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Space engineering - Ground systems and operations - Part 2: Documents requirements definitions (DRDs)

Raumfahrttechnik - Bodensysteme und Bodenbetrieb - Teil 2: Dokumente mit Definitionen von Anforderungen

Ingénierie spatiale - Systemes sol et exploitation - Partie 2 : Définition des exigences documentaires (DRD)

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Space engineering - Ground systems and operations - Part 2:
Documents requirements definitions (DRDs)

Ingénierie spatiale - Systèmes sol et exploitation - Partie 2 :
Définition des exigences documentaires (DRD)

Raumfahrttechnik - Bodensysteme und Bodenbetrieb - Teil
2: Dokumente mit Definitionen von Anforderungen

This European Standard was approved by CEN on 2 February 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Contents

	page
Foreword	7
Introduction	8
1 Scope	9
2 Normative references	9
3 Terms, definitions and abbreviated terms	9
4 Document requirements definitions (DRD) list	9
Annex A (normative) Customer requirements document (CRD) DRD	12
A.1 Introduction	12
A.2 Scope and applicability	12
A.2.1 Scope	12
A.2.2 Applicability	12
A.3 References	12
A.3.1 Glossary and dictionary	12
A.3.2 Source documents	12
A.4 Definitions and abbreviations	13
A.5 Description and purpose	13
A.6 Application and interrelationship	13
A.7 Customer requirements document preliminary elements	13
A.7.1 Title	13
A.7.2 Title page	13
A.7.3 Contents list	13
A.7.4 Foreword	14
A.7.5 Introduction	14
A.8 Customer requirements document content	14
A.8.1 Scope and applicability	14
A.8.2 References	15
A.8.3 Definitions and abbreviations	15
A.8.4 Mission overview	16
A.8.5 Project responsibilities	16
A.8.6 Major project milestones	16
A.8.7 Mission constraints	17
A.8.8 Mission operations requirements	17
Annex B (normative) Ground segment baseline definition (GSBD) DRD	20
B.1 Introduction	20
B.2 Scope and applicability	20
B.2.1 Scope	20
B.2.2 Applicability	20
B.3 References	20
B.3.1 Glossary and dictionary	20
B.3.2 Source documents	20
B.4 Definitions and abbreviations	21
B.5 Description and purpose	21
B.6 Application and interrelationship	21
B.7 Ground segment baseline definition preliminary elements	22
B.7.1 Title	22
B.7.2 Title page	22

B.7.3	Contents list	22
B.7.4	Foreword.....	22
B.7.5	Introduction.....	22
B.8	Ground segment baseline definition content	22
B.8.1	Scope and applicability.....	22
B.8.2	References.....	23
B.8.3	Definitions and abbreviations	23
B.8.4	Mission description and ground segment overview.....	24
B.8.5	Mission constraints and implementation assumptions	24
B.8.6	Ground segment interfaces	25
B.8.7	Pre-launch support and implementation.....	25
B.8.8	Mission operations	26
B.8.9	Ground segment systems and facilities.....	27
B.8.10	Required input and output items and services	27
B.8.11	Ground segment quality	28
B.8.12	Annexes	28
Annex C	(normative) Mission operations concept document (MOCD) DRD	30
C.1	Introduction	30
C.2	Scope and applicability.....	30
C.2.1	Scope	30
C.2.2	Applicability.....	30
C.3	References.....	30
C.3.1	Glossary and dictionary.....	30
C.3.2	Source documents	30
C.4	Definitions and abbreviations	31
C.5	Description and purpose	31
C.6	Application and interrelationship.....	31
C.7	Mission operation concept document preliminary elements.....	31
C.7.1	Title	31
C.7.2	Title page	31
C.7.3	Contents list	31
C.7.4	Foreword.....	31
C.7.5	Introduction.....	32
C.8	Mission operations concept document content.....	32
C.8.1	Scope and applicability.....	32
C.8.2	References.....	32
C.8.3	Definitions and abbreviations	33
C.8.4	Mission operations requirements and constraints	33
C.8.5	Space segment characteristics	34
C.8.6	Mission operations concepts	34
Annex D	(normative) Space segment user manual (SSUM) DRD	37
D.1	Introduction	37
D.2	Scope and applicability.....	37
D.2.1	Scope	37
D.2.2	Applicability.....	37
D.3	References.....	37
D.3.1	Glossary and dictionary.....	37
D.3.2	Source documents	37
D.4	Definitions and abbreviations	38
D.5	Description and purpose	38
D.6	Application and interrelationship.....	39
D.7	Space segment user manual preliminary elements.....	39
D.7.1	General.....	39
D.7.2	Title	39
D.7.3	Title page	39
D.7.4	Contents list	39
D.7.5	Foreword.....	39
D.7.6	Introduction.....	39

