ASSOCIATION CONNECTING
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IPC-SM-839

Pre and Post Solder Mask Application Cleaning Guidelines

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A standard developed by IPC

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Table of Contents

Figures

Tables

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1.0 SCOPE

This document is intended to cover all aspects, both method and degree, of cleaning associated with the preparation of bare printed circuit boards prior to solder mask application. It continues with the prudent control of the cleanliness level during the solder mask application and cure processes. It includes maintenance of the cleanliness level of solder masked boards during pre-assembly processes and/or storage time prior to assembly. Finally, based on the procedures used in the previous steps, it deals with maintaining the soldered assembly at a degree of cleanliness consistent with the end use.

1.1 Introduction The cleaning process prior to any printed board fabrication step is the single most important function over which there must be complete control. Also, it is paramount to remember that with any ''build up'' type of manufacturing, each step taken, no matter how trivial it is perceived, may involve multiples in cost added. This is especially true with printed circuit boards where the myriad of steps require complete cleaning procedures. Cleaning before solder mask application is critical because there will not be further opportunity to remove extraneous matter after the application step. In general, the use of a class 10,000 or better clean room is desirable to reduce particulate contamination.

Because of the differences in preparing and cleaning boards with copper and tin/lead, this document treats each type of circuitry individually in Sections 3 and 4, respectively.

2.0 APPLICABLE DOCUMENTS

The following document, of the issue currently in effect, forms a part of this specification to the extent specified herein.

2.1 Institute for Interconnecting and Packaging Electronic Circuits (IPC)[1]

IPC-TM-650 Test Methods Manual[2]

2.3.25 Detection and Measurement of Ionizable Surface Contaminants

2.3.26 Ionizable Detection of Surface Contaminants (Dynamic Method)

2.3.26.1 Ionizable Detection of Surface Contaminants (Static Method)

2.3.38 Surface Organic Contaminant Detection Test (In-House Method)

2.3.39 Surface Organic Contaminant Identification Test (Infrared Analytical Method)

2.6.3.1 Moisture and Insulation Resistance—Polymeric Solder Masks and Conformal Coatings

IPC-S-804 Solderability Test Methods for Printed Wiring Boards

IPC-SM-840 Qualification and Performance of Permanent Polymer Coating (Solder Mask) for Printed Boards

3.0 SOLDER MASK OVER BARE COPPER

In this process, an etch resist, which is usually plated tin/lead, is removed so that the plated copper traces are left bare. Solder mask is applied over bare copper to permit solder leveling, reduce solder pot contamination, protect electrical integrity, and eliminate mechanical damage. The removal of etch resists, pre-cleaning and post-cleaning, are explained in Section 3. See Figure 1 for the process flow chart.

3.1 Metallic Resist Stripping Two techniques are used for stripping tin-lead or tin, the key metallic resists, from circuit boards. They are distinguished by the use of either a peroxide or a non-peroxide (acid based) solution, and are described in the following paragraphs.

3.1.1 Peroxide Peroxide is an aggressive oxidizer, and all equipment exposed to it should be of plastic construction. In addition, many products also contain ammonium bifluoride, which will also etch glass. Since the peroxide reactions are exothermic, cooling coils are recommended. Laminate attack can result from the heat and the ammonium bifluoride. Compatibility of laminates with the solutions should be checked before setting process guidelines.

3.1.2 Non-Peroxide Non-peroxide strippers are nitric- or fluoboric-acid-based solutions. They are used in either single- or two-step processes. Single-step processes usually involve spray techniques, while two-step processes can involve either soak or spray techniques. Non-peroxide strippers are generally not exothermic, and will not attack laminate. However, a specific laminate should be checked for compatibility with the particular stripper being used. In general, non-peroxide strippers are slower than peroxide. With fluoboric acid-based solutions, spray equipment used

1. Publications are available from IPC, 2215 Sanders Road, Northbrook, IL 60062
2. For convenience, reprints of IPC-TM-650 test methods are provided at the end of this specification.