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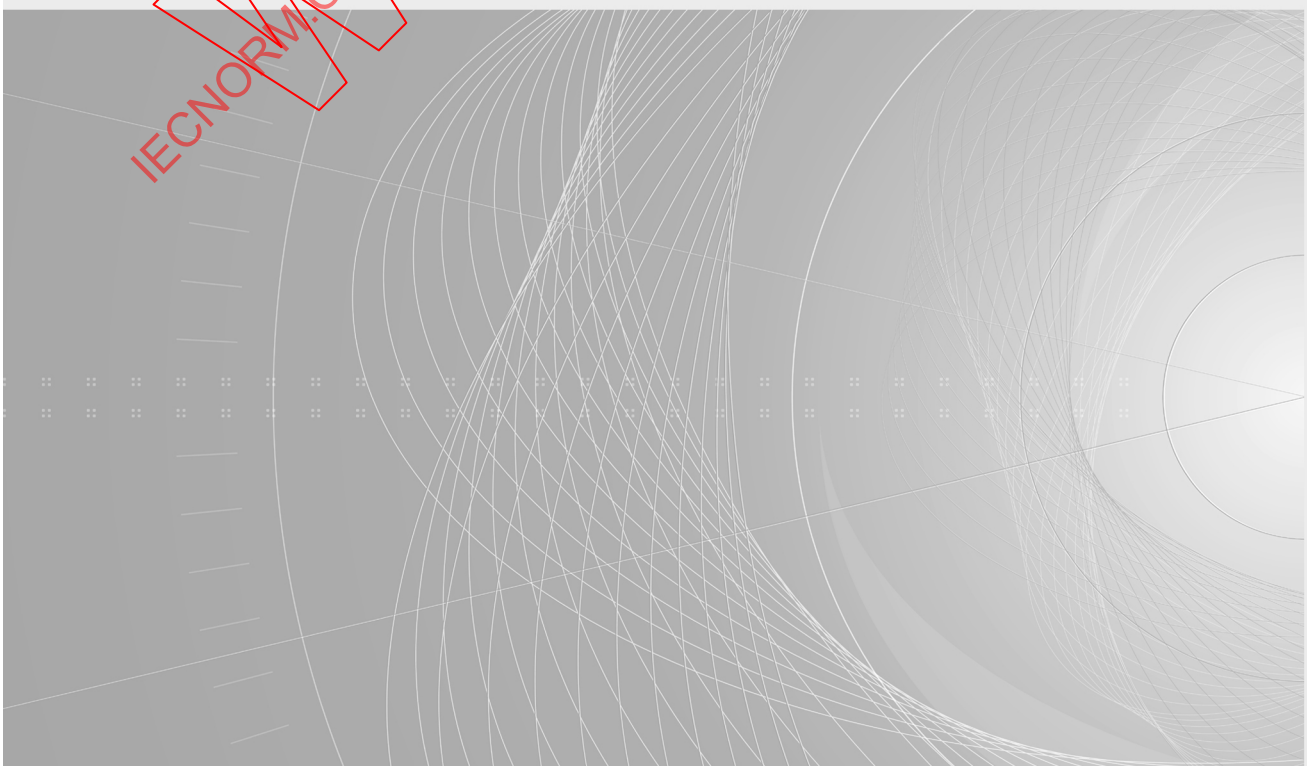
PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Process management for avionics – Aerospace and defence electronic systems containing lead-free solder –
Part 1: Lead-free management



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PRE-STANDARD

Process management for avionics – Aerospace and defence electronic systems containing lead-free solder –
Part 1: Lead-free management

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROCESS MANAGEMENT FOR AVIONICS – AEROSPACE AND DEFENCE ELECTRONIC SYSTEMS CONTAINING LEAD-FREE SOLDER –

Part 1: Lead-free management

FOREWORD

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A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC-PAS 62647-1 has been processed by IEC technical committee 107: Process management for avionics.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
107/106/PAS	107/115A/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS is based on GEIA-STD-0005-1 and is published as a double logo PAS. GEIA, Government Electronics and Information Technology Association, has been transformed into TechAmerica Association.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single period up to a maximum of 3 years, at the end of which it shall be published as another type of normative document, or shall be withdrawn.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This PAS is intended for use by Aerospace and High Performance (AHP) electronics system customers, i.e., aerospace and defence vehicle integrators, operators, and regulatory organizations, and their suppliers, i.e., system original equipment manufacturers (OEMs) and system maintenance facilities as they incorporate Pb-free solder or Pb-free piece part and board finishes.