EN 14737-2:2004 (E)

D.8	Space segment user manual content	40
D.8.1	Scope and applicability	40
D.8.2	References	40
D.8.3	Definitions and abbreviations	40
D.8.4	Mission definition	41
D.8.5	Satellite system description	42
D.8.6	System level operations	44
D.8.7	Platform subsystems description	45
D.8.8	Payload definition	48
Annex E (normative)	Operational validation plan (OVP) DRD	49
E.1	Introduction	49
E.2	Scope and applicability	49
E.2.1	Scope	49
E.2.2	Applicability	49
E.3	References	49
E.3.1	Glossary and dictionary	49
E.3.2	Source documents	49
E.4	Definitions and abbreviations	50
E.5	Description and purpose	50
E.6	Application and interrelationship	50
E.7	Operational validation plan preliminary elements	50
E.7.1	Title	50
E.7.2	Title page	50
E.7.3	Approval page	50
E.7.4	Distribution list	51
E.7.5	Amendment control table	51
E.7.6	Contents list	51
E.7.7	Foreword	51
E.7.8	Introduction	51
E.8	Operational validation plan content	51
E.8.1	Scope and applicability	51
E.8.2	References	52
E.8.3	Definitions and abbreviations	52
E.8.4	Overview	53
E.8.5	Simulations and rehearsals	54
E.8.6	Ground segment readiness tests	54
E.8.7	Records and reports	54
Annex F (normative)	Flight operations plan (FOP) DRD	56
F.1	Introduction	56
F.2	Scope and applicability	56
F.2.1	Scope	56
F.2.2	Applicability	56
F.3	References	56
F.3.1	Glossary and dictionary	56
F.3.2	Source documents	56
F.4	Definitions and abbreviations	57
F.5	Description and purpose	57
F.6	Application and interrelationship	57
F.7	Flight operations plan preliminary elements	57
F.7.1	General	57
F.7.2	Title	57
F.7.3	Title page	58
F.7.4	Approval page	58
F.7.5	Distribution list	58
F.7.6	Amendment control table	58
F.7.7	Contents list	58
F.7.8	Foreword	58
F.7.9	Introduction	58

ITeH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 14737-2:2004

[https://standards.iteh.ai/catalog/standards/sist/473028f6-87f4-498e-ac39-](https://standards.iteh.ai/catalog/standards/sist/473028f6-87f4-498e-ac39-af01735cc192/sist-en-14737-2-2004)

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F.8	Flight operations plan content	59
F.8.1	Scope and applicability	59
F.8.2	References	59
F.8.3	Definitions and abbreviations	59
F.8.4	Mission management	60
F.8.5	[Insert mission phase name] operations	61
F.8.6	Flight control procedures	61
F.8.7	Hand-over procedures	62
Annex G	(normative) Ground operations plan (GOP) DRD	63
G.1	Introduction	63
G.2	Scope and applicability	63
G.2.1	Scope	63
G.2.2	Applicability	63
G.3	References	63
G.3.1	Glossary and dictionary	63
G.3.2	Source documents	63
G.4	Definitions and abbreviations	64
G.5	Description and purpose	64
G.6	Application and interrelationship	64
G.7	Ground operations plan preliminary elements	64
G.7.1	Title	64
G.7.2	Title page	64
G.7.3	Approval page	64
G.7.4	Distribution list	64
G.7.5	Amendment control table	65
G.7.6	Contents list	65
G.7.7	Foreword	65
G.7.8	Introduction	65
G.8	Ground operations plan content	65
G.8.1	Scope and applicability	65
G.8.2	References	66
G.8.3	Definitions and abbreviations	66
G.8.4	[Insert ground segment entity name] management	67
G.8.5	[Insert mission phase name] operations	67
G.8.6	Entity operational procedures	68
G.8.7	Hand-over procedures	68
Annex H	(normative) Operations anomaly report (OAR) DRD	69
H.1	Introduction	69
H.2	Scope and applicability	69
H.2.1	Scope	69
H.2.2	Applicability	69
H.3	References	69
H.3.1	Glossary and dictionary	69
H.3.2	Source documents	69
H.4	Definitions and abbreviations	69
H.5	Description and purpose	70
H.6	Application and interrelationship	70
H.7	Operations anomaly report preliminary elements	70
H.7.1	Identification number	70
H.7.2	Operational context	70
H.7.3	Suspected problem source	70
H.7.4	Title	70
H.7.5	Date and time of occurrence	70
H.7.6	Severity	70
H.7.7	Originator	71
H.7.8	Approval	71
H.7.9	Distribution list	71
H.7.10	Version control	71

EN 14737-2:2004 (E)

