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Specification for Electroless Nickel/Immersion Gold (ENIG) Plating for Printed Boards

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Developed by the Plating Processes Subcommittee (4-14) of the Fabrication Processes Committee (4-10) of IPC

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Performance Specification for Electroless Nickel/ Immersion Gold (ENIG) Plating for Printed Boards

1 SCOPE

This performance specification sets requirements for Electroless Nickel/Immersion Gold (ENIG) deposit thicknesses for applications including soldering, wire bonding and as a contact finish. It is intended for use by chemical suppliers, printed board manufacturers, electronics manufacturing services (EMS) and original equipment manufacturers (OEM). This standard may be used to specify acceptance criteria to meet performance requirements in addition to those found in the IPC-6010 series (IPC-6012, IPC-6013 and IPC-6018) of standards. The ENIG deposit specified by using this document will meet the highest coating durability rating as specified in the J-STD-003 printed board solderability specification.

This specification is based on three critical factors:

1) The ENIG plating process is in control producing a normal distribution for nickel and gold deposit thickness.
2) That the tool used to measure the deposit and therefore control the process is accurate and reproducible for the thickness range specified.
3) That the ENIG plating process results in uniform deposit characteristics.

If any of these three critical factors are not met, then the deposit produced will not meet the performance criteria defined herein.

1.1 Purpose This specification sets the requirements specific to ENIG as a surface finish (see Table 3-1 for a summary of these requirements).

1.2 Description ENIG is an electroless nickel layer capped with a thin layer of immersion gold (IAu). It is a multifunctional surface finish, applicable to soldering, aluminum and copper wedge wire bonding, press fit connections, and as a contact surface. The immersion gold layer protects the underlying nickel from oxidation/passivation over its intended life. However, this layer is not impervious and it will not pass the requirements of a ‘‘classic’’ porosity test as defined in ASTM B735 and IPC-TM-650, Methods 2.3.24, 2.3.24.1 and 2.3.24.2.

1.3 Classification IPC standards recognize that electrical and electronic assemblies are subject to classifications by intended end-item use. Three general end-product classes have been established to reflect differences in manufacturability, complexity, functional performance requirements, and verification (inspection/test) frequency. It should be recognized that there may be overlaps of equipment between classes.

CLASS 1 General Electronic Products

Includes products suitable for applications where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Service Electronic Products

Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically, the end-use environment would not cause failures.

CLASS 3 High Performance/Harsh Environment Electronic Products

Includes products where continued high performance or performance-on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems.

1.4 Measurement Units All dimensions and tolerances in this specification are expressed in hard SI (metric) units and bracketed soft imperial [inch] units. Users of this specification are expected to use metric dimensions. All dimensions ≥ 1 mm [0.0394 in] will be expressed in millimeters and inches. All dimensions < 1 mm [0.0394 in] will be expressed in micrometers and microinches.

1.5 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.