The Aerospace Industries Association (AIA), the Avionics Maintenance Conference (AMC), and Government Electronics and Information Technology Association (GEIA) formed the Lead-free Electronics in Aerospace Project Working Group (LEAP WG) to generate a series of industry standard documents for the use and handling of Pb-free solder, piece parts and boards in AHP. This PAS – originally published as GEIA-STD-0005-1 – was prepared by the LEAP WG; and was balloted and approved by GEIA G-12 (Solid State Subcommittee) and the GEIA Avionics Process Management Committee. According to agreements between GEIA and IEC, this PAS is extended at international level.

This PAS is intended to work in concert with GEIA-HB-0005-1 [1], GEIA-HB-0005-2 [2], and IEC/PAS 62647-2 (based originally on GEIA-STD-0005-2). Figure 1 shows a schematic representation of their relationships with each other, and with information about lead-free (Pb-free) electronics from sources external to the AHP industries.

This PAS may be referenced in proposals, requests for proposals, work statements, contracts, and other aerospace and high performance industry documents.

The European Union (EU) has enacted two directives; 2002/95/EC Restriction of Hazardous Substances (RoHS) and 2002/96/EC Waste Electrical and Electronic Equipment (WEEE) that restrict or eliminate the use of various substances in a variety of products that are put on the market after July 2006. One of the key materials restricted is lead, which is widely used in electronic solder and electronic piece part terminations. These regulations may appear to affect only products for sale in the EU; however, due to the reduced market share of the AHP industries, many of the lower tier suppliers to those industries will change their products to serve their primary, non-AHP markets. Additionally, several U.S. states have enacted similar "green" laws and many Asian electronics manufacturers have recently announced completely green product lines. Since AHP is one of the few major industrial sectors that still repair Circuit Card Assemblies (CCAs) and the lead-free materials and processes are relatively immature and poorly understood, an aerospace-wide approach to their application is desired.

AHP industries products may be in one of a number of stages of the incorporation of Pb-free electronics, including

1) products that have been designed and qualified with traditional tin-lead (SnPb) electronic piece parts, materials, and assembly processes, and that will need to be maintained in the SnPb configuration;
2) products that have been designed and qualified with traditional SnPb electronic piece parts, materials and assembly processes, and have incorporated Pb-free electronic piece parts;
3) products that have been designed and qualified with SnPb materials, and are incorporating Pb-free materials;
4) new products designed with Pb-free materials.

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1 A future IEC/PAS 62647-21, based on GEIA-HB-0005-1, is in preparation.

2 A future IEC/PAS 62647-22, based on GEIA-HB-0005-2, is in preparation.

PROCESS MANAGEMENT FOR AVIONICS – AEROSPACE AND DEFENCE ELECTRONIC SYSTEMS CONTAINING LEAD-FREE SOLDER –

Part 1: Lead-free management

1 Scope

This PAS defines the objectives of, and requirements for, documenting processes that assure customers and regulatory agencies that Aerospace and High Performance (AHP) electronic systems containing Pb-free solder, piece parts, and boards will satisfy the applicable requirements for performance, reliability, airworthiness, safety, and certifiability throughout the specified life of performance.

Its goal is to communicate requirements for a Lead-free Control Plan (LFCP), hereinafter referred to as the plan, and to assist suppliers in the development of their own plans. The plan documents the plan owner's (supplier's) processes, that assure their customers, and all other stakeholders that the plan owner's products will continue to meet their requirements[3].

This PAS does not contain detailed descriptions of the processes to be documented but lists high-level requirements for such processes, and areas of concern to the AHP industries that must be addressed by the processes.

This PAS applies only to entities within the control of the AHP electronics system supply chain; and is intended to address issues that are unique to those industries.

