IEC 62239-1

Edition 1.0 2018-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Process management for avionics – Management plan –
Part 1: Preparation and maintenance of an electronic components management plan

Gestion des processus pour l'avionique – Plan de gestion –
Partie 1: Préparation et maintenance d'un plan de gestion des composants électroniques

IEC 62239-1:2018-09(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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PROCESS MANAGEMENT FOR AVIONICS –
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Part 1: Preparation and maintenance of
an electronic components management plan

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62239-1 has been prepared by IEC technical committee 107: Process management for avionics.

IEC 62239-1 cancels and replaces IEC TS 62239-1 published in 2015.

This first edition cancels and replaces the first edition of IEC TS 62239-1 published in2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) added references to SAE EIA-STD-4899, IECQ OD 3702, IECQ OD 3407-1, IEC TR 62240-2, IECQ component schemes, SAE AS6081, SAE AS6171. GEIA-STD-0005-1 GEIA STD 0008;

b) replaced Annex C (which was transferred into IEC TR 62240-2) with a cross-reference table to SAE EIASTD4899 rev C clauses/subclauses for guidance purposes only;

c) added the analysis of component technical erratum in 4.8.2;

d) updated Bibliography and reference documents.

The text of this international standard is based on the following documents:

CDV	Report on voting
107/320/CDV	107/333/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62239 series under the general title *Process management for avionics – Management plan,* can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This document provides the structure for avionics equipment manufacturers, subcontractors, maintenance facilities, and other aerospace component users to develop their own electronic component management plan (ECMP), hereinafter also referred to as ‘plan’. This document states objectives to be accomplished. The plan does not describe specific requirements and those who prepare plans in compliance with this document will document processes that are the most effective and efficient for them in accomplishing the objectives of this document. In order to allow flexibility in implementing and updating the documented processes, plan owners are encouraged to refer to their own internal process documents instead of including detailed process documentation within their plans.

NOTE The equipment manufacturer, often called in the industry the original equipment manufacturer (OEM) is in general considered as the plan owner.

This component management document is intended for aerospace users of electronic components. This document is not intended for use by the manufacturers of electronic components. Components selected and managed according to the requirements of a plan compliant with this document may be approved by the concerned parties for the proposed application, and for other applications with equal or less severe requirements.

Organizations that prepare such plans may prepare a single plan and use it for all relevant products supplied by the organization or may prepare a separate plan for each relevant product or customer.

PROCESS MANAGEMENT FOR AVIONICS – MANAGEMENT PLAN –

Part 1: Preparation and maintenance of an electronic components management plan

1 Scope

This part of IEC 62239 defines the requirements for developing an electronic components management plan (ECMP) to guarantee to customers that all of the electronic components in the equipment of the plan owner are selected and applied in controlled processes compatible with the end application and that the technical requirements detailed in Clause 4 are accomplished.

In general, the plan owner of a complete electronic components management plan (ECMP) is the avionics original equipment manufacturer (OEM).

NOTE SAE EIA-STD-4899 can be used to comply with the requirements of IEC 62239-1 where applicable (see Annex C), to enable the plan owner to harmonise its plan for both documents.

This document provides an aid in the aerospace certification process.

Although developed for the avionics industry, this process can be applied by other industrial sectors.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 62396 (all parts), *Process management for avionics – Atmospheric radiation effects*

IEC 62396-1:2016, *Process management for avionics – Atmospheric radiation effects – Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*

IEC TS 62647-1, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 1: Preparation for a lead-free control plan*

GEIA-STD-0005-1, *Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-Free Solder*

IPC/JEDEC J-STD-20, *Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices*

3 Terms, definitions and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

NOTE In their plan, plan owners can use alternative definitions consistent with convention in their company.

3.1 Terms and definitions

3.1.1
environment
applicable environmental conditions (as described in the equipment specification) that the equipment is able to withstand without loss or degradation in equipment performance throughout its manufacturing cycle and maintenance life (the length of which is defined by the plan owner in conjunction with customers)

3.1.2
purchased
bought outside the plan owner's organization, from an independent supplier

Note 1 to entry: This indicates that the plan owner does not manufacture this in-house.

3.1.3
capable
capacity of a component to be used successfully in the intended application

3.1.4
certified
assessed to and compliant with an applicable certification body

3.1.5
characterization
process of testing a sample of components to determine the key electrical parameter values that can be expected of all produced components of the type tested

3.1.6
component application
domain of use where the component meets the design requirements

3.1.7
component manufacturer
organization responsible for the component specification and its production

3.1.8
component obsolescence
absence of availability of a component which is not procurable due to the manufacturer(s) ceasing production

Note 1 to entry: Component obsolescence management is considered an element of component dependability.

