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Entwurf**Raumfahrtproduktsicherung –
Lagerung, Handhabung und Transport von Raumfahrzeug-Hardware;
Englische Fassung FprEN 16602-20-08:2016**

Space product assurance –
Storage, handling and transportation of spacecraft hardware;
English version FprEN 16602-20-08:2016

Assurance produit des projets spatiaux –
Stockage, manipulation et transport du matériel d'un véhicule spatial;
Version anglaise FprEN 16602-20-08:2016

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2016-03-04 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfes besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal des DIN unter www.entwuerfe.din.de bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
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- oder in Papierform an den DIN-Normenausschuss Luft- und Raumfahrt (NL), 10772 Berlin (Hausanschrift: Burggrafenstr. 6, 10787 Berlin).

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 57 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Dieses Dokument (FprEN 16602-20-08:2016) wurde im Technischen Komitee CEN/CLC/TC 5 „Raumfahrt“, dessen Sekretariat von DIN (Deutschland) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-06-02 AA „Interoperabilität von Informations-, Kommunikations- und Navigationssystemen (Spiegelausschuss zu CEN/CLC/TC 5)“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Dieses Dokument (FprEN 16602-20-08:2016) basiert auf ECSS-Q-ST-20-08C.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die englische Originalfassung von FprEN 16602-20-08:2016.

Dieses Dokument wurde speziell zur Behandlung von Raumfahrtsystemen erarbeitet und hat daher Vorrang vor jeglicher Europäischer Norm, da es denselben Anwendungsbereich hat, jedoch über einen größeren Geltungsbereich (z. B. Luft- und Raumfahrt) verfügt.

Nationaler Anhang NA (informativ)

Begriffe

3 Begriffe und Abkürzungen

3.1 Begriffe aus anderen Normen

- a) Für die Anwendung dieses Dokuments gelten die Begriffe nach ECSS-S-ST-00-01 und insbesondere die folgenden Begriffe:
- 1) Reinheit
 - 2) Verunreinigung
 - 3) Raumsegment
 - 4) Raumsegment-Subsystem
 - 5) Raumsegmentelement
 - 6) Reinheit
 - 7) Sicherheit

3.2 Für diese Norm spezifische Begriffe

3.2.1

Handhabung

Bewegen, Heben, Kippen, Drehen und Vor-Ort-Transport von Raumfahrzeug-Hardware

ANMERKUNG Vor-Ort-Transport bedeutet Transport zwischen Gebäuden ohne Nutzung der öffentlichen Infrastruktur.

3.2.2

Lagerung

zwischen Kunden und Lieferanten vereinbarte nichtoperative Phase zwischen zwei Phasen der Herstellung, Montage und Prüfung oder Start innerhalb der Lebensdauer einer Raumfahrt-Hardware

3.2.3

Transport

Bewegen von Hardware zwischen zwei Plätzen mit Nutzung der öffentlichen Infrastruktur

3.3 Abkürzungen

Für die Anwendung dieser Norm gelten die Abkürzungen nach ECSS-S-ST-00-01 und die folgenden Abkürzungen:

Abkürzung	Bedeutung
ABCL	Bestands-Konfigurationsliste (en: as built configuration list)
AIT	Baugruppe, Integration und Test (en: assembly, integration and test)
AR	Abnahme-Review (en: acceptance review)
BOM	Stückliste (en: bill of materials)
CIL	Liste der kritischen Einheiten (en: critical items list)
CTT	Transportgenehmigung (en: consent to transport)
DRB	Lieferungs-Untersuchungsausschuss (en: delivery review board)
DRD	Dokumenten-Anforderungsdefinition (en: document requirements definition)
EIDP	Endeinheit-Datenpaket (en: end item data package)
ESD	elektrostatische Entladung (en: electrostatic discharge)
FMEA	Fehlerart- und auswirkungsanalyse (en: failures modes and effect analysis)
HW	Hardware (en: hardware)
ITT	Ausschreibung (en: invitation to tender)
MGSE	mechanisches Bodendienstgerät (en: mechanical ground support equipment)
N/A	nicht anwendbar (en: not applicable)
NCR	Nichtkonformitäten/Fehler-Bericht (en: nonconformance report)
PSR	Review vor Lagerung (en: pre-storage review)
QA	Qualitätssicherung (en: quality assurance)
RFD	Abweichungsantrag (en: request for deviation)
RFW	Antrag auf Sonderfreigabe (en: request for waiver)
TOL	Leiter der Transporte (en: transport operations leader)
TRR	Testbereitschafts-Review (en: test readiness review)

