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Rumfart – Generelle krav til systemudvikling

Space engineering – System engineering general requirements

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EUROPÄISCHE NORM

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English version

Space engineering - System engineering general requirements

Ingénierie spatiale - Exigences générales d'ingénierie système

Raumfahrttechnik - Grundsätze und Verfahrensweise

This European Standard was approved by CEN on 21 August 2017.

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European Foreword

This document (EN 16603-10:2018) has been prepared by Technical Committee CEN-CENELEC/JTC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-10:2018) originates from ECSS-E-ST-10C Rev.1.

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of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

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 supersedes EN 13292:1999, EN 14514:2004 and EN 14607-7:2004.

The main changes with respect to EN 13292:1999, EN 14514:2004 and EN 14607-7:2004 are:

- The main driver for the changes in this issue of the standard comes from the intention to include in this document only requirements and remove all informative material related to the process for inclusion in a future handbook.
- Inclusion of EN 16603-11 (ECSS-E-AS-11) "Adoption Notice of ISO 16290, Space systems - Definition of the Technology Readiness Levels (TRLs) and their criteria of assessment" as Normative Reference.
- Former clause 5 “System engineering process”, replaced by a brief overview of the project phases and related system engineering tasks in the current clause 4.3 “Overview of system engineering tasks per project phase”.
- Former Clause 4 split into an introductory clause 4 “Overview of Systems engineering” and clause 5 “General Requirements”.
- Clause 7 "Pre-tailoring matrix per space product types" added
- The remaining requ irements have been reworded for readability and consistency. Repetition of requirements included in other related standards have been eliminated.
- Regarding the documentation model, the only significant modification originates in the simplification of the concept of Functional Specification and Technical Specification. In EN 16603-10-06 only one specification, the technical requirements specification (customer specification), is considered. This is reflected in this standard, as explained in clause 5.2.3.1
- Annex A: System engineering documents delivery per review: This annex replaces and expands old Annex B. It includes the listing of the main documents per phase of the project development indicating when the document needs to be available.
- Document Requirements Descriptions (DRD) added in several Annexes that include all the project documents pertinent to this standard. In the previous issue the DRDs were not included.

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previous issue. It presents where specific subjects contained in the previously used Design and Development Plan are located in the new set of ECSS documents.

This document has been prepared under a standardization request 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 organisations 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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1
Scope

This standard specifies the system engineering implementation requirements for space systems and space products development.

Specific objectives of this standard are:

- to implement the system engineering requirements to establish a firm technical basis and to minimize technical risk and cost for space systems and space products development;
- to specify the essential system engineering tasks, their objectives and outputs;
- to implement integration and control of engineering disciplines and lower level system engineering work;
- to implement the "customer-system-supplier model" through the development of systems and products for space applications.

Depending of the product category, the application of this standard needs to be checked and if needed tailored. The pre-tailoring table in clause 7 contains the applicability of the requirements of this document and its annexes according to product type. Specific requirements related to system engineering, like technical specification, verification, and testing are specified in dedicated documents and standards within the set of ECSS system engineering standards ECSS-E-ST-10-XX.

Discipline or element specific engineering implementation requirements are covered in dedicated ECSS standards. These standards are based on the same principles, process and documentation model. The applicability of each these standards can therefore not be considered in isolation from the others.

NOTE 1 The term "Discipline" is defined in ECSS-M-ST-10, as "a specific area of expertise within a general subject". The name of the discipline normally indicates the type of expertise, e.g. in the ECSS system mechanical engineering, software and communications are disciplines within the engineering domain.

NOTE 2 The requirements on the system engineering process are gathered in this standard; specific aspects of the SE process are further elaborated in dedicated standards.

For engineering process both for SW and for Ground Segment and Operations the following standards are considered fully sufficient for development of these items:

- ECSS-E-ST-70 Space engineering - Ground systems and operations
- ECSS-E-ST-40 Space engineering - Software

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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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2
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
EN 16603-11	ECSS-E-AS-11	Adoption Notice of ISO 16290, Space systems - Definition of the Technology Readiness Levels (TRLs) and their criteria of assessment
EN 16603-10-02	ECSS-E-ST-10-02	Space engineering – Verification
EN 16603-10-06	ECSS-E-ST-10-06	Space engineering – Technical requirements specification
EN 16603-10-09	ECSS-E-ST-10-09	Space engineering – Reference coordinate system
EN 16603-10-24	ECSS-E-ST-10-24	Space engineering – Interface control
EN 16601-10	ECSS-M-ST-10	Space project management – Project planning and implementation
EN 16601-40	ECSS-M-ST-40	Space project management – Configuration and information management
EN 16602-10	ECSS-Q-ST-10	Space product assurance - Product assurance management
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance - Nonconformance control system
EN 16602-20-10	ECSS-Q-ST-20-10	Off-the-shelf items utilization in space systems