3.1.9
component qualification
process used to demonstrate that the component is capable of meeting its specification for all the required conditions and environments

3.1.10
component quality assurance
activities and processes to provide adequate confidence that each individual component meets the performance and environmental requirements

3.1.11
component selection
process of choosing a specific component for a specific application

3.1.12
component standardization
process of developing and agreeing by consensus on uniform engineering criteria for products and methods for achieving compatibility, interoperability, interchangeability, or commonality of material

Note 1 to entry: Standardization is used to reduce proliferation of components into inventory.

3.1.13
counterfeit, verb
action of simulating, reproducing or modifying a material good or its packaging without authorization

Note 1 to entry: It is the practice of producing products which are imitations or are fake goods or services. This activity infringes the intellectual property rights of the original manufacturer and is an illegal act. Counterfeiting generally relates to wilful trade mark infringement.

[SOURCE: IEC TS 62668-1:2016, 3.1.4]

3.1.14
counterfeited component
material good imitating or copying an authentic material good which may be covered by the protection of one or more registered or confidential intellectual property rights

Note 1 to entry: A counterfeited component is one whose identity or pedigree has been altered or misrepresented by its supplier.

Identity = original manufacturer, part number, date code, lot number, testing, inspection, documentation or warranty etc.

Pedigree = origin, ownership history, storage, handling, physical condition, previous use etc.

[SOURCE: IEC TS 62668-1:2016, 3.1.5]

3.1.15
fraudulent component
electronic component produced or distributed either in violation of regional or local law or regulation, or with the intent to deceive the customer

Note 1 to entry: This includes, but is not limited to the following which are examples of components which are fraudulently sold as new ones to a customer:

(1) a stolen component;

(2) a component scrapped by the original component manufacturer (OCM) or by any user;

(3) a recycled component, that becomes a fraudulent recycled component when it is a disassembled component resold as new component (see Figure 1), where typically there is evidence of prior use and rework (e.g. solder, re-plating or lead re-attachment activity) on the package terminations;

(4) a counterfeit component, copy, imitation, full or partial substitute of brands;

(5) fraudulent designs, models, patents, software or copyright sold as being new and authentic. For example: a component whose production and distribution are not controlled by the original manufacturer;

(6) unlicensed copies of a design;

(7) a disguised component (remarking of original manufacturer name, reference date/code or other identifiers etc.), which may be a counterfeit component; see Figure 1;

(8) component without an internal silicon die or with substituted silicon die which is not the original manufacturer's silicon die.

[SOURCE: IEC TS 62668-1:2016, 3.1.10]

3.1.16
dependability
capability of a product enabling it to achieve the specified functional performance at the appropriate time and for the planned duration, without damage to itself or its environment

Note 1 to entry: Dependability is generally characterised by the following four parameters: reliability, maintainability, availability, safety.

3.1.17
franchised distributor or agent
individual or corporate organization that is legally independent from the franchiser (in this case the electronic component manufacturer or OCM) and who agrees under contract to distribute products using the franchiser's name and sales network

Note 1 to entry: Distribution activities are carried out in accordance with standards set and controlled by the franchiser. Shipments against orders placed can be dispatched either direct from the OCM or the franchised distributor or agent. In other words, the franchised distributor enters into contractual agreements with one or more electronic component manufacturers to distribute and sell said components. Distribution agreements may be stipulated according to the following criteria: geographical area, type of clientele (avionics for example), maximum manufacturing lot size. Components sourced through this route are protected by the OCM's warranty and supplied with full traceability.

[SOURCE: IEC TS 62668-1:2016, 3.1.9]

3.1.18
electronic components management plan
ECMP
plan owner's document that defines the processes and practices for applying components to an equipment or range of equipment and which generally addresses all relevant aspects of controlling components during system design, development, production, and post-production support

Note 1 to entry: This note applies to the French language only.

3.1.19
electronic components
electronic parts
piece parts
electrical or electronic devices that are not subject to disassembly without destruction or impairment of design use

Note 1 to entry: Resistors, capacitors, diodes, integrated circuits, hybrids, application specific integrated circuits, wound components and relays are examples of electronic component.

3.1.20
electronic equipment
functioning electronic device produced by the plan owner, which incorporates electronic components

Note 1 to entry: End items, sub-assemblies, line-replaceable units and shop-replaceable units are examples of electronic equipment.

3.1.21
flight equipment
equipment used for the active flying of the aircraft (UAV, etc.) and associated with active flying of the aircraft such as flight recorders, etc.

Note 1 to entry: This excludes equipment fitted to the aircraft not actively involved with the flying of the aircraft, such as in-flight entertainment, galley equipment, etc.

