IPC-5262

Design, Critical Process and Acceptance Requirements for Polymeric Applications

Developed by 5-24g Polymerics Standard Task Group

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

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1 GENERAL REQUIREMENTS

1.1 Scope This document prescribes the minimum design, critical process and acceptance requirements for the application of polymeric materials to electrical/electronic components, modules, printed wiring assemblies and other elements thereof.

IPC-AJ-820, IPC-HDBK-001, IPC-HDBK-830 and IPC-HDBK-850 are companion documents to this specification. They contain valuable explanatory and tutorial information compiled by IPC Technical Committees that is relevant to this specification.

Although the handbooks are not a part of this specification, when there is confusion over the specification verbiage, the reader is encouraged to refer to the handbooks for assistance.

Reference materials listed in this text are recommended reading. The User is encouraged to obtain all relevant referenced materials as this document cannot (nor can any single document) cover every material, process, environment, performance or safety aspect that affects a given design.

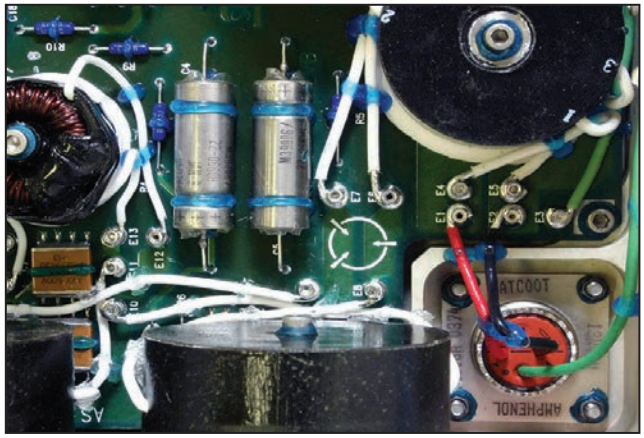

Figure 1-1 Printed wire Assembly With Staking
Image Courtesy: NASA/Johnson Space Center (JSC) Quality & Flight Equipment Division Group

1.2 Purpose The intent of this document is to establish a baseline of requirements, procedures, practices and process attributes based on Lessons Learned and Best Practices that have been demonstrated through use and experience, to result in a robust design and high reliability.

This document is intended for use by the design engineer, manufacturing engineer, quality engineer or other individual responsible for implementation and compliance with requirements of this document to the applicable performance class.

a. In-Service Criteria. This document defines design requirements and acceptability criteria for "New/Beginning of Life" hardware. It is not the intent of this document to establish or define "In Service" acceptance criteria to address performance or reliability issues caused by aging or use. However, the acceptability criteria and limits that are currently detailed in this document may be considered to be wide enough to be applicable to the more common hardware degradation caused by aging/use. Use of these criteria for acceptance of "In Service" hardware conditions **shall [N1D2D3]** be as agreed between the Manufacturer and the User.

b. Metallic Whisker Control. It is not the intent of this document to be used as a stand-alone document for the control and mitigation of performance and/or reliability concerns related to metallic whiskers.

Note: *Users of this document are encouraged to review GEIA-STD-0005-1, GEIA-STD-0005-2 or IPC-AJ-820 for additional information pertaining to control of metallic whiskers.*

c. Alternate/Proprietary Documents or Processes. It is not the intent of this document to exclude any alternate or manufacturer-proprietary documents or processes that meet or exceed the baseline of requirements established by this document. Use of alternate or manufacturer-proprietary documents or processes that tailor (e.g., change, increase, reduce, delete) any of the mandatory requirements of this document **shall [N1D2D3]** require review and prior approval of the User.

d. For purposes of this document:

1) The Designer is the design agent for the User.

2) The User is the individual, organization, company, contractually designated authority or agency responsible for the procurement or design of electrical/electronic/electromechanical (EEE) hardware and having the authority to define the class of equipment and any variation or restrictions to the requirements of this document (e.g., the originator/custodian of the contract detailing these requirements).

3) The Supplier is considered the individual, organization or company which provides the Manufacturer (Assembler) components (e.g., electrical, electronic, electromechanical, mechanical, printed boards) and/or materials (e.g., solder, flux, cleaning agents).

4) The Manufacturer is considered the entity that provides a service or product to the User.

e. The acceptability of the use of polymerics with no-clean flux chemistries **shall [N1D2D3]** be as agreed between the Manufacturer and the User.

1.3 Applicability This document is applicable to manufacturers involved in the application of polymeric processes (e.g., bonding, staking, conformal coating, encapsulation) to electrical/electronic components, including printed board assemblies, optical and metallic cable and wiring harness assemblies, mechanical items (e.g., tin-plated chassis, brackets, fasteners), and elements thereof, and wherever invoked contractually. The User is responsible for determining whether the use of polymeric materials may be required to ensure performance or reliability of the hardware.

1.4 Performance/Product Classification This document recognizes 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 functional performance requirements, and verification (inspection/test) frequency.

a. It should be recognized that there may be overlaps of equipment between classes.

b. The User is responsible for defining the product class.

c. The contract should specify the performance class required, whether compliance to any of the Appendices is required, and indicate any exceptions to specific parameters where appropriate. If the performance Class is not specified, Class 3 requirements are applicable.

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 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.

MILITARY/SPACE
Includes products from Performance Class 3 – High Performance/Harsh Environment Electronic Products, with additional considerations for unique materials requirements and more extreme operational environments, such as vibration and thermal cycling. Space/military classification deviations to IPC-A-5262 requirements are defined and listed in Appendix A.

M/S When the [M/S] symbol appears next to a paragraph, it indicates that Appendix A contains requirements to be used in addition to, and in some cases in place of, those published in that paragraph. The criteria in Appendix A are not binding, unless separately and specifically included by the applicable contract, approved drawing(s), or purchase order. Appendices do not apply unless separately invoked per 1.13.

1.5 Definition of Requirements The imperative form of action verbs are used throughout this document to identify acceptance requirements that may require compliance, depending upon the Performance Classification of the hardware.

SHALL/SHALL NOT. The words **shall** or **shall not** are used whenever a requirement is intended to express a provision that is mandatory. Deviation from a **shall** or **shall not** requirement for a particular Performance Class may be considered if sufficient technical rationale/objective evidence (OE) is supplied to the User to justify the exception.

d. **SHOULD/SHOULD NOT.** The words **should** or **should not** are used whenever a requirement is intended to express a provision that is non-mandatory, and which reflects general industry practice and/or procedure.

e. **MAY.** The word **may** is intended to express an action or provision that is to be considered non-mandatory, and which is provided as a "recommendation".

1.5.1 Requirement Format (N/A/D) To assist the User, each requirement is identified by its Performance Classification (x1x2x3) and applicability, where "x" represents:

N = No requirement has been established for this Class
A = Acceptable
D = Defect

Examples:

- **[N1N2D3]** is Requirement Not Established Class 1 or 2, Defect Class 3
- **[N1D2D3]** is Requirement Not Established Class 1, Defect Classes 2 and 3
- **[N1A2D3]** is Requirement Not Established Class 1, Acceptable Class 2, Defect Class 3
- **[A1A2D3]** is Acceptable Classes 1 and 2, Defect Class 3
- **[D1D2D3]** is Defect for all Classes.