STABILANT 22

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APPLICATION NOTE

Problems with Silicone Films on Electromechanical Contacts

Why do silicone films cause intermittencies in contacts?

While the water-repellent character of silicones makes them potentially beneficial for use on connector assemblies exposed to excessive moisture, there are other characteristics which, under certain circumstances, can cause problems. Silicone films can, under certain conditions, combine with metal ions to form restive films such as sodium silicate. As some potentially reactive silicones can be polymerized by metals such as lead or sodium, the potential for the formation of very thin, high resistance films can exist.

Where does this problem exist?

Many situations introduce silicone contamination, for which Stabilant 22 is offered as an ideal preventative solution. Stabilant 22 can be used in all types of connectors, for DC current and frequencies from to DC to several gigahertz, on faders or potentiometers, on signal switches and power switches for non-inductive (non-arcing) loads. The potential uses are almost limitless.

The most obvious location is where silicone dielectric greases are used to waterproof connectors, but it can also exist where silicone mold-releases were employed in the manufacture of either molded-rubber or molded-plastic parts used in the connector assembly. While the service departments of some companies are aware of the potential problem, some well-meaning customers may cause the problem by employing cleaning-sprays that contain silicones. Several of these were very popular as TV-tuner cleaners and are still available from electronic parts houses.

Some pieces of equipment incorporate silicone oils in their design. The most notable of these are photocopiers, where silicone-bearing oils are often used in the toner fusion section of the equipment in order to ensure that the fusion rollers will not stick to the melted ink particles. As the surface energy of the melted ink is often quite low, there is a need for a very low surface energy on the heated roller in contact with the paper. Under these circumstances it is not unusual to encounter contact problems in the vicinity of the fuser section.

In addition, the cooling airflow may carry silicone vapor or particles to other connectors downstream of the fusion unit. There is even a potential problem for connectors near the paper path that follows the fuser. Although the amount of oil carried by the paper itself is probably negligible, there is usually some small amount of airflow caused by the motion of the paper and this also may carry the silicones to the paper exit areas of the equipment.

Because the deposition of silicones on the contacts in copiers takes place over a long period of time, there is a greater potential for those films to react to other atmospheric contaminants than would occur in the case of contacts where a silicone oil was used as a moisture barrier.

This phenomenon can be divided into two classes, those where the material acting to catalyse the silicone is found in the contact itself, and those where the catalytic material is external to the contact. In the former case, the metal connector pins, especially when a plating material such as a solder alloys, will be the source of the catalyst, while in the latter, atmospheric metal ions such as the salt-laden air found in costal areas can initiate the problem.

Can these problems be prevented?

Yes, most cases can be prevented. The ideal solution is the elimination of the silicones from the connector and/or the equipment in the design stage. For obvious reasons the latter may not be possible. In some cases, it may be feasible to enclose a wiring-harness-mounted connector-pair in a long-sleeve of plastic tubing in order to minimize the exposure of the connector to the silicone-bearing airflow. While this might not prevent the problem from occurring in the long term, it might delay the time when a critical film thickness builds up. It may also be possible to reposition the connector, or even to alter the airflow so that the connector lies in a stream of clean air.

What can Stabilant 22 do to stop these problems?

If Stabilant 22 can be applied during manufacture of the equipment, the material will act as a barrier to deposition of the silicone.

Where the condition already exists, liberal application of isopropyl alcohol can usually purge the collector of most of the silicones; application of Stabilant 22A should prevent re-introduction of silicone and prevent future trouble. If the silicone has already reacted to form an insulating film (e.g., of sodium silicate) it may be necessary to use abrasion to remove the film. Where doubt exists as to the actual state of the silicone contamination, it is probably worthwhile to replace the connector. In a production setting, one may have the contact surfaces analyzed in a laboratory equipped for micro-analysis. In such cases, the lab may well be able to advise the service department as to the most efficient and/or most environmentally acceptable solvent to use in the removal of the contaminant film.

In any event, Stabilant 22 could prevent the problem from recurring.

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

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