3.1.22
NAND
Negative-AND
logic gate which produces, in digital electronics, an output that is false (0) only if all its inputs are true (1) and an output true (1) if one or both inputs are false (0)

3.1.23
NOR
Negative-OR
logic gate which produces, in digital electronics, an output that is true (1) if both the inputs are false (0) and an output false (0) if one or both inputs are true (1)

3.1.24
obsolete component
component which is no longer manufactured, and may or may not still be available

3.1.25
package type
generic package family describing the physical outline and lead style

Note 1 to entry: Plastic quad flat-package, ball grid array, chip scale package, SOIC package, SOT23, etc., are examples of package type.

3.1.26
plan owner
original design authority responsible for all aspects of the design, functionality and reliability of the delivered equipment in the intended application and responsible for writing and maintaining their specific ECMP

3.1.27
recycled component
electrical component removed from its original product or assembly and available for reuse

Note 1 to entry: The component has authentic logos, trademarks and markings. However, it typically has no output to measure the useful life remaining for its reuse. A recycled component can fail earlier than a new one when re-assembled into another product or assembly. A recycled component may also be physically or ESD damaged during the removal process.

[SOURCE: IEC TS 62668-1:2016, 3.1.17]

3.1.28
risk
measure of the potential inability to achieve overall program objectives within defined cost, schedule, and technical constraints

3.1.29
risk management
act or practice of dealing with risk that includes planning for risk, assessing (identifying and analysing) risk areas, developing risk handling options, monitoring risks to determine how risks have changed, and documenting the overall risk management program

3.1.30
single event effect
SEE
response of a component caused by the impact of a single particle (for example galactic cosmic rays, solar energetic particles, energetic neutrons and protons)

Note 1 to entry: The range of responses can include both non-destructive (for example upset) and destructive (for example latch-up or gate rupture) phenomena.

Note 2 to entry: This note applies to the French language only.

[SOURCE: IEC 62396-1:2016, 3.53, modified – Note 2 has been added.]

3.1.31
subcontractor assembly facilities
location where the subcontractor conducts assembly processes and uses approved test equipment to the plan owners' drawings and bills of material and test specifications without owning the intellectual property rights to the equipment

3.1.32
subcontractor
person or entity to whom the holder of obligations under a contract has delegated part or all of such obligations

3.1.33
substitute component
component used as a replacement in equipment after the equipment design has been approved

Note 1 to entry: In some contexts, the term "alternate component" is used to describe a substitute component that is equal to or better than the original component.

3.1.34
suspect component
electronic component which has lost supply chain traceability back to the original manufacturer and which may have been misrepresented by the supplier or manufacturer and may meet the definition of fraudulent or counterfeit component

Note 1 to entry: Suspect components may include but are not limited to:

1) counterfeit components;
2) recycled components coming from uncontrolled recycling operations carried outside of the OEM. Franchised network and OEM business where typically it has been fraudulently sold to the OEM as being in a new unused condition.

[SOURCE: IEC TS 62668-1:2016, 3.1.21]

3.1.35
validation
method of qualifying components at the plan owner, when no in-service data from prior use is available and there is no manufacturer's qualification data to analyse

3.2 Abbreviated terms

AC	approved component
AQEC	aerospace qualified electronic component (see IEC TS 62564-1)
AQP	automotive qualification programme
BGA	ball grid array (related to an electronic component package)
CECC	Cenelec Electronic Components committee
COTS	commercial off the shelf

CTE	coefficient of thermal expansion
DDR	double data rate
DMSMS	diminishing manufacturing sources and materials shortages
DPMO	defects per million opportunities
DRAM	dynamic random access memory
DLA	Defence Logistics Agency
DSCC	Defence Supply Centre Columbus (now known as the DLA)
ECMP	electronic components management plan
ELFR	early life failure rate
EM	electro-migration
EMC	electromagnetic compatibility
ESD	electrostatic discharge
ESS	environmental stress screening
FITS	failures in time
FPGA	field-programmable gate array
H3TRB	high humidity, high temperature reverse bias
HAST	highly accelerate stress testing
HCI	hot carrier injection
HTOL	high temperature operating life
HTRB	high temperature reverse bias
IATF	International Automotive Task Force
IECQ	international electrotechnical system quality
ILD	inter-level dielectric
IMD	intra-metal dielectric
JEDEC	Joint Electron Device Engineering Council
LCC	leadless chip carrier (related to an electronic component package)
LED	light emitting diode
MRAM	magnetic random access memory
MSD	moisture sensitivity damage
MSL	moisture sensitivity level
OEM	original equipment manufacturer
OCM	original component manufacturer
PCB	printed circuit board
PCN	product/process change notice (in this abbreviation “Product” stands for “electronic component”)
PIND	particle impact noise detection
PPM	parts per million
RH	relative humidity
RTV	room temperature vulcanization
SDRAM	synchronous dynamic random access memory
SEB	single event burn-out
SEE	single event effects
SEFI	single event functional interrupt