

An Investigation into Hand Sanitizers and Hand Lotions and Potential Risks to High-Performance Electronics

In response to the global outbreak of the COVID-19 virus, governments and health organizations precautions are recommending the increased use of hand sanitizer solutions or similar germicidal agents. For manufacturers of electronic assemblies, this may mean a potential transfer of these solutions/agents to the surface of their assemblies as a potential contaminant.



Several years ago, Doug Pauls and Michael Vosatka of Rockwell Collins, authored a paper for IPC APEX that provided a detailed examination of some typical hand sanitizers and hand lotions and their impact on high-reliability electronic hardware.

Their research, which included SIR (Surface Insulation Resistance), FTIR and, ion chromatography, is very timely again in today's environment. A summary of the conclusions are below and a link to the full paper can be found at the end of the brief:

CONCLUSIONS:

- FTIR scans showed that in all cases, there was some organic material transferred to the ceramic plates.
- Sanitizer and lotion residues do not adversely impact solderability.
- The ion chromatography data shows that the amounts of ionic residues, primarily chloride, are relatively low and do not represent a contamination risk.
- The differences between the lotions and sanitizers, and that of bare hands alone are not considered to be significant.
- Sanitizer and lotion residues do have an effect on SIR in the uncleaned condition, though the impact will depend on the chemical nature of the residue and the amount of residue left on the assembly surface.
- The performance of the cleaned samples shows that the standard Rockwell Collins aqueous cleaning process adequately removes the sanitizer and lotion residues to acceptable levels, even though some of the sanitizer and lotion residues have an impact even after cleaning and conformal coating.
- None of the test samples showed any corrosion or electrochemical migration (dendritic growth). This indicates that the residues were not ionic in nature and the effects were due to the attraction of water vapor by the hydrophilic nature of the residues.

- With one exception, all of the adhesion failures occurred on the interface that had been handled with treated hands. This indicates that the candidate materials had some effect on adhesion.

RECOMMENDATIONS

1. The best method for cleaning hands is with soap and hot water, which removes residues from the hands. Hand sanitizer solutions, which do not remove residues, should not be considered as a replacement for washing hands with soap and water.
2. It is recommended that the hand sanitizers remain in restroom areas for the following reasons:
 - a. It is a general best industry practice to keep non-essential liquids (e.g. drinks) out of a manufacturing area due to the potential for contamination.
 - b. If kept to the restrooms, there is additional time for any volatile materials to evaporate, minimizing any potential transfer of residues to the assemblies.
 - c. Most of the sanitizer materials were contained inside plastic containers, which may represent an ESD hazard.
3. In the event that hand sanitizers are placed in assembly areas, the following actions should be taken:
 - a. The plastic containers should be considered as an ESD hazard and must be kept a minimum of 12" away from any ESD sensitive assembly, per ESD Association guidelines. Alternatively, the plastic containers can be treated with an approved staticide chemical.
 - b. When (not if) the sanitizer material is spilled onto electronic assemblies, they should be run through a suitable (aqueous) wash process as soon as practical. This would remove the majority of residue material and reduce the risk of failures.
 - c. The message given to floor personnel should consistently be that hand sanitizing is not an acceptable alternative to washing hands with soap and water.
 - d. To clean up sanitizer spilled on work surfaces, wipe up the excess with paper towels and dispose of as flammable waste. Clean the area with alcohol and allow to dry.
4. The data does show some minor degradation due to residues from the heavier hand lotions, primarily with respect to the impact on adhesion of applied adhesives. It is recommended that operators wear gloves during the application of adhesives, both to limit contact with the adhesive and to limit transfer of lotion/sanitizer residues to the assembly surface.
5. Consequently, it is not recommended that any sort of "ban" on hand lotions be pursued, nor should the use be encouraged either. Operators should be counseled that hand lotion residues can transfer to assembly surfaces and the use of such lotions should be minimized while at work.

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