SLOVENSKI STANDARD
SIST EN 16603-10:2018

01-julij-2018

Nadomešča:
SIST EN 13292:2000
SIST EN 14514:2005
SIST EN 14607-7:2005

Vesoljska tehnika - Sistemskotehnične splošne zahteve

Space engineering - System engineering general requirements

Raumfahrttechnik - Grundsätze und Verfahrensweise

Ta slovenski standard je istoveten z: **EN 16603-10:2018**

ICS:

49.140	Vesoljski sistemi in operacije	Space systems and operations

SIST EN 16603-10:2018 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16603-10

April 2018

ICS 49.140

Supersedes EN 13292:1999, EN 14514:2004, EN 14607-7:2004

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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Ref. No. EN 16603-10:2018 E

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of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.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

- Annex R: Mapping of typical DDP to ECSS documents: This is an addition with respect to the 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.

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

- ECSS-Q-ST-80 Space product assurance - Software product assurance

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

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

3
Terms, definitions and abbreviated terms

3.1 Terms from other standards

a. For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply, in particular for the following terms:

1. acceptance
2. approval
3. configuration baseline
4. critical
5. development
6. equipment
7. inspection
8. integration
9. mission statement
10. product tree
11. requirement
12. specification
13. subsystem
14. system
15. test
16. verification

b. For the purpose of this Standard, the terms and definitions from ECSS-E-AS-11 apply, in particular for the following terms:

1. technology readiness level

3.2 Terms specific to the present standard

3.2.1 requirement traceability

requirement attribute that links each single requirement to its higher level requirements inside the requirement set

NOTE 1 to entry: This enables the derivation of a requirement tree, which demonstrates the coherent flow-down of the requirements.

3.2.2 recurring product

product which conforms to a qualified design and is produced according to the corresponding production master file

3.2.3 system engineering

interdisciplinary approach governing the total technical effort required to transform requirements into a system solution

NOTE 1 to entry: From IEEE P1220.

3.2.4 verification matrix

initial issue of the VCD which contains for each requirement to be verified the methods, levels and stages of product verification

NOTE 1 to entry: See ECSS-E-ST-10-02 for a more detailed definition of the VCD.

3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

Abbreviation	Meaning
AIT	assembly, integration and test
AIV plan	assembly, integration and verification plan
AOCS	attitude and orbit control sub-system
AR	acceptance review
CDR	critical design review
COTS	commercial off-the-shelf
CRR	commissioning results review NOTE For space vehicles (e.g. launcher, transfer vehicle, crew transport vehicle) the CRR can be replaced or complemented by a flight qualification review (FQR).
DDF	design definition file
DDP	design development plan
DJF	design justification file
DRD	document requirements definition
ECSS	European Cooperation for Space Standardization
ELR	end-of-life review
FDIR	failure, detection, isolation, recovery

Abbreviation	Meaning
FM	flight model
FMECA	failure modes, effects, and criticality analysis
FOM	flight operations manual
FRR	flight readiness review
FTA	fault tree analysis
GSE	ground support equipment
HITL	human-in-the-loop
ICD	interface control document
ILS	integrated logistic support
IRD	interface requirement document
LRR	launch readiness review
MCR	mission closed-out review
MDD	mission description document
MDR	mission definition review
MOP	mission operations plan
MS	mission statement
ORR	operational readiness review
PDR	preliminary design review
PMP	project management plan
PM&P	parts materials and processes
PRR	preliminary requirement review
PUM	product user manual
QR	qualification review
RAMS	reliability, availability, maintainability, safety
RAR	risk assessment report
RF	radio frequency
RJF	requirement justification file
ROD	review of design
ROM/RAM	read only memory / random access memory
RTM	requirement traceability matrix
R&D	research and development
SE	system engineering
SEP	system engineering plan
SFT	system functional test
SRR	system requirement review
SVT	system validation test

Abbreviation	Meaning
TP	technology plan
TRA	technology readiness assessment
TRL	technology readiness level
TRSL	technology readiness status list
TS	technical requirements specification
UM	user manual
VCD	verification control document
VP	verification plan
w.r.t.	with respect to