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Qualification and Performance Specification of Permanent, Semi-Permanent and Temporary Legend and/or Marking Inks

Developed by the Legend Inks Task Group (5-33E) of the Cleaning and Coating Committee (5-30) of IPC

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

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1 SCOPE AND DESIGNATION

1.1 Scope This specification **shall** define the criteria for and method of obtaining the maximum information about and confidence in legend and marking ink material under evaluation.

This specification covers the following legend and marking ink types (applications):

Type 1: Permanent legend and marking ink with some areas of direct metal contact between electrical nodes

Type 2: Permanent legend and marking ink without direct metal contact (e.g., ink over solder mask)

Type 3: Semi-permanent legend and marking ink

Type 4: Temporary legend and marking ink

This specification **shall** establish the requirements for:

- The evaluation of legend and marking ink materials.
- The conformance of legend and marking ink material properties.
- The qualification of the legend and marking ink via the appropriate test substrate.
- The qualification assessment of the legend and marking ink in conjunction with the production printed board (PB) process.
- Serialization or personalization present on the PB.

NOTE: If a permanent legend and/or marking ink is to be used as a primary dielectric (solder mask), it shall require qualification as a solder mask per IPC-SM-840.

1.2 Purpose This specification **shall** establish the requirements, based on applicable test methods and conditions, for the evaluation of a legend and marking ink material and for the determination of the acceptability of use on a standard PB system. These same requirements **shall** also be used to qualify a PB production process based on conformance criteria defined by the reliability requirements of the end use environment. Acceptability and/or verification criteria of the production PBs **shall** be determined in accordance with the applicable performance requirements contained in IPC-6011, IPC-6012, IPC-6013, IPC-6016 and IPC-6018. The legend and marking ink materials described herein, when applied to the PB substrate **shall not** degrade the performance of a PB substrate. The legend and marking ink material **shall not** contribute to electromigration and other forms of detrimental or conductive growth.

NOTE: The determination of compatibility between legend and marking ink materials and post soldering products and processes is beyond the scope of this specification. The use of Test Methods specified herein to determine the compatibility and the requirement to do so shall be as agreed between user and supplier (AABUS).

This specification **shall** list the base requirements for legend and marking ink and legend and marking ink production processes. The legend and marking ink **shall** be cured or conditioned per the manufacturer's recommended application process in accordance with those conditions specified for that product. Additional requirements or deviations from these requirements **shall** be AABUS.

For reference in this specification, the manufacturer of the legend and/or marking ink is the supplier. The fabricator of the PB with the legend and/or marking ink applied is the user, unless within the context, the fabricator is supplying it to the end user, in which case the fabricator is the supplier.

1.3 Types Permanent legend and marking ink used as a primary dielectric **shall** be qualified as a solder mask per IPC-SM-840. This specification covers the four basic types and/or applications of legend and marking ink as listed below:

Type 1: Permanent legend and marking ink with direct metal contact – this ink type and application is similar to classic PB marking methods where some type of ink (e.g., UV, thermal, photoimageable solder mask (PISM)) is deposited in a pattern on a PB. Due to component size, ink registration limitation, or large ink area deposit, the ink may contact electrical circuits. In applications where the ink bridges electrical circuits, the ink serves as a primary dielectric, whether intended or not by design. As such, a Type 1 legend and marking ink **shall** be qualified to IPC-SM-840.

Type 2: Permanent legend and marking ink without direct metal contact – this ink type and application is the ''classic'' PB marking method where some type of ink (e.g., UV, thermal, PISM) is deposited in a pattern on a PB over solder mask or laminate. The particular pattern is often used to convey information, such as component location, component identification, component polarity, date/lot code information, etc.

Type 3: Semi-permanent marking ink – this ink type is not designed to withstand all PB manufacturing processes and