3.4 Nomenklatur

3.4.1 Offizielle Verben

Für dieses Dokument gilt die folgende Nomenklatur:

- Das Wort „müssen“ (en: shall) wird in dieser Norm zur Formulierung von Anforderungen verwendet. Sämtliche Anforderungen werden durch das Wort „müssen“ ausgedrückt.
- Das Wort „sollten“ (en: should) wird in dieser Norm zur Formulierung von Empfehlungen verwendet. Sämtliche Empfehlungen werden durch das Wort „sollten“ ausgedrückt.

ANMERKUNG Es ist zu erwarten, dass während der Anpassung die Empfehlungen in diesem Dokument entweder in Anforderungen umgewandelt oder gestrichen werden.

- Die Wörter „dürfen“ (en: may) und „brauchen nicht“ (en: need not) werden in dieser Norm zur Formulierung der Zulässigkeit oder Unzulässigkeit verwendet. Sämtliche Zulässigkeiten werden über

das Wort „dürfen“ ausgedrückt. Sämtliche Unzulässigkeiten werden über die Wörter „brauchen nicht“ ausgedrückt.

- Das Wort „können“ (en: can) wird in dieser Norm zur Formulierung von Fähigkeiten oder Möglichkeiten verwendet und stellt daher, wenn nicht durch eines der vorstehenden Worte begleitet, einen beschreibenden Text dar.

ANMERKUNG Beim ECSS haben „dürfen“ (en: may) und „können“ (en: can) völlig unterschiedliche Bedeutungen: „dürfen“ wird normativ (Zulässigkeit) und „können“ beschreibend verwendet.

- Zeitformen der Gegenwart und Vergangenheit werden in dieser Norm verwendet, um Tatsachenaussagen zu treffen und stellen daher einen beschreibenden Text dar.

— Leerseite —

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English version

Space product assurance - Storage, handling and transportation of spacecraft hardware

Assurance produit des projets spatiaux - Stockage, manipulation et transport du matériel d'un véhicule spatial

Raumfahrtproduktsicherung - Lagerung, Handhabung und Transport von Raumfahrzeug-Hardware

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/CLC/TC 5.

If this draft becomes a European Standard, CEN and CENELEC 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.

This draft European Standard was established by CEN and CENELEC in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European Foreword

This document (FprEN 16602-20-08:2016) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN (Germany).

This document (FprEN 16602-20-08:2016) originates from ECSS-Q-ST-20-08C.

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

Introduction

This Standard focuses on requirements for preservation of space segments and associated hardware.

1

Scope

The Standard specifies requirements to ensure safe handling, storage, transportation of space segment hardware, including associated items to avoid degradation from integration up to launch.

The standard is applicable to: Space systems, Space segments, Assembled Spacecraft, Space segment elements, Spacecraft Modules, space segment subsystems, space segment equipment, partly manufactured space segment equipment. Intended programs are all space programs and target users all space hardware suppliers and customers.

The standard does not cover obsolescence management issues.

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

NOTE This standard is applicable to GSE, when mentioned in the different clauses of this standard.

