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**Number 8**

## **APPLICATION NOTE**

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### **Use of Stabilant 22 for in CATV Distribution Equipment**

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#### **What is Stabilant 22?**

Stabilant 22 is an *initially non-conductive* block polymer that under the effect of an electrical field and/or when used in a very narrow gap between metal contacts, becomes *conductive*. The electric field gradient at which this occurs is set so that the material will remain *non-conductive* between adjacent contacts in a multiple pin environment.

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

While Stabilant 22 exhibits surfactant action it is *not* sold as a contact cleaner. Equally, it exhibits quite good lubricating properties but is *not* sold as a contact lubricant. Its strength is in its *active properties* when used in a connection and the other properties are a bonus.

#### **What are its uses in CATV equipment?**

Stabilant 22 can be used wherever electrical contacts are used, whether this is in connectors. or in switches. In cable equipment its most frequent use is in the co-axial connections on the Main Line/Distribution amplifiers such as the Lindsey Equipment Models 10-40 and 961 or on the case joints in the Jerrold units. By eliminating the effects of corroded connections, it restores service in much less time than conventional methods. In many cases it eliminates the need to replace line amplifiers having badly corroded connectors. On case joints it eliminates the need for the cleaning and metal scraping of the joint as well as the need for the over-tightening that often strips the case screws. Because Stabilant 22's use in a contact enhances the performance of that contact beyond that of an equivalent new contact, the performance improvements are often dramatic. We have been told that it makes the quality of the signal at the end of a long series of amplifiers more nearly equal that of the beginning of the chain!

In head-end equipment the improvement often obtained in color accuracy and signal to noise ratio even with brand new equipment is sufficient justification for the material's use!

Stabilant's performance in subscriber taps and in splices is one of improving the reliability of the connections eliminating many costly service calls and improving customer satisfaction.

Stabilant 22 is also a preferred contact treatment in TV Security systems. Many installations are not easy to service and because of the nature of the use of the system many customers are extremely critical of any erratic operation of these systems. We have been told that there is often a marked improvement in the quality of the picture and that details are much easier to see!

### **Why should we use Stabilant over less expensive alternatives?**

Granted that the material itself is expensive, however it is unique in having a very long useful life once in place. Unlike some other contact treatments Stabilant 22 will not cross-link (becoming varnish-like) under the action of sulfur-based curing agents in elastomers, cutting oil residues, or the sulfur-bearing free-machining metal alloys used in some contacts. In most types of service work, the cost of the time involved in removing and replacing a board will be much greater than the cost of the Stabilant used to treat the board. Here what is important is that not only will proper board treatment cure existing contact problems, it will prevent others from occurring thus eliminating the necessity of repeating the treatment at a later date! In other words, why do a job more than once?

In addition, as Stabilant is one of the very few alternatives to repeated use of environmentally unfriendly solvent-cleaning, it is not subject to the increasing restrictions that are being placed on the use of solvents.

### **In what forms is Stabilant available?**

Stabilant 22 is packaged in 15ml, 50ml, 100ml, 250ml, 500ml and 1 Liter containers. Stabilant 22 is available in two forms; as a concentrate Stabilant 22, and as an isopropyl alcohol-diluted form called Stabilant 22A. Because of the 4:1 dilution, a given size container of Stabilant 22A will cost about one-fifth the amount of a container of Stabilant 22 for it has only one-fifth the amount of the concentrate in it. Stabilant 22E is similar to 22A but using ethanol as a diluent.

Another type of packaging is available for industrial-bulk users. Stabilant 22S packages the concentrate such that it occupies one-fifth the volume of an otherwise empty container. This allows the end-user to add his own diluent and saves the added costs of shipping isopropyl alcohol. as well as allowing the end-user to use an alternate diluent such as one of the other solvents used in electronics.

### **What is the difference in use of Stabilant 22A vs. 22?**

The concentrate, Stabilant 22 is most useful where the connections are out in the open such as exposed RF connectors. Where the connections are not too easy to get at or where the user wishes to apply the material to something such as a socketed IC (without removing the IC from its socket) it is easier to use the alcohol diluted form, Stabilant 22A. The isopropyl alcohol diluent serves only to carry the concentrate into the connector.

Stabilant 22 also serves as an insertion lubricant when used on multi-pin IC's. Stabilant 22A can be used to service amplifier case problems in the field, as it will often penetrate the joint without having to loosen the case screws.

### **Is it available in a spray can?**

Not at present. During the initial stages of our market research, we did provide spray cans of the material, but the users found that in most cases it did not speed the application of the Stabilants enough to offset the added cost of the material that was wasted. The spray generally left a film of excess material that had to be cleaned up for appearance and practical reasons.

A further consideration is the fact that because of their degradation of the ozone layer chlorofluorocarbon propellants are no longer generally used in spray cans, a highly inflammable mixture of butane and propane often being substituted. Remember, very little Stabilant 22 is necessary to treat a contact, so why waste it?

### **Is Stabilant just another contact cleaner?**

No, it is important to remember that Stabilant 22 is an electrically active material which enhances conductivity within a contact without causing leakage between adjacent contacts. Thus, large quantities of the material do not have to be "hosed" on as is the case with cleaners.

### **How much should be used?**

Normally, a final film thickness of from 1 to 2 mils of the concentrate is all that is necessary. In other words, you want just enough to fill up the interstices between the contact's faces. Where you're using Stabilant 22A, you'll have to use enough so that once the isopropyl alcohol evaporates the desired 1 to 2 mil film of Stabilant 22 remains.

