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Number 19

## APPLICATION NOTE

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### Use of Stabilant 22 for Process Control Equipment

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#### Introducing Stabilant 22

Stabilant 22 is an initially non-conductive block polymer that when used in a thin film within contacts switches to a conductive state under the effect of the electrical field. The field gradient at which this occurs is set such that the material will remain non-conductive between adjacent contacts in a multiple pin connector environment.

*Thus, Stabilant 22 provides the connection reliability of a soldered joint without bonding the contacting surfaces together!*

Contacts are generally the weakest link in any piece of electrical/electronic equipment whether it be in low current devices found in computers or higher current circuits found in automotive and aviation applications, to name only a few. The use of Stabilant 22 or its isopropanol-diluted form, Stabilant 22A, will make contacts from 10 to 100 times more reliable, eliminating costly service call-backs and ensuring customer satisfaction.

#### How can Stabilant 22 make complex process control systems more reliable?

Whenever a complex process control system is treated using Stabilant 22 or Stabilant 22A to prevent system malfunction or crashes, the user must be aware that erratic operation of the system may be the result of a bad connection anywhere in the system. Many custom programs have a built-in tolerance of any peripheral error and deliver a warning of a peripheral malfunction; others, faced with an I/O device error, may cause the whole system to "hang" or otherwise misbehave.

For this reason, we recommend that all connections in a system be cleaned and treated. Where protocol converters, MLJX's, or other complex peripherals are involved it is important to remember that any one of these might be causing the problem. Generally, we have found that the equipment operating in the most contaminated area or under the most environmentally severe conditions will be the first to cause problems. This can apply to a lesser degree even when the equipment is in hermetically sealed cases, after it has been in use for some period of time.

## **How does Radio Frequency Interference cause problems?**

The possibility of system malfunction due to electromagnetic pulse (EMI) or even Radio Frequency Interference (RFI) should also be considered. Thin film contamination is encountered in many connector types, not only on the pins themselves, but on the outer shielding shells. Thin films of contaminants could result in RF voltages being developed between surfaces that should be connected together. Where corrosion is present it is not unusual for many of the metal corrosion products to act as semiconductors; these can rectify (or “detect”) RF signals or electromagnetic pulses, causing distortion or modulation of the signal these connectors should carry.

## **What about grounding of equipment?**

Complex systems are especially prone to problems caused by poor signal or power supply grounds. It is important to ensure that the grounding of the equipment is functioning properly, whether the ground connection is for safety, shielding or as a return line (zero reference) of a circuit .

Cases where equipment has been grounded to water pipes and where the pipes have later been removed from service and are themselves no longer grounded are not unusual. Even dedicated grounds made to copper-plated rods in the ground should be inspected for loose clamps, or corroded wires. Stabilant 22 can improve the reliability and lower the resistance of these connections.

It is also important to check to see if some other piece of equipment has been installed which might be sharing a supposedly dedicated ground. Electricians must be aware that an isolated ground system may be dedicated for use with a computer or controller; a good example is the isolated ground systems provided for hospital equipment.

## **Can new equipment cause problems?**

Sometimes process control equipment malfunctions just after some other piece of equipment has been installed in the plant. This type of malfunction may be eliminated by using a power conditioning device in the electrical supply line feeding the controlling computer alone. Problems can also be caused by peripheral equipment operating off a different power source than the controller/computer when signal isolating interfaces are not used. Problems are often caused by the creation of ground loop conditions that can shift voltage levels, affecting the integrity of the data or control signals. It has to be recognised that not all power supply outlets have low impedance connections. The transients from one piece of equipment can often affect another's operation. An example occurs where an older dot-matrix printer is installed on the same UPS (Uninterruptable Power Supply) as the computer/controller. Here, problems might occur due to the current pulses from the printer's hammer-wire solenoids creating spikes that couple into the computer circuits, especially if the UPS is being operated near the limit of its current specifications!

## **Are there any potential connector incompatibilities?**

Occasionally, on conventional (untreated) connectors you may encounter contact pairs where one connector's pins are gold plated, while the matching socket is plated with solder alloy (or vice versa).

Unless the connector design is such as to maintain a high contact pressure there is a galvanic effect, caused by the mismatched materials, facilitating corrosion. Under certain conditions of heat and humidity a poorly conductive black deposit will be formed within the contact pair. This problem cannot be permanently cured by the use of the Stabilant 22 although the reliability of the contact can usually be increased. One of the connectors should be changed over to match the plating material on the other for best results. Stabilant 22 provides the best results on either the gold-to-gold, or the solder-to-solder contacts.

### **What's the bottom line?**

Simply that Stabilant 22 is not a cure-all. While in most applications it can substantially reduce the erratic operation of a system, to be effective on hard-to-isolate problems in a complex system, it must be used throughout the system as part of the maintenance program.

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**

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