



BSI Standards Publication

Process management for avionics — Management plan

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

National foreword

This Published Document is the UK implementation of IEC/TS 62239-1:2015. It supersedes PD IEC/TS 62239-1:2012 which is now withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/107, Process management for avionics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2015.
Published by BSI Standards Limited 2015

ISBN 978 0 580 87989 0
ICS 03.100.50; 31.020; 49.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 April 2015.

Amendments/corrigenda issued since publication

| Date | Text affected |
|------|---------------|
|------|---------------|



TECHNICAL SPECIFICATION



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 03.100.50; 31.020; 49.060

ISBN 978-2-8322-2608-7

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD 4

INTRODUCTION 6

1 Scope 7

2 Normative references 7

3 Terms, definitions and abbreviations 7

 3.1 Terms and definitions 8

 3.2 Abbreviations 12

4 Technical requirements 13

 4.1 General 13

 4.2 Component selection 14

 4.2.1 General 14

 4.2.2 Application conditions for use 14

 4.2.3 Availability and durability 14

 4.2.4 Additional performance 14

 4.2.5 Component identification 14

 4.3 Component application 15

 4.3.1 General 15

 4.3.2 Electromagnetic compatibility (EMC) 15

 4.3.3 Derating and stress analysis 15

 4.3.4 Thermal analysis 16

 4.3.5 Mechanical analysis 17

 4.3.6 Testing, testability, and maintainability 17

 4.3.7 Avionics radiation environment 18

 4.3.8 Management of lead-free termination finish and soldering 18

 4.3.9 Counterfeited, fraudulent and recycled component avoidance 18

 4.3.10 Moisture and corrosion 19

 4.3.11 Additional customer related application requirements 19

 4.4 Component qualification 19

 4.4.1 General 19

 4.4.2 Minimum component qualification requirements 20

 4.4.3 Original component manufacturer quality management 20

 4.4.4 Original component manufacturer process management approval 20

 4.4.5 Demonstration of component qualification 20

 4.4.6 Qualification of components from a supplier that is not qualified 22

 4.4.7 Distributor process management approval 22

 4.4.8 Subcontractor assembly facility quality and process management approval 23

 5 Continuous component quality assurance 23

 4.5.1 General quality assurance requirements 23

 4.5.2 On-going component quality assurance 23

 4.5.3 Plan owner in-house continuous monitoring 24

 4.5.4 Component design and manufacturing process change monitoring 24

 4.6 Component dependability 25

 4.6.1 General 25

 4.6.2 Component availability and associated risk assessment 25

 4.6.3 Component obsolescence 25

| | | |
|-----------------------|---|----|
| 4.6.4 | Proactive measures | 26 |
| 4.6.5 | Component obsolescence awareness | 26 |
| 4.6.6 | Reporting | 26 |
| 4.6.7 | Semiconductor reliability and wear out | 26 |
| 4.6.8 | Reliability assessment | 26 |
| 4.7 | Component compatibility with the equipment manufacturing process | 27 |
| 4.8 | Component data | 27 |
| 4.8.1 | General | 27 |
| 4.8.2 | Minimum component data requirements | 28 |
| 4.9 | Configuration control | 28 |
| 4.9.1 | General | 28 |
| 4.9.2 | Alternative components | 29 |
| 4.9.3 | Alternative sources | 29 |
| 4.9.4 | Equipment change documentation | 29 |
| 4.9.5 | Customer notifications and approvals | 29 |
| 4.9.6 | Focal organization | 30 |
| 5 | Plan administration requirements | 30 |
| 5.1 | Plan organization | 30 |
| 5.2 | Plan terms and definitions | 30 |
| 5.3 | Plan focal point | 30 |
| 5.3.1 | Primary interface | 30 |
| 5.3.2 | Plan focal point responsibilities | 30 |
| 5.4 | Plan references | 30 |
| 5.5 | Plan applicability | 30 |
| 5.6 | Plan implementation | 31 |
| 5.6.1 | ECMP compliance | 31 |
| 5.6.2 | Plan objectives | 31 |
| 5.6.3 | Plan owner subcontracted activities | 31 |
| 5.7 | Plan acceptance | 31 |
| 5.8 | Plan maintenance | 31 |
| Annex A (informative) | Requirement matrix for IEC TS 62239-1 | 32 |
| Annex B (informative) | Typical qualification requirements and typical component minimum qualification requirements | 53 |
| Annex C (informative) | Semiconductor reliability and wear out | 57 |
| Annex D (informative) | Guidelines for environmental protection techniques and for comparison of components specifications | 58 |
| Bibliography | | 73 |
| Figure 1 | Suspect components perimeter | 19 |
| Table A.1 | – Requirements matrix | 32 |
| Table B.1 | – Typical qualification requirements and typical component minimum qualification requirements | 54 |
| Table D.1 | – Environmental protection techniques to be considered during the avionics design process | 58 |
| Table D.2 | – Guidelines for the comparison of internationally available component specifications – Microcircuits | 63 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROCESS MANAGEMENT FOR AVIONICS –
MANAGEMENT PLAN –

**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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, accept to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62239-1, which is a technical specification, has been prepared by IEC Technical Committee 107: Process management for avionics.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

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

- a) the number of “shall” requirements has been rationalized;
- b) the terms “supplier”, “equipment manufacturer”, and “OEM” have been replaced by “plan owner”;
- c) the term “device” has been replaced by “component”;
- d) a requirement matrix has been included in Annex A, Table A.1;
- e) various specifications and standards have been updated;
- f) a new subclause (4.3.5.2) on mechanical stresses generated by temperature variation has been added;
- g) a new subclause (4.3.10) on moisture and corrosion has been added.

The text of this technical specification is based on the following documents:

| | |
|---------------|------------------|
| Enquiry draft | Report on voting |
| 107/245/DTS | 107/258/RVC |

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

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

A list of all the parts in the IEC TS 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 publication will remain unchanged until the stability date indicated on the IEC website under “<http://webstore.iec.ch>” in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This technical specification provides the structure for avionics equipment manufacturers, subcontractors, maintenance facilities, and other aerospace component users to develop their own Electronic Component Management Plans (ECMPs), hereinafter also referred to as 'plan'. This technical specification states objectives to be accomplished. The plan is not prescriptive and those who prepare plans in compliance with this technical specification will document processes that are the most effective and efficient for them in accomplishing the objectives of this technical specification. 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 technical specification is intended for aerospace users of electronic components. This technical specification 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 technical specification 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, which is a technical specification, defines the requirements for developing an Electronic Components Management Plan (ECMP) to assure 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 is the avionics original equipment manufacturer (OEM).

This document provides an aid in the aerospace certification process.

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

2 Normative references

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

IEC 62396-1:2012, *Process management for avionics – Atmospheric radiation effects – Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*¹

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*

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

3 Terms, definitions and abbreviations

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

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

¹ A new edition is under development. It will be published soon.