H.7.11	Status	71
H.8	Operations anomaly report content.....	71
H.8.1	Introduction	71
H.8.2	Details of the anomaly	71
H.8.3	Actions taken.....	72
H.8.4	Operational impact.....	72
H.8.5	Recommendations	72
Annex I	(normative) Flight control procedure (FCP) DRD.....	73
I.1	Introduction	73
I.2	Scope and applicability	73
I.2.1	Scope	73
I.2.2	Applicability	73
I.3	References.....	73
I.3.1	Glossary and Dictionary.....	73
I.3.2	Source documents.....	73
I.4	Definitions and abbreviations.....	74
I.5	Description and purpose.....	74
I.6	Application and interrelationship.....	74
I.7	Flight control procedure preliminary elements	74
I.7.1	Identification number.....	74
I.7.2	Title.....	74
I.7.3	Version control.....	74
I.7.4	Author	74
I.8	Flight control procedure content	75
I.8.1	General.....	75
I.8.2	Introduction	75
I.8.3	Required operational authority.....	75
I.8.4	Expected duration.....	75
I.8.5	Pre-conditions	75
I.8.6	Procedure body.....	75
I.8.7	Post conditions	76

<https://standards.iteh.ai/catalog/standards/sist/4/502816-8/14-498e-ac39-af01735cc192/sist-en-14737-2-2004>

Foreword

This document (EN 14737-2:2004) has been prepared by CMC.

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 September 2004, and conflicting national standards shall be withdrawn at the latest by September 2004.

It is based on a previous version¹⁾ originally prepared by the ECSS Space Engineering Working Group, reviewed by the ECSS Technical Panel and approved by the ECSS Steering Board. The European Cooperation for Space Standardization (ECSS) is a cooperative effort of the European Space Agency, National Space Agencies and European industry associations for the purpose of developing and maintaining common standards.

This European Standard is one of the series of space standards intended to be applied together for the management, engineering and product assurance in space projects and applications.

EN 14737 "Space engineering – Ground systems and operations" is published in 2 Parts:

Part 1: Principles and requirements

Part 2: Document requirements definitions (DRDs)

Requirements in this European Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

The formulation of this European Standard takes into account the existing EN ISO 9000 family of documents.

The annexes A, B, C, D, E, F, G, H and I are normative.

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

¹⁾ ECSS-E-70-2A.

EN 14737-2:2004 (E)

Introduction

Ground systems and operations are key elements of a space system and as such play an essential role in achieving mission success. Mission success is defined here as the achievement of the target mission objectives as expressed in terms of the quantity, quality and availability of delivered mission products and services within a given cost envelope.

Mission success requires successful completion of a long and complex process covering the definition, design, implementation, validation, in flight operations and post operational activities, involving both the ground segment and also space segment elements. It involves technical activities, as well as human and financial resources, and encompasses the full range of space engineering disciplines. Moreover it necessitates a close link with the design of the space segment in order to ensure proper compatibility between both elements of the complete space system.

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1 Scope

Part 2 of ECSS-E-70 "Space engineering — Ground systems and operations" specifies the content of the document requirements definitions (DRDs) which are called up by other European Space Standards and specifically referenced in EN 14737-1: "Principles and requirements".

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13701:2001, *Space systems — Glossary of terms*.

EN 14737-1, *Space engineering — Ground systems and operations — Part 1: Principles and requirements*.

ECSS-E-70-41A, *Space engineering — Ground systems and operations — Telemetry and telecommand packet utilization*.

iTeh STANDARD PREVIEW

3 Terms, definitions and abbreviated terms

For the purposes of this European Standard, the terms, definitions and abbreviated terms given in EN 13701 and EN 14737-1 apply.

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4 Document requirements definitions (DRD) list

European Space Standards specify the production and use of project documents. Document requirements definitions are defined to control the content of the project documents.

Document requirements definitions serve to ensure:

- a) completeness and consistency of information within documents;
- b) that the information contained in a document conforms to its defined scope, and correctly implements its interfaces with other documents; and
- c) that portions of a document can be generated or maintained by separate organizational groups and seamlessly integrated into a coherent whole.

Table 1 lists and gives a summary of the DRDs that are defined in the annexes of this European Standard and called up in EN 14737-1.

