

The Adherent[®]

Technology Insights from Adhesives Research



Taking your products further.™

Enhance the Performance and Reliability of Electronic Devices With Clean Adhesives

The growing complexity of sensitive electronic components over the last decade has significantly shaped the way adhesive manufacturers formulate adhesives for cleanliness. The origins of Adhesives Research's (AR's) electronically clean adhesives date back to the late 1980s, when a major hard-disk drive (HDD) manufacturer discovered that molecule deposits outgassed from its industrial-grade adhesives were contributing to HDD crashes. AR was approached to develop a low-outgassing sealing pressure-sensitive adhesive (PSA) to improve the reliability of these devices. Today the technology continues to evolve for new applications.

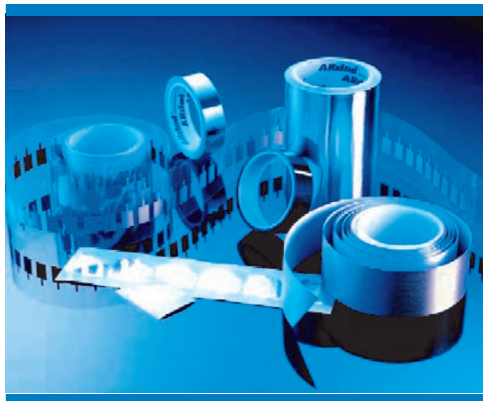
AR's electronically clean PSA products must pass 3 criteria. It is important to note that these criteria apply not only to the adhesives themselves, but also to the careful selection of the materials incorporated into an electronically clean product construction, including all raw materials, substrates/carriers and release liners.

The 3 criteria for electronically clean adhesives includes:

1. Physically Clean: Producing PSAs in a controlled manufacturing environment such as a clean or white room environment with specialized product packaging is one way AR assures a quality product.

2. Chemically Clean: Not only must electronically clean adhesives be chemically inert to a device's other components, but they must also demonstrate low-outgassing characteristics.

Outgassing refers to the unwanted chemicals that can be emitted from an adhesive or other component while a finished device is in use. Outgassing also presents a challenge when creating and maintaining clean high-vacuum environments.



The rate of outgassing increases at higher temperatures because the vapor pressure and rate of chemical reaction increases. In electronic applications, these emissions can contribute to contamination that may cause fogging of components, corrosion of conductive surfaces, or component delamination, which can create electrical interconnection issues.

As a benchmark, industrial PSAs typically outgas 10,000-30,000 nanograms/cm² of material. In comparison, AR's clean PSAs only emit 100-300 nanograms/cm². Clean adhesives do not sacrifice chemistry or any performance properties when compared to industrial adhesives; rather they are carefully processed in a controlled environment to remove any remaining small molecules that have the potential to outgas.

3. Ionically Clean: Some materials release ions such as sodium, potassium, calcium, nitrates, phosphates, etc., which have the potential to corrode sensitive components like indium tin oxide used in touch screens. These substances are avoided through careful raw material selection.

The results of this attention to detail are PSA tapes that are both acrylic acid- and organotin-free, demonstrate low extractable ions, and provide resistance to corrosion and environmental aging.

Today electronically clean adhesives are used in a wide range of electronics applications beyond HDD including mobile devices, touch screens, LEDs, photovoltaic solar cells and medical electronics. The clean technology is currently incorporated into AR's optically clear and electrically conductive products and principles of this technology can be applied to pharmaceutical and medical product platform technologies.



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