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Space engineering - Control performances

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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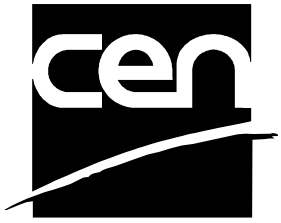
English version

Space engineering - Control performances

Ingénierie spatiale - Performance de systèmes de contrôle

Raumfahrttechnik - Steuerungsleistung

This European Standard was approved by CEN on 1 March 2014.



CEN-CENELEC Management Centre:
Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 16603-60-10:2014) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-60-10:2014) originates from ECSS-E-ST-60-10C.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2015, and conflicting national standards shall be withdrawn at the latest by March 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This standard focuses on the specific issues raised by managing performance aspects of control systems in the frame of space projects. It provides a set of normative definitions, budget rules, and specification templates applicable when developing general control systems.

The standard is split up in two main clauses, respectively dealing with:

- Performance error indices and analysis methods.
- Stability and robustness specification and verification for linear systems.

This document constitutes the normative substance of the more general and informative handbook on control performance, issued in the frame of the E-60-10 ECSS working group. If clarifications are necessary (on the concepts, the technical background, the rationales for the rules for example) the readers should refer to the handbook.

NOTE It is not intended to substitute to textbook material on automatic control theory, neither in this standard nor in the associated handbook. The readers and the users are assumed to possess general knowledge of control system engineering and its applications to space missions.

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Scope

This standard deals with control systems developed as part of a space project. It is applicable to all the elements of a space system, including the space segment, the ground segment and the launch service segment.

It addresses the issue of control performance, in terms of definition, specification, verification and validation methods and processes.

The standard defines a general framework for handling performance indicators, which applies to all disciplines involving control engineering, and which can be applied as well at different levels ranging from equipment to system level. It also focuses on the specific performance indicators applicable to the case of closed-loop control systems – mainly stability and robustness.

Rules are provided for combining different error sources in order to build up a performance error budget and use this to assess the compliance with a requirement.

NOTE 1 Although designed to be general, one of the major application field for this Standard is spacecraft pointing. This justifies why most of the examples and illustrations are related to AOCS problems.

NOTE 2 Indeed the definitions and the normative clauses of this Standard apply to pointing performance; nevertheless fully specific pointing issues are not addressed here in detail (spinning spacecraft cases for example). Complementary material for pointing error budgets can be found in ECSS-E-HB-60-10.

NOTE 3 For their own specific purpose, each entity (ESA, national agencies, primes) can further elaborate internal documents, deriving appropriate guidelines and summation rules based on the top level clauses gathered in this ECSS-E-ST-60-10 standard.

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply, However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS System – Glossary of terms