Table 1 — EN 14737-2 DRD list

DRD ID	DRD title	DRD summary content	Applicable to (phase)	Delivered (phase)	Remarks
EN 14737-2:2004, annex A	Customer requirements document (CRD)	Formally defines the requirements from the Customer on the ground segment. Covers design, implementation and operations as well as cost and programmatic issues.	B	B	
EN 14737-2:2004, annex B	Ground segment baseline Definition (GSBD)	Formal response to CRD. Constitutes the ground segment technical baseline for the its design, implementation of the ground segment and for the operations of the mission. It includes conformance to CRD requirements, identifies derived requirements and major constraints and assumptions.	C to F	B	
EN 14737-2:2004, annex C	Mission operations concept document (MOCD)	Defines the overall mission operations concept at the level of major ground segment entities.	A, B	A ^a /B	
EN 14737-2:2004, annex D	Space segment user manual (SSUM)	Provides all information required to implement the ground segment and to operate the space segment, i.e.: — space segment design characteristics of operational relevance (e.g. operational modes, constraints); — telemetry and telecommand lists (i.e. all information items required for ground processing of TM and TC); — nominal and contingency recovery procedures (only covering space segment aspect).	C to F	C ^a /D	Used in phases C/D for design of G/S and maintenance in phase F
EN 14737-2:2004, annex E	Operational validation plan (OVP)	Provides all information required to execute the operational validation of the ground segment, i.e.: — definition of simulations and rehearsal activities; — timeline of above activities; — related organizational aspects and required resources and participation.	D	D	

Table 1 — EN 14737-2 DRD list

DRD ID	DRD title	DRD summary content	Applicable to (phase)	Delivered (phase)	Remarks
EN 14737-2:2004, annex F	Flight operations plan (FOP)	Defines information required to operate the space segment during all applicable in-orbit phases of the mission, i.e.: — general operation organization and decision making process and major mission rules; — detailed schedule of flight operations; — Flight control procedures (FCP see below) for both nominal operations and major contingencies	D	E, F	To contain also space segment disposal procedures
EN 14737-2:2004, annex G	Ground operations plan (GOP)	Defines all information required to operate the corresponding ground facility and its constituent elements in order to support the mission, i.e.: — operations management and organizational aspects; — detailed schedule of activities for the entity in relation to mission events; — elementary entity operation procedures.	D	E, F	To contain also ground segment disposal procedures
EN 14737-2:2004, annex H	Operations anomaly report (OAR)	Documents a departure from the expected performance of an item during its operation. Includes: — date and time of anomaly occurrence and unique identifier for the anomaly; — summary description of the symptoms and impacts; — corrective actions and recommendations.	E	E	
EN 14737-2:2004, annex I	Flight control procedure (FCP)	Elementary constituent of the FOP. — Defines all actions to be performed to ensure adequate configuration of the space segment to achieve a given mission goal. — Addresses operational responsibilities, system prerequisites and post execution verification conditions. Two types of FCPs can be distinguished, for nominal and routine operations, and contingency operations respectively.	D	E, F	To contain also space segment disposal procedures
^a Delivery phase marked with an asterisk indicates a preliminary (draft) delivery.					

Annex A (normative)

Customer requirements document (CRD) DRD

A.1 Introduction

The customer requirements document (CRD) defines the requirements from the space segment customer on the supplier of the ground segment and operations.

A.2 Scope and applicability

A.2.1 Scope

This document requirements definition (DRD) establishes the data content requirements for the customer requirements document. This DRD does not define format, presentation or delivery requirements for the customer requirements document.

A.2.2 Applicability

This DRD is applicable to all projects using the European Space Standards.

A.3 References

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A.3.1 Glossary and dictionary

This DRD uses terminology and definitions controlled by:

EN 13701:2001, *Space systems — Glossary of terms*.

EN 14737-1, *Space engineering — Ground systems and operations — Part 1: Principles and requirements*.

A.3.2 Source documents

This DRD defines the content and data requirements of a Customer Requirements Document as controlled by the following source document: EN 14737-1, *Space engineering — Ground systems and operations — Part 1: Principles and requirements*.

A.4 Definitions and abbreviations

For the purposes of this DRD the definitions and abbreviations given in EN 13701 and in EN 14737-1 shall apply.

The following abbreviated terms are defined and used within this DRD:

Abbreviation Meaning

AOCS	attitude and orbit control system
CRD	customer requirements document
DRD	document requirements definition
GSBD	ground segment baseline definition
HCI	human-computer interaction
LEOP	launch and early orbit phase

A.5 Description and purpose

The CRD contains all the essential top-level assumptions, constraints and operational requirements for the [insert project name] mission to allow the supplier of the ground segment and operations to perform a design of the ground segment and to develop an operations concept.

A.6 Application and interrelationship

The CRD shall be written by the space project customer and is the highest-level requirements document defining the requirements on the ground segment and operations. The supplier of the ground segment and operations shall formally respond to the CRD with the ground segment baseline definition document (GSBD) where all requirements in the CRD can be traced to a proposed implementation.

A.7 Customer requirements document preliminary elements

A.7.1 Title

The document to be created based on this DRD shall be titled "[insert project name] customer requirements document".

A.7.2 Title page

The title page shall identify the project document identification number, title of the document, date of release and release authority.

A.7.3 Contents list

The contents list shall identify the title and location of every clause and major sub-clause, figure, table and annex contained in the document.