IPC-1402

Standard for Greener Cleaners Used in Electronic Manufacturing

Developed by the Green Cleaners in Manufacturing Task Group (5-26a) of the Assembly & Joining Committee (5-20) of IPC

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

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Standard for Greener Cleaners Used in Electronic Manufacturing

1.0 SCOPE

This standard applies to cleaning products used in the Electronics Manufacturing, including but not limited to original equipment manufacturers, electronics manufacturing services companies, board manufactures, cable and wire harness manufacturers and electronics industry suppliers.

This standard applies to direct use chemicals to clean products or components, as well as to clean manufacturing machines or tooling during operation and maintenance.

Cleaning product categories that are in scope of this document include but are not limited to:

- Removing solder and flux residuals from PCBs, components
- Cleaning of the contaminated surfaces inside reflow ovens
- Cleaning the flux residual on stencil, carrier, and frames
- Cleaning adhesive dispensing needles
- Screen wiping
- Optical lens cleaning
- Packaging printer cleaning
- De-bonding solutions for re-work or recycle
- Degreasing tooling and machine parts
- Stripping of coatings

Product categories that are out of scope of this document include but are not limited to:

- Demolding solutions
- Cleaners used in non-manufacturing activities (e.g., laboratory, office housekeeping, and maintenance unrelated to manufacturing)
- Surface treatment agents used to promote adhesion, etching and post etching operations, and chemical mechanical planarization (CMP process).

This standard is focused on reducing the human health and environmental impacts and improving the safety of cleaning products used during the manufacturing process. This standard does not include or assess the performance of cleaning products.

This standard is targeted to define greener cleaners and does not replace the risk assessment associated with cleaning application under various working conditions.

1.1 Purpose The purpose of this standard is to set pragmatic, minimum criteria for greener cleaning products used in electronics manufacturing that can be feasibly and efficiently applied by decision-makers to protect workers and the environment. The minimum criteria are based on a foundational set of scientifically defensible environmental, health and safety requirements using a combination of list-based data sources, information found on Safety Data Sheets (SDSs) and analytical testing results. Additional guidance is included to facilitate continuous improvement in formulating safer cleaning products.

1.1.1 Users This standard is intended to be used by chemists, EHS professionals, and engineers working at companies formulating cleaning products or manufacturing electronics. It can also be used by purchasers and other stakeholders interested in evaluating use of safer cleaning products by suppliers.

1.1.2 Value Electronic manufacturers can demonstrate their commitment to protection of workers and the environment by specifying use of this standard for selecting cleaning products. Cleaning product formulators can demonstrate their commitment to providing greener and safer products to the market by formulating products to meet this standard, and following the included guidance to continually improve their formulations.

1.1.3 Limitations This standard is intended to be an important initial step in identifying greener cleaners that avoid known problematic chemicals using list-based data sources and analytical testing results. This standard is intended to work in harmony with more detailed hazard and alternatives analyses, or independent product certification schemes requiring a comprehensive review of all available data and information that goes well beyond the data requirements of this standard. Since the data used to

demonstrate how a cleaning product meets this standard have a significant impact on the results, a reviewer may come to a different conclusion regarding the product after conducting a more comprehensive chemical hazard assessment.

1.2 Definition of Requirements The words **shall** or **shall not** are used in the text of this document wherever there is a requirement for materials, preparation, process control or acceptance.

The word "should" reflects recommendations and is used to reflect general industry practices and procedures for guidance only.

Line drawings and illustrations are depicted herein to assist in the interpretation of the written requirements of this Standard. The text takes precedence over the figures.

1.3 Order of Precedence The contract **shall** take precedence over this Standard, referenced standards and drawings. In the event of conflict, the following order of precedence applies:

1) Procurement as agreed and documented between customer and supplier.

2) Master drawing reflecting the customer's detailed requirements.

3) When invoked by the customer or per contractual agreement, this standard.

When documents other than this standard are cited, the order of precedence **shall** be defined in the procurement documents. The User has the opportunity to specify alternate acceptance criteria.

1.3.1 Conflict In the event of conflict between the requirements of this standard and the applicable drawing(s) and documentation, the applicable user-approved drawing(s) and documentation govern.

Some examples of documentation include the contract, purchase order, technical data package, engineering specification or performance specification. In the event of a conflict between the text of this standard and the applicable documents cited herein, the text of this standard takes precedence. In the event of conflict between the requirements of this standard and drawing(s) and documentation that has not been user approved, this standard governs.

1.3.2 Clause References When a clause in this document is referenced its subordinate clauses apply, unless the requirement references specific subordinate clauses.

1.3.3 Appendices Appendices to this standard are not binding requirements unless separately and specifically required by this standard, the applicable contracts, assembly drawing(s), documentation or purchase orders.

1.4 Abbreviations and Acronyms Periodic table elements are abbreviated in the standard. See the list below for full spellings of abbreviations (including elements) and acronyms used in this standard.

1.4.1 CAS RN Chemical Abstract Service Registry Number

1.4.2 GHG Greenhouse Gasses

1.4.3 GWP Global Warming Potential

1.4.4 ODS Ozone Depleting Substances

1.4.5 VOC Volatile Organic Compounds

1.4.6 CEPN Clean Electronics Production Network

1.4.7 ACI American Cleaning Institute

1.4.8 AISE International Association for Soaps, Detergents and Maintenance Products

1.4.9 ISO International Standard for Organization

1.4.10 EU European Union

1.4.11 ECHA European Chemicals Agency

1.4.12 IPCC International Panel on Climate Change

1.4.13 PHA Process Hazard Evaluation

1.4.14 CFC Chlorofluorocarbons

1.4.15 HCFC Hydrochlorofluorocarbons

1.4.16 CH_3Br Methyl bromide

1.4.17 CCl_4 Carbon tetrachloride

1.4.18 CH_3 CCl_3 Methyl chloroform