospital's bottom line. In cases where device manufacturers will not collaborate with, or sell parts to hospital Biomed staff, being able to repair a device is even more critical. Conversely, manufacturers' techs will also find Stabilant 22 a potential remedy that repairs a device at the initial service call rather than causing a hospital to be without a critical device due to parts on backorder.

Technology downtime is more than just a cost and profit issue, the lives of people hang in the balance when device failure disrupts the delivery and scheduling of care for many.

Biomedical electronic equipment on which Stabilant has been used:

Stabilant 22 has been used for patient monitoring equipment such as ECG and respiration monitors, defibrillators, infusion pumps, EEG equipment, scanners, ultrasound equipment, recording equipment, and computers, to name but a few.

In the hospital, Stabilant 22 is excellent for Telemetry box internal connections, connectors and card edges in portable X-ray systems, medical monitors in their connectors, back planes and module connectors, circular connectors for probes, battery connections and much more. Briefly, the Stabilants can be used on virtually all low voltage connectors or switches wherever a mechanical contact carries an electrical current.

This treatment is most valuable when used on micropower circuits such as CMOS logic. The only usage that is contraindicated is application in a "shotgun application" approach where intercontact voltages of greater than 100 volts are encountered. This does not prevent them from being applied to individual pins, but Stabilant 22 should not be allowed to spill across the inter-conductor surfaces where voltages may exceed 100 volts. Too high a field strength could cause the "switch to conductive state" effect to occur. For this same reason some caution should be used where a connector assembly (in the 100 volt plus applied voltage class) is so designed that there are narrow cracks running between contacts – any cracks which could fill with Stabilant through capillary action.

Because the switching speed is very slow, in the typical order of several seconds there is no discernible harmonic distortion introduced by the Stabilants except at frequencies lower than several seconds per cycle. Indeed, the Stabilants are used in recording equipment to reduce distortion and improve signal-to-noise ratios by eliminating thin-film rectification artifacts from mechanical connections.

Stabilant 22 may be applied to socketed IC's and transistors, edge card connectors, rack and panel connectors, 'D' type connectors, coaxial and tri-axial connectors such as BNC's, slide switches, rotary switches, key switches (including computer keyboards) to name but a few.

Results:

Our biomedical customers report that in many cases, defective equipment could be returned to service once its connectors were treated with Stabilant 22, and from that point on, its reliability as expressed in mean time between failures was generally much greater. They have also commented on their practice of treating all the connections on a piece of out-of-service equipment before resorting to more orthodox troubleshooting.

As noted, this very quick and easy treatment is all that is needed in many cases and has cut the servicing load substantially. In new installations of complex computer-controlled networks of monitoring equipment, combining pre-existing equipment with new systems, the use of Stabilants has often cut the initial troubleshooting period from several weeks to under a day.

NATO CAGE/Supplier Code 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. This note is based on the original work of William Michael Dayton-Wright and includes updated material from biomedical technicians who have kindly shared their relevant experience with D.W.E. staff.