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BSI Standards Publication

Process management for avionics - Atmospheric radiation effects

Part 6: Extreme space weather and potential impact on the avionics environment and electronics

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National foreword

This Published Document is the UK implementation of IEC/TR 62396-6:2017. It supersedes PD IEC/PAS 62396-6:2014 which is withdrawn.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.

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TECHNICAL REPORT

colour inside

Process management for avionics – Atmospheric radiation effects – Part 6: Extreme space weather – Potential impact on the avionics environment and electronics

INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC TR 62396-6, which is a technical report, has been prepared by IEC technical committee 107: Process management for avionics.

This first edition cancels and replaces the first edition of IEC PAS 62396-6 published in 2014. This edition constitutes a technical revision. The technical changes with respect to the previous edition are the contents of the present document.

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

Enquiry draft	Report on voting
107/298/DTR	107/305/RVDTR

Full information on the voting for the approval of this technical report 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 parts in the IEC 62396 series, published under the general title *Process management for avionics – Atmospheric radiation effects* 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- withdrawn,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.

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 document provides information intended to improve the understanding of extreme space weather events.

Rarely occurring natural hazards can have a high impact to society and national economies. Natural events have no respect for national boundaries and the whole world can suffer. The April 2010 Icelandic (Eyjafjallajökull) volcano eruption and resulting ash cloud and the March 2011 Japanese earthquake and tsunami demonstrated how devastating rarely occurring natural events can be.

In 2011 the UK recognised “extreme space weather” (ESW) events (also referred to as solar super storms and sometimes simply as super storms) as one of these rare, but high impact, hazards. There is evidence of the impact of ESW events in the past. During an event in February 1956, which was monitored at ground level, a rise in radiation flux of more than 2 orders of magnitude was derived for aircraft environments.

The document does not consider high altitude nuclear explosions or any other man-made modifications of space weather.

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PROCESS MANAGEMENT FOR AVIONICS – ATMOSPHERIC RADIATION EFFECTS –

Part 6: Extreme space weather – Potential impact on the avionics environment and electronics

1 Scope

This part of IEC 62396, which is a technical report, provides information intended to improve the understanding of extreme space weather events; it details the mechanisms and conditions that produce “extreme space weather” (ESW) as a result of a large increase in the activity on the surface of the sun and it discusses the potential radiation environment based on projection of previous recorded ESW.

This document does not detail the solutions with regard to the ESW events whose occurrence is extremely rare. As the stakes related to ESW environment go widely beyond the electronics issues and there are a lot of other elements in consideration (human concern for example), this document does not detail potential specific provisions or mitigations.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62396-1 and the following 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

3.1
Carrington event
largest solar storm on record, which took place from 1 to 3 September 1859, and is named after British astronomer Richard Carrington

3.2
coronal mass ejection
CME
large burst of solar wind plasma ejected into space