Some applications may have unique requirements that exceed the scope of this PAS, and should be covered separately.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/PAS 62647-2 (originally published as GEIA-STD-0005-2), *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 2: Mitigation of the deleterious effects of tin*

GEIA-HB-0005-1, *Program Management / Systems Engineering Guidelines for Managing the Transition to Lead-free Electronics* [4]

GEIA-HB-0005-2, *Technical Guidelines for Aerospace and High Performance Electronics Containing Lead-free Solder* [5]

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[3] This PAS was developed primarily for aerospace products; however, it also may be applicable, at the discretion of the user, to other products with similar characteristics, e.g., low-volume, rugged environments, high reliability, long lifetime, and repairability. Other industries may use this PAS by substituting the name of their industry for the word "aerospace" in this PAS.

[4] A future IEC/PAS 62647-21, based on GEIA-HB-0005-1, is in preparation.

[5] A future IEC/PAS 62647-22, based on GEIA-HB-0005-2, is in preparation.

IPC-1066, *Marking, Symbols and Labels for Identification of Lead-free and Other Reportable Materials in Lead-free Assemblies*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1
assemblies
electronic items that require electrical attachments, including soldering of wires or component terminations; examples include circuit cards and wire harnesses

3.2
critical item or function
item or function which, if defective, will result in the system's inability to retain operational capability, meet primary objective, or affect safety

3.3
customer
entity or organization that (a) integrates a piece part, soldered assembly, unit, or system into a higher level system, (b) operates the higher level system, or (c) certifies the system for use. For example, this may include end item users, integrators, regulatory agencies, operators, original equipment manufacturers (OEMs), and subcontractors

3.4
high performance system or product
System or Product which requires continued performance or performance on demand, or equipment down time cannot be tolerated, or end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems

3.5
lead-free
defined as less than 0,1 % by weight of lead in accordance with Waste Electrical and Electronic Equipment (WEEE) guidelines

3.6
lead-free control plan
aerospace or defence system supplier's document that defines the processes that assure the plan owners, their customers, and all other stakeholders that aerospace and high performance high-reliability electronics systems containing Pb-free solder and Pb-free piece part and board finishes will continue to be reliable, safe, producible, affordable, and supportable

3.7
Pb-free tin
tin or any tin alloy with <3 % lead (Pb) content by weight. This means that some Pb-free finishes other than Pb-free tin, such as tin-bismuth and tin-copper, are considered to be "tin" for the purposes of this PAS. Many of these alloys have not been assessed for whiskering behavior

3.8
Pb-free tin finish
Pb-free tin final finishes or underplates either external or internal to a device, board or other hardware. This includes all leads and surfaces, even those coated, encapsulated, or otherwise not exposed. It may include finishes on electrical piece parts, mechanical piece parts, and boards. It does not include Pb-free bulk solders, assembly materials, solder balls, or those devices where the Pb-free tin finish has been completely replaced

3.9
piece part
electronic piece part that is not normally disassembled without destruction and is normally attached to a printed wiring board to perform an electrical function

3.10
repair
act of restoring the functional capability of a defective article in a manner that precludes compliance of the article with applicable drawings or specifications

3.11
rework
act of reprocessing non-complying articles, through the use of original or equivalent processing in a manner that assures full compliance of the article with applicable drawings or specifications

3.12
solder ball technology
identifies a family of components that employ solder balls or bumps to make mechanical and electrical connections between components and printed circuit boards. Examples are ball grid arrays (BGA), flip chip, and chip scale interconnections

3.13
soldered assembly
assembly of two or more basic parts interconnected by a solder alloy. A lead-based soldered assembly is one in which the solder alloys are solely lead-based. A lead-free soldered assembly is one in which the solder alloys are solely lead-free

3.14
sub-contractor
organization, within the given high-reliability industry, that supplies, maintains, repairs, or supports electronic systems, and is not the direct supplier to the customer or user of those systems

3.15
supplier
entity or organization that designs, manufactures, repairs, reworks, or maintains a piece part, unit, or system. For example, this includes original equipment manufacturers (OEMs), repair and rework facilities, subcontractors, and piece part manufacturers

3.16
system
one or more units that perform electrical function(s)

3.17
system design authority
entity responsible for producing and/or maintaining the design of the system

3.18
tin whisker
spontaneous crystal growth that emanates from a tin surface. They may be cylindrical, kinked, or twisted. Typically they have an aspect ratio (length/width) greater than two, with shorter growths referred to as nodules or odd-shaped eruptions (OSEs)