### **What is the 15mL service kit?**

This was made up at the request of several manufacturers who wanted a standard kit of reasonable dimensions that they could issue to their field service personnel. It consists of a 15ml container of Stabilant 22A and some micro-brush applicators, all in a small capped tube. The applicators are reusable.

### **Why would anyone want to buy larger quantities of the concentrate?**

Many manufacturers and larger cable companies prefer to make large volume purchases, diluting the material and issuing it, as required, for specific field service requirements.

Many end users have found that the material cuts their service costs so much that it is more economical to purchase Stabilant 22 in the larger container sizes rather than run any risk of being without the material. The number of different applications tends to increase as users discover the large number of problems that can be solved by the material.

## **How can I be sure that the material works?**

Quite apart from the fact that Stabilant 22 has passed a number of stringent field tests before being issued a NATO supply code number (CAGE code), we could cite the fact that Stabilant 22 is used by many hospitals on their bio-medical electronics to improve reliability of the equipment where lives are in the balance. We could cite the use of Stabilant 22 by many broadcasting networks to achieve the last measure of reliability in critical network switching applications. We could cite its use in navigational aids, or the years of use in the audio field, where even consumers found the material easy to use and its results impressive. But we still feel that the best way to find out how well it works is to try it out! That's why we have samples available. Almost every service shop or manufacturer has equipment available where the switches or connectors have become erratic over the years. Use Stabilant 22A on them for a quick turnaround test or use the material in field service and satisfy yourself.

## **Will it work on UHF equipment?**

Yes. Stabilant 22 is being used on UHF equipment, including UHF-frequency connections, and further - it is in use for waveguide flanges up to 5 GHz and co-ax connectors as well.

## **Can I use Stabilant 22 on connectors and switches in other equipment?**

Of course! As we indicated, many users start out by trying it out on erratic test equipment - devices often suffering from poor contact problems. Audio/RF Function and Signal generators, distortion/spectrum/waveform analyzers, reflectance equipment, oscilloscopes, vector scopes - all types of test gear can be made more reliable using the material. One note of caution: because Stabilant 22/22A switches to the conductive state under applied electric field gradients (in the open) of from 9,000 to 13,000 volts per inch, don't use it on high voltage connectors. As a rule-of-thumb, it can be used on circuits of under 100 volts with impunity. Where higher voltages are involved it may be necessary to calculate the electric field gradient across the insulating surface to determine if the material can be used. Any use for high-voltage circuit connectors requires that the material be applied ONLY to the contacts, with no excess used. (Any spillage should be cleaned with isopropyl alcohol).

When used on socketed IC's, photo-couplers/isolators, rotary, push button (such as the ITT Schadow # FE switch), or slide switches, or even on BNC connectors, the net effect is usually to make the proper operation of the equipment less erratic, and in the case of IEEE-488 bus-controlled equipment, to cut down on the potential for system lockups. The effect of Stabilant 22 in Computers is to reduce the number of times the system locks up or crashes, sometimes it even eliminates non-software crashes completely. On equipment using internal microprocessor control, Stabilant 22/22A has an obvious use on socketed IC's, card-edge connectors, parallel (Centronics Standard) and serial (RS-232C etc., USB) ports.

## **Is Stabilant 22 hazardous?**

Stabilant 22 comes with minor precautions. It has caused no skin reactions (sensitization) in tests. In the undiluted form, it is non-flammable, although if its temperature is raised above 200° C the decomposition products would burn. If orally ingested in small amounts it will cause bowel looseness while ingestion of amounts in the order of 100 ml of the concentrate could lead to systemic collapse! Stabilant 22 has an LD<sub>50</sub> of about 5 grams per kilogram body weight. No skin reaction has been noted in tests, save that Stabilant's detergency can remove skin oils under conditions of constant exposure, increasing the skin's susceptibility to chafing. Stabilant 22A contains isopropyl alcohol (as a diluent) so the safety precautions appropriate to that material should also be considered. Safety Data Sheets for Stabilant 22 and 22A have further details on properties and safe handling.

## **What is the best way to apply Stabilant 22 / 22A to contacts?**

The 15ml and 50 ml containers have a "dropper" type caps that allow Stabilant 22A to be applied directly to such components as socketed IC's, switches, connectors, etc. Some end users prefer to buy larger quantities and use industrial syrettes to apply the material onto connections. Camel's hair or sable brushes can be used to brush it on card-edge connectors. Cards can also have their edge connectors dipped into the dilute material. If Stabilant 22 is used as an IC insertion aid, a small piece of conductive foam epoxied to the inside of a flat tin can be saturated with Stabilant 22 and the IC pins thrust into the foam to coat them.

## **Does the action of Stabilant 22/22A deteriorate with age?**

Stabilants were studied in some field trial applications for over twelve years without showing any sign of reduced effectiveness. The material has a high molecular weight and a very low vapor pressure, so it is not prone to evaporation.

Once again let us emphasize the point that unlike some other contact treatments containing oils, Stabilant 22 will not cross-link when exposed to certain materials such as high sulfur brass, on connectors having bodies made of elastomers or thermosetting resins containing accelerants or curing agents, or when used on contacts where these cross-link promoting agents are present in the environment. This phenomenon of "varnishing" does not occur with Stabilant 22.

NATO CAGE/Supplier Code 38948

15ml Stabilant 22 (Concentrate), NATO Part # 5999-21-909-9981

15ml Stabilant 22A (Isopropanol Diluted), NATO Part # 5999-21-900-6937

15ml Stabilant 22E (Ethanol Diluted), NATO Part # 5999-21-909-9984

The Stabilants 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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