PREVENTING DAMAGE TO MOISTURE SENSITIVE DEVICES (MSDs) AND BARE BOARDS BEFORE AND DURING THE ASSEMBLY PROCESS THROUGH PROPER HANDLING & STORAGE

The process of managing and safeguarding the assembly process from environmental influences begins as soon as raw materials are received. Effective management of Electrostatic Discharge (ESD) is established and meticulously outlined. Grounding stations and heel straps are commonly used measures in numerous facilities to mitigate ESD risks. However, ESD management is just one aspect of the broader challenges encountered during assembly.

The effects of humidity on electronic components and Printed Boards (PCBs) are often overlooked. Despite the climate control in most manufacturing environments, moisture can still pose a threat, especially when Moisture Barrier Bags (MBBs) are opened for inspection, inadvertently setting the moisture sensitivity countdown. Once opened, resealing an MBB does not stop the clock, leaving components vulnerable to moisture absorption, which can compromise the longevity of moisture-sensitive devices (MSDs).

Unlike MSDs, bare boards are not subject to stringent moisture control standards. The IPC D-35 subcommittee is addressing this with the IPC-1601 guideline draft for Printed Board Handling and Storage. Currently, without standardized procedures for managing moisture exposure before assembly, manufacturers must independently monitor and mitigate humidity's impact on these materials.

This paper investigates the use of desiccant-based, self-regenerating cabinets for storing bare boards, showing their effectiveness in halting and potentially reversing the moisture sensitivity timer for MSDs, as per J-STD-033B01. Our results indicate that such cabinets can also protect bare boards from moisture damage during assembly.

Introduction: Moisture entrapped in components and PCBs significantly hinders the assembly and fabrication process, with excessive moisture causing board failures during soldering. The expansion of moisture into steam can lead to delamination and damage to components and multi-layer PBs, producing defective products.

Background: Various precautions, including IPC standards, aim to minimize moisture-induced defects by classifying and handling MSDs appropriately. Despite a shift away from military specifications, the emphasis on moisture management during reflow has increased, with IPC standards offering guidelines for storing MSDs in low-humidity conditions to avoid moisture-related damage.

Moisture-Related Concerns: The discrepancy between ideal humidity levels for worker comfort and those required for component safety poses a challenge. Moisture can be introduced at any stage from circuit card fabrication to assembly, necessitating rigorous control and management to prevent defects.

Experiment Methodology: Our study tested the efficacy of different storage methods for PBs on moisture absorption, using FR-4 substrate test coupons and adhering to IPC's draft standards for moisture testing in printed circuit boards.

Results: The experiment revealed that storage in an ultra-low humidity cabinet significantly reduces moisture re-absorption compared to ambient storage, demonstrating the cabinet's ability to continuously remove moisture and protect against moisture-related issues.

Conclusion: Proper moisture management, from fabrication to assembly, is crucial for minimizing defects in soldering phases. Dry cabinet storage emerges as an effective solution for controlling moisture in both MSDs and PCBs, aligning with IPC guidelines to enhance the quality and reliability of electronic components and boards throughout the production process.

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