3.19
unit
one or more assemblies within a chassis to perform electrical function(s)

4 Symbols and abbreviated terms

AHP	Aerospace and High Performance
AIA	Aerospace Industries Association
AMC	Avionics Maintenance Conference
BGA	Ball Grid Array
GEIA	Government Engineering and Information Technology Association
GIDEP	Government Industry Data Exchange Program
LEAP WG	Lead-free Electronics in Aerospace Project Working Group
LFCP	Lead Free Control Plan
OEM	Original Equipment Manufacturer
Pb	Lead
SAC	Tin Silver Copper
Sn	Tin
JCAA/JG-PP	Joint Council on Aging Aircraft Joint Group on Pollution Prevention

5 Objectives

5.1 General

This PAS describes a Lead Free Control Plan that documents the processes used to assure that aerospace and high performance electronic systems that are produced, supplied, reworked, repaired, or maintained by the plan owner, and that contain Pb-free solder, piece parts, or boards will satisfy the applicable requirements for performance, reliability, safety, and certifiability throughout the specified life of performance of the system. Specific objectives to be accomplished are as follows:

5.2 Reliability

The processes and materials using Pb-free solder and finishes are demonstrated as capable of producing reliable products.

5.3 Configuration control and product identification

The configurations of all systems, equipment, assemblies, sub-assemblies, and piece parts are identified and controlled.

5.4 Risks and limitations of use

Risks and limitation of use of the plan owner's products, due to the use of Pb-free solders and finishes, are identified, and information is provided to control them.

5.5 Deleterious effects of tin whiskers

The deleterious effects of tin whiskers are mitigated.

5.6 Repair, rework, maintenance, and support

Repair, rework, maintenance, and support activities are controlled in a manner that controls effects of Pb-free solder materials and processes.

6 Technical requirements

6.1 General

The AHP system supplier shall have a plan that documents the processes the plan owner uses to accomplish the objectives of Clause 5.

The plan shall state clearly, concisely, and unambiguously

- what the plan owner does to accomplish each of the objectives;
- the process by which compliance to the plan is demonstrated;
- the evidence that is available to show that the objectives have been accomplished.

Depending on program or product line requirements, the plan owner may, with appropriate justification, amend the above list of objectives by adding or deleting them. If this is done, then the plan will be assessed according to the amended list of requirements, as stated in the plan.

6.2 Reliability

6.2.1 General

The plan shall document processes that are capable of assuring the reliability of the equipment using the substrate solder finish materials, termination solder materials and finishes, assembly solder alloys, fluxes, cleaning agents, board materials, piece parts, and soldering processes in the given application.

NOTE This document is limited to issues that are unique to aerospace and high performance industries; for example it is assumed that assembly processes and materials that assure high quality assembly in other industries will be acceptable in the given aerospace or high performance industry. On the other hand, users of this PAS should address unique reliability issues such as long life, rugged operating environments, high consequences of failure, etc. An example would be to assure that bakeout processes prior to assembly will limit susceptibility to "popcorning" when subjected to higher soldering process temperatures.

This requirement applies to combinations of substrate solder finish materials, termination solder materials and finishes, and assembly solder alloys used in the given application.

This requirement applies to original production and repair and rework of systems.

This requirement applies to purchased sub-assemblies, such as disk drives, that include solder alloys.

6.2.2 Test and analysis methods

The plan shall document methods to test assemblies made with the alloys, and combinations thereof, to provide data to assess their reliability in the given application.

NOTE 1 The test methods should address the major failure mechanisms expected for the materials and construction of the assembly, which for solder joints include crack propagation caused by alternating stresses, and the formation of brittle intermetallic phases or voids. The recommended test method for crack propagation is temperature cycling, and the recommended test method for brittle phases or voids is steady state temperature aging. Failure analysis by metallographic examination and/or composition analysis is critical to interpreting results from these tests. Other failure mechanisms may include popcorning and printed wiring board interconnect fractures resulting from higher reflow temperatures required for many Pb-free solder alloys.

NOTE 2 Guidelines and examples for planning and conducting tests, and for analyzing and using results therefrom, are included in GEIA-HB-0005-2.

