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Guidelines for Cleaning of Printed Boards and Assemblies

Developed by the Cleaning and Alternatives Subcommittee (5-31) of the Cleaning and Coating Committee (5-30) of IPC

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Users of this publication are encouraged to participate in the development of future revisions.

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1 OVERVIEW

1.1 Scope This manual will only include assembly process printed wiring assembly cleaning. The corresponding information on printed wiring board cleaning will be contained in a separate companion document.

1.2 Purpose The purpose of this document is to collect and update all the pertinent information on printed wiring assembly (PWA) cleaning in a single, easy to revise/updated document.

1.3 Background Information on cleaning printed circuit boards (PCBs), printed wiring boards (PWBs), and printed wiring assemblies (PWAs) during manufacture could be found within a number of IPC documents and handbooks, specifically:

- CH-65 Guidelines for Cleaning of Printed Boards and Assemblies
- SM-839 Pre and Post Solder Mask Application Cleaning Guidelines
- SC-60 Post Solder Solvent Cleaning Handbook
- SA-61 Post Solder Semi-Aqueous Cleaning Handbook
- AC-62 Aqueous Post Solder Cleaning Handbook

While collecting relevant information in various places was recorded for its members to use, one was never sure that one had all the needed information at hand.

1.4 Current and Emerging Cleaning-Related Challenges With the advent of low residue (i.e., no-clean) flux/paste in the early 1990s, many concluded that cleaning was no longer needed. This conclusion neglected the continued drives toward tighter spacing, higher reliability requirements, higher density packaging, underfill adhesion and reduced costs. Since post assembly cleaning normally removed all upstream soils as well, the industry had to convert to clean printed wiring board and clean component manufacturing processes, clean packaging and ultraclean workplaces. Often this became more cumbersome and complicated than post assembly cleaning had been.

Recently, the conversion of soldering processes to lead-free platings/finishes and soldering alloys, often with much higher soldering process temperatures, have further complicated the demands made on solder flux/paste compositions, to accomplish a no clean joining operation, while burning away completely without voids, solder balls or other reliability issues.

The advent of halogen-free laminates, as well as other possible restrictions on the industry's processing chemicals, will generate new processing challenges to be met.

The ability to effectively clean stencils has become significantly more important. Greater demands on stencil printing have emerged with the advent of fine and ultrafine parts, as well as ball grid arrays. Clean stencils are a must in delivering the proper amount of paste. A partially or fully obstructed aperture on a stencil is more likely to occur with today's finer pitch devices. It has been estimated that approximately 70% of SMT solder defects are due to solder paste printing problems. Stencil cleaning processes are covered in a separate document.

Environmental and worker safety issues are very much a part of today's cleaning picture. Assemblers must consider factors such as VOCs, BODs, CODs (Volatile Organic Compounds, Biological Oxygen Demand and Chemical Oxygen Demand, respectively), waste water treatment, heavy metals, close-looping and pH. Because of demanding official regulations (federal and/or local), it can be one or more of these factors that determine the choice of a cleaning process and associated equipment.

1.5 Document Chapters

1.5.1 Section 2: Applicable Documents This section contains references to industry standards, federal regulations, test methods and vehicles that are applicable to post solder cleaning of electronic assemblies. Not all of these are cross-referenced in the text. They are listed below for the convenience of the readers.