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 16603-10	ECSS-E-ST-10	Space engineering - System engineering general requirements
EN 16603-10-03	ECSS-E-ST-10-03	Space engineering - Testing
EN 16601-40	ECSS-M-ST-40	Space project management- Configuration and information management
EN 16601-80	ECSS-M-ST-80	Space project management - Risk management
EN 16602-10	ECSS-Q-ST-10	Space product assurance - Product assurance management
EN 16602-10-04	ECSS-Q-ST-10-04	Space product assurance - Critical item control
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance - Nonconformance control system
EN 16602-20	ECSS-Q-ST-20	Space product assurance - Quality assurance
EN 16602-30-02	ECSS-Q-ST-30-02	Space product assurance - Failure modes effects (and criticality) analysis
EN 16602-40	ECSS-Q-ST-40	Space product assurance - Safety

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. cleanliness
 - 2. contamination
 - 3. space segment
 - 4. space segment subsystem
 - 5. space segment element
 - 6. cleanliness
 - 7. safety

3.2 Terms specific to the present standard

3.2.1 handling

movement, lifting, tilting, rotation, on-site transports, of space hardware

NOTE On-site transport is a transport between buildings, without any use of public infrastructures.

3.2.2 storage

non-operating phase between two phases of manufacturing, assembly and testing or launch campaign of a space hardware lifetime agreed between a customer and a supplier

3.2.3 transport

movement of hardware between two places, using public infrastructure

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
ABCL	as built configuration list
AIT	assembly, integration and test
AR	acceptance review
BOM	bill of materials
CIL	critical items list
CTT	consent to transport
DRB	delivery review board
DRD	document requirements definition
EIDP	end item data package
ESD	electrostatic discharge
FMEA	failures modes and effect analysis
HW	hardware
ITT	invitation to tender
MGSE	mechanical ground support equipment
N/A	not applicable
NCR	nonconformance report
PSR	pre-storage review
QA	quality assurance
RFD	request for deviation
RFW	request for waiver
TOL	transport operations leader
TRR	test readiness review

3.4 Nomenclature

3.4.1 Formal verbs

The following nomenclature apply throughout this document:

- The word “shall” is used in this document to express requirements. All the requirements are expressed with the word “shall”.
- The word “should” is used in this document to express recommendations. All the recommendations are expressed with the word “should”.

NOTE It is expected that, during tailoring, all the recommendations in this standard are either converted into requirements or tailored out.

- The words “may” and “need not” are used in this document to express positive and negative permissions respectively. All the positive permissions are expressed with the word “may”. All the negative permissions are expressed with the words “need not”.
- The word “can” is used in this document to express capabilities or possibilities, and therefore, if not accompanied by one of the previous words, it implies descriptive text.

NOTE In ECSS “may” and “can” have a complete different meaning: “may” is normative (permission) and “can” is descriptive.

- The present and past tense are used in this document to express statement of fact, and therefore they imply descriptive text.

General requirements for storage, handling and transportation

4.1 Project phasing

- a. The overall activities for handling, storage and transportation shall be planned as part of the normal engineering activities at each project phase in conformance with requirement 5.4.1.1b from ECSS-E-ST-10,
- b. Handling, storage and transportation documentation shall be phased with design documents and issued at various reviews.

NOTE Guidelines for deliverables per review list are provided in the Annex E.

4.2 Design considerations

- a. In line with requirement 5.4.1.1b from ECSS-E-ST-10, the design shall not prevent to meet the handling, storage and transportation constraints, as specified in Design Definition File in conformance with DRD from Annex G of ECSS-E-ST-10.
- b. The flight hardware shall be designed for an lifetime extending from the equipment Delivery Review Board to satellite end of operation lifetime, including specified storage at any level from unit to space segment element level.
- c. The satellite design should provide the capability of performing periodic inspection, maintenance and local testing during AIT and on-ground storage without the need to remove equipment or activate the complete satellite.

NOTE Example of this maintenance is exercising of mechanisms to allow lubricant redistribution.

- d. Coherent with specific storage duration of minimum 6 months, the design shall ensure that there is no need for inspection, testing or maintenance during 6 months.
- e. The need for maintenance and refurbishment shall be derived from the design.