NOTE 3 Test methods to demonstrate reliability in high-reliability industries are still in development. This document, and also GEIA-HB-0005-2, recommends the use of "conservative" test methods that will assure reliability, even if their efficiency is less than optimal. As more is learned about the test methods, they may be modified to improve accuracy and efficiency.

Analysis methods may be used in lieu of testing, provided the analysis methods have been verified by testing.

6.2.3 Environmental and operating conditions

The life cycle environmental and operating conditions for the given application (for the individual assembly) shall be known, and used in assessing the reliability of the given materials and processes in the given application. This information should be agreed upon by the supplier and the customer.

In cases where a given Pb-free solder alloy or finish in a comparable application has been shown to be reliable for a given set of environmental conditions, it may be considered reliable in other, less severe, environmental conditions.

A given Pb-free solder alloy or finish in a given application may be considered reliable if its reliability is shown to be equal to or better than a Sn-Pb alloy or finish in parallel testing in comparable environmental conditions, provided that the SnPb alloy or finish satisfies the reliability requirements. The test conditions should be shown to correlate to actual life cycle environmental and operating use conditions.

6.2.4 Data

The plan shall document methods to include the use of archived and retrievable reliability data from at least one of the following: (a) in-service data from similar systems in comparable applications and environmental conditions; or (b) test data from studies conducted on the solder or finish compositions used in the given system design, or a comparable one, under comparable conditions. The data shall represent parts, materials, and processes comparable to the construction being assessed.

NOTE 1 Example sources of test data include:

- Computer-Aided Life Cycle Engineering Electronics Packaging and Systems Center, University of Maryland
- IPC - Association Connecting Electronics Industries
- JEDEC
- Japan Engineering and Information Technology Association (JEITA)
- Joint Council on Aging Aircraft Joint Group on Pollution Prevention (JCAA/JG-PP)

NOTE 2 Guidelines for planning and conducting tests, and for analyzing and using results therefrom, are included in GEIA-HB-0005-2.

6.2.5 Conversion of results from available data to applicable conditions

The plan shall document processes to determine and quantify the relevant environmental use conditions and reliability requirements for specific given products. In the event that the above data are obtained from service or test environmental conditions that are different from those expected for the use conditions of a given system, the documented processes will include those used to convert results to use conditions of the given system, using appropriate acceleration factors.

NOTE 1 The purpose of this requirement is to assure that the actual use conditions of the given product are considered in the application of data.

NOTE 2 Methods to convert data from one set of environmental conditions to another are described in GEIA-HB-0005-2.

6.3 Configuration control and product identification

6.3.1 General

NOTE The purpose of this requirement is to provide information to users and maintainers of the system, so that they can use appropriate solder alloys, finishes, fluxes, and cleaning agents to assure the integrity of the system throughout the specified life of performance.

6.3.2 Termination material and finish alloy compositions of piece parts

The plan shall document processes that identify (on appropriate controlled documents that assure configuration identification and control) all piece part and assembly materials for which reliability, compatibility, processing, or other issues, may exist. Examples of such alloys are

- solder alloys with high melting temperatures, e.g., >250 °C;
- piece parts supplied with solder ball technology;
- solder alloys containing bismuth;

- piece parts with Pb-free tin termination materials or finishes.

NOTE 1 To accomplish this, the plan owner may contact piece part manufacturers and suppliers, consult data sheets, or use external resources such as Q-Star. At the time of publication of this PAS, it is not clear whether or not this will be adequate, or whether additional testing or analysis of the piece parts will be required.

NOTE 2 It is recommended that plan owners subscribe to a part change notice (PCN) service, e.g., PCN Alert, Part Miner, Total Parts Plus, Arrow Risk Manager, Avnet Pomiere, GIDEP, etc., in addition to maintaining an active interface with piece part manufacturers, manufacturers' representatives, and piece part distributors. Changes in termination finish will result in re-evaluation of the piece part and its compatibility with other materials and processes.

NOTE 3 The purpose of this requirement is to ensure that the information necessary for reliable repair and rework of the equipment is available to the repair and rework facilities, so that the repair and rework materials and processes can be appropriate for the given piece part termination or finish alloy.

