



IPC-7526A

Stencil and Misprinted Board Cleaning Handbook

Developed by the Stencil Cleaning Task Group (5-31g) of the
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Users of this publication are encouraged to participate in the development
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Stencil and Misprinted Board Cleaning Handbook

1.0 SCOPE

1.1 Statement of Scope This handbook addresses understencil cleanliness during stencil printing, removal of solder paste from stencils following the cleaning process and misprint PCB board cleaning considerations.

1.2 Purpose The goal in stencil printing is to place an exact amount of material in a precise location on the PCB. The print medium might be solder paste, adhesive/glue, flux, or thick film materials. The squeegee speed or pressure can affect the quality of the material deposition, the stencil is the primary control mechanism for material deposition. The purpose of this handbook is to provide the assembler best practice guidelines for understencil cleanliness during the stencil printing process, and stencil cleaning once the stencil is removed from the stencil printer. The document also addresses best practices for cleaning a PCB that was misprinted.

1.2.1 Problem Statement: The stencil and PCB must be well aligned and in very tight contact (gasketing) to achieve an acceptable print. The problem is that poor contact between the stencil and the board can cause poor quality prints resulting in soldering defects. A common root cause of gasketing issues is solder paste on the stencil's contact side. The cleanliness of the stencil is critical to the success of the stencil printing process. Insufficient solder is the primary cause of defects originating from the stencil printing process; therefore, stencil cleanliness is an essential process step for delivering the proper amount of solder paste to the PCB pads.

2.0 APPLICABLE DOCUMENTS

The following documents are provided as possible sources of additional information.

2.1 Reference Documents

IPC-7525 Stencil Design Guidelines

IPC-A-610 Acceptability of Electronic Assemblies

IPC-7093 Bottom Terminated Components

IPC-CH-65 Guidelines for Cleaning of Printed Boards and Assemblies

IPC-SC-60 Post Solder Solvent Cleaning Handbook

IPC-SA-61 Post Solder Semi-Aqueous Cleaning Handbook

IPC-AC-62 Post Solder Aqueous Cleaning Handbook

IPC-CA-82 General Requirements for Thermally Conductive Adhesives

IPC-3406 Guidelines for Electrically Conductive Surface

IPC-3408 General Requirements for Anisotropically Conductive Adhesive Films

2.2 Joint Industry Standards

J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies

J-STD-005 Requirements for Soldering Pastes

2.3 Surface Mount Technology Association (SMTA)

Stencil Printing Fundamentals Stencil Printing 101

2.4 American Standards for Testing Materials

ASTM Standards & Publications can be found at <https://www.astm.org/Standard/standards-and-publications.html>

2.5 Federal Laws and Standards

CAA Clean Air Act

CWA Clean Water Act

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

RCRA Resource Conservation and Recovery Act

SARA Superfund Amendment and Reauthorization Act

2.6 Department of Defense

MIL-C-85447 Cleaning Compounds, Electrical & Electronic Components

2.7 Occupational Safety and Health Administration

OSHA 29CFR 1910.106 Flammable and Combustible Liquids

OSHA 29 CFR 1910.134 Respiratory Protection

OSHA 29 CFR 1910.1000 Air Contaminants

2.8 Environmental Protection Agency (EPA)

EPA 40 CFR 63 National Emission Standards for Hazardous Air Pollutants for Source Categories

EPA 40 CFR 82 Protection of Stratospheric Ozone

EPA-453/R-94-081 Guidance Document for the Halogenated Solvent Cleaner NESHAP

EPA 40 CFR 117 Determination of Reportable Quantities for Hazardous Substances

EPA 40 CFR 136.36 Toxic Criteria for those States Not Complying with Clean Water Act Section 303(c)(2)(B)

EPA 40 CFR 261 Identification and Listing of Hazardous Waste

EPA 40 CFR 302.4 Designation of Hazardous Substances

EPA 40 CFR 355.30 (b) Emergency Release Notification

EPA 40 CFR 370 Hazardous Chemical Reporting: Community Right to Know

2.9 Department of Transportation

DOT 33 CFR 153.203 Procedure for the Notice of Discharge

2.10 National Fire Protection Association (NFPA)

NFPA 35 Definitions of Flammable & Combustible Substances

2.11 Air Quality Management Standards (AQMD)

AQMD Rules & Compliance can be found at <http://www.aqmd.gov/home/air-quality>

3.0 STENCIL CLEANING PROCESS

3.1 Process Overview Stencil printing is a well-known and proven process technology for surface mounted and through hole components. Solder paste deposition on fine pitch and area array packages offer an attractive, cost-saving, and high-volume production process. The cleanliness of the stencil is critical to the success of the stencil printing process. Insufficient solder is the primary cause of defects originating from the stencil printing process; therefore, stencil cleanliness is an essential process step for delivering the proper amount of solder paste to the PCB pads. Stencil cleaning must remove all solder particles and flux vehicle from stencil apertures without damaging the stencil, bonding adhesive or mounting mesh.

The degree of cleanliness required varies with complexity of the board design. Stencils are usually cleaned to a visually clean condition. Cleaning misprinted circuit boards requires the removal of un-reflowed solder paste and ionic contaminants. An inadequately cleaned misprint can leave undesired residues on the processed assembly, potentially impacting quality and reliability. For additional information on assembly cleaning processes, please refer to IPC-CH-65.

When cleaning the stencil after removal from the printer, the most effective cleaning processes integrate mechanical and chemical cleaning forces. Cleaning chemistry suppliers work closely with cleaning equipment manufacturers to provide an integrated process. Stencil cleaning faces the challenge of removing solder paste and Surface Mount Technology (SMT) adhesive from tiny apertures while not damaging the stencil. To achieve reproducibility in cleaning, the process requires a mild chemistry integrated with stencil cleaning equipment that removes solder paste and SMT residues from fine apertures without damaging the stencil.

In summary, the stencil cleaning objectives are the removal of contaminants in the form of non-reflowed solder paste and uncured adhesives. Process engineers are seeking robust processes that provide practical, cost effective, safe, and environmentally friendly methods.