6.3.3 Solder alloys used in the assembly process

6.3.3.1 General

The plan shall document processes that identify, and record in a controlled manner, the solder alloys, fluxes, cleaning agents, and soldering processes used in the assembly process, both by in-house and contract manufacturers. This applies to both original and repaired equipment.

NOTE IPC-1066 provides information that can aid in this.

6.3.3.2 Assemblies containing a single solder alloy

Solder alloys, fluxes, cleaning agents, and processes (including time-temperature profiles) shall be documented in the appropriate controlled document system. This information may be identified on a label or included in the maintenance manual, or other similar means. Assemblies assembled with Pb-free solders may be identified per the marking requirements of IPC-1066.

6.3.3.3 Assemblies containing more than one solder alloy

Solder alloys, fluxes, cleaning agents, and processes (including time-temperature profiles) shall be documented in the appropriate controlled document system.

A description or pictorial layout of the board, identifying the locations of each solder alloy, shall be included in the appropriate controlled document system.

This information may be identified on a label or included in the maintenance manual, or other similar means. The practice of using more than one solder alloy on an assembly should be discouraged.

6.3.4 Aircraft wiring

If applicable, the processes described above shall be documented in the plan for aircraft wiring and similar applications.

6.3.5 Changes in solder alloys

The plan shall document processes to assure that no changes to the solder alloys or finishes are made without prior written authorization and approval by the plan owner.

6.3.6 Identification

Where required by contract, all Pb-free sub-assemblies, assemblies, and equipment shall be identified as such by affixing industry-approved Pb-free labels appropriately.

NOTE Industry standards that contain marking requirements include JESD-97, IPC-1065, IPC-1066, etc.

6.3.7 Part number changes

Part number changes will be determined by the requirements of the specific program. Examples of changes to be considered are re-designs of assemblies from lead-based to Pb-free, changes in piece part finish or materials, and changes in assembly solder alloys. Changes to basic parts on soldered assemblies and soldered assemblies within equipment should be considered.

6.4 Risks and limitations of use

6.4.1 Incompatible materials

The plan shall document processes that identify solder materials, finishes, fluxes, cleaning agents, and part characteristics such as temperature and moisture limitations, in sufficient detail to ensure that subsequent repair or rework is not made with incompatible materials, fluxes, or cleaning agents.

6.4.2 Limitations on system use

The plan shall document processes that identify and report limitations on system operation, to avoid unacceptable levels of risk to performance, reliability, safety, or airworthiness due to the use of Pb-free solder or finishes.

NOTE Examples of such a limitation include the location within the vehicle (inside or outside the hull of an aerospace vehicle), critical vs. non-critical equipment, or special maintenance requirements for a given application.

6.4.3 Limitations on environmental conditions

The plan shall document processes that identify operating and environmental conditions that cause unacceptable levels of risk to performance, reliability, safety, or airworthiness due to the use of Pb-free solder or finishes.

6.4.4 Limitations on maintenance, rework, and repair

The plan shall document processes that identify limitations on equipment maintenance, rework, and repair due to the use of Pb-free solder or finishes.

6.4.5 Other risks and limitations

The plan shall document processes that identify and quantify other risks and limitations associated with the use of the selected Pb-free solder or finishes.

6.5 Deleterious effects of tin whiskers

When the deleterious effects of tin whiskers are addressed, the documented plan shall include a reference to, and a commitment to follow, a plan to mitigate the deleterious effects of tin whiskers, prepared and approved in compliance to the requirements of GEIA-STD-0005-2.

NOTE The necessity to impose document GEIA-STD-0005-2 should be based on analysis of the overall effect of tin whiskers on the system in its intended application.

6.6 Repair, rework, maintenance, and support

6.6.1 General

NOTE 1 It is recommended that the plan owner consult and, if possible, comply with the provisions of ARINC Project Paper 671 in documenting the processes used in this subclause.

The requirements of this PAS shall apply equally to original equipment manufacturing and repair, rework, maintenance and support activities.

The system design authority shall

- assure that all data and information required to comply with the requirements of this PAS are available to those responsible for repair, rework, maintenance, and support; and
- assure that repair, rework, and maintenance documents issued by the system design authority are consistent with the design authority's plan;
- assure that sufficient information is provided to enable the repair and rework facility to use alloys, materials, finishes, and processes that are compatible with the item being repaired or reworked.

NOTE 2 At the time of publication of this PAS, the tin-silver-copper (SAC) system is one of the more likely Pb-free alloys that will be used to replace SnPb alloys for assembly of high-reliability electronic systems. Based on the best current technical information, the SAC system is a likely alloy of choice for repair and rework facilities, and with proper understanding and control, can be compatible with SnPb alloys. Therefore, it is recommended that equipment designed with Pb-free solder and finishes be reparable with alloys based on the SAC system. Users of this PAS are advised to verify this observation, and to stay current with developments in this area.

NOTE 3 The composition ranges for the major constituent alloys of the SAC system are as follows:

tin:	95,5 – 96,5 %
silver:	3,0 – 4,0 %
copper:	0,5 – 0,7 %
all others:	< 0,1 %

The repair, rework, maintenance, and support facility shall

- assure that all repair, rework, maintenance, and support processes are documented, and are in compliance with the requirements of the plan;
- understand the limitation of their processes, so that they will not attempt repair, rework, maintenance, and support activities that exceed the capabilities of their documented processes.

6.6.2 Replacing piece parts

The documented replacement process shall include the following steps:

- removal of the piece part to be replaced, using controlled processes for preheat and reflow;
- removal of the solder material from the printed wiring board;
- attachment of the replacement piece part, using a solder alloy material that is verified as compatible with alloy and finish of the piece part, and a controlled reflow process;
- related processes such as cleaning, underfill, etc.

7 Plan administrative requirements

7.1 Plan organization

The plan shall be organized in such a manner that each of the requirements of Clause 6 is addressed clearly, concisely, unambiguously; and in a manner that is verifiable by the customer or the customer's representative.

NOTE Figure 1 shows the relationship between this PAS and other selected documents; and Figure 2 shows the suggested structure of a plan.

7.2 Terms and definitions

The terms and definitions used in the plan shall be those of Clause 3 of this PAS, unless they are clearly defined otherwise in the plan.

7.3 Plan focal authority

The plan shall identify a focal authority, internal to the plan owner, with the following responsibilities:

- act as the primary interface between the plan owner and outside parties in matters pertaining to the plan;
- assure that the plan is reviewed and updated as necessary; and
- ensure that all technical and administrative issues are resolved in a timely manner.

7.4 References

The plan shall include a list of references to all the documents referenced in the plan, including this PAS, other industry and government documents, and the plan owner's internal documents.

7.5 Plan applicability

The plan shall document all the product types, families, or technologies to which the plan applies.

NOTE 1 This is not intended to be a list of part numbers. It may include, for example, the applicable market segment, or an effectivity date, or other range of products.

NOTE 2 Of particular concern here is the effectivity date.

7.6 Plan implementation

The plan owner shall implement and follow the processes documented in the plan, within its range of applicability.

7.7 Plan acceptance

The plan shall be accepted when the plan owner and the customer agree that it is acceptable to both parties, if the customer chooses to exercise the right of acceptance.

NOTE It is most efficient when the plan documenting baseline processes for a given plan owner is accepted by a wide range of customers. It is even more efficient with the use of a third-party approval process that is accepted by all (or most) customers.

7.8 Plan modifications

The plan may be modified by adding, deleting, or changing one or more clauses. Modified plans shall be given unique identification numbers.

NOTE 1 The baseline plan is expected to satisfy the majority of the plan owner's program requirements; but it may be modified, or tailored, to satisfy individual program or product requirements. In this case, the baseline plan remains in effect, and the modified plan becomes a program-specific plan.

NOTE 2 A typical modification would be to tailor the baseline plan to address issues specific to a given program or product, to include processes that the plan owner does not intend to use for all programs or products.

NOTE 3 The typical modification would be to add program- or product-specific requirements. The program cost of these requirements could then be determined and made available for program management decisions.

NOTE 4 If the baseline plan is permanently modified, it is superseded by the modified plan, which then becomes the new baseline plan.

NOTE 5 Within the aerospace and defence industries, space-related programs are known to have requirements that may not be applicable to products used in atmospheric environments.

In the event that a plan is changed, a process shall be in place to notify all entities that are affected by the change.

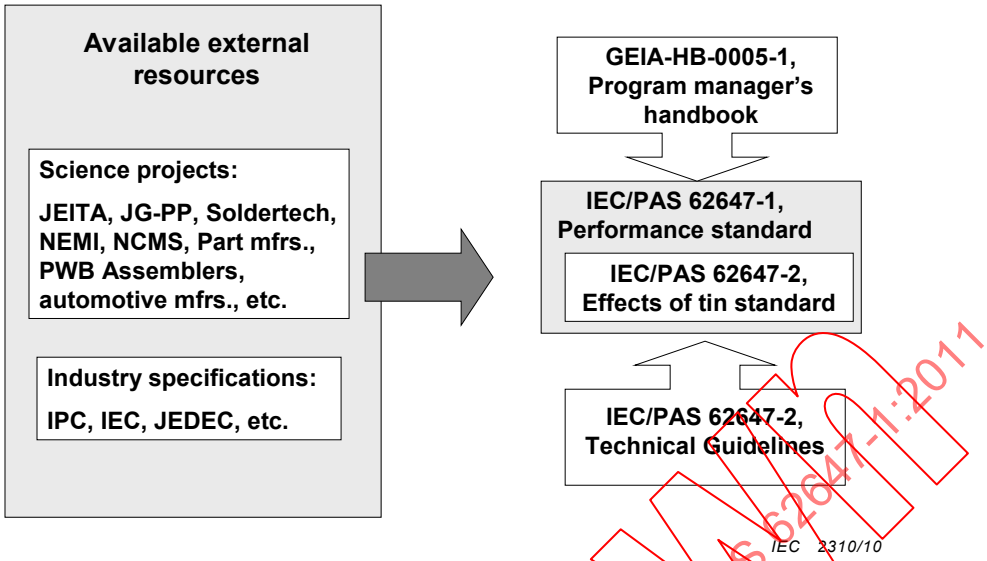

Figure 1 – Relationship of IEC/PAS 62647-1, IEC/PAS 62647-2, GEIA-HB-0005-1, and GEIA-HB-0005-2 with each other, and with information about Pb-free electronics from sources external to the aerospace and high performance electronics industries

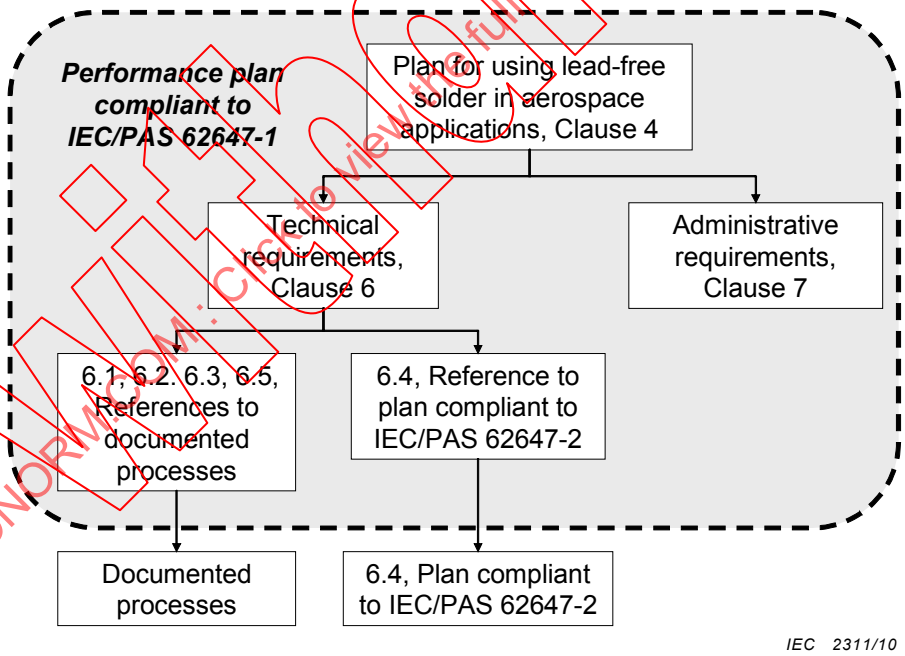

Figure 2 – Schematic diagram of the content of a performance plan compliant to IEC/PAS 62647-1