SLOVENSKI STANDARD
SIST EN 16604-20:2020

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Vesoljska vzdržljivost - Planetarna zaščita

Space sustainability - Planetary protection

Nachhaltigkeit im Weltraum - Planetarer Schutz

Développement durabel de l'espace - Protection planétaire

Ta slovenski standard je istoveten z: **EN 16604-20:2020**

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Space sustainability - Planetary protection

Durabilité des activités spatiales - Protection planétaire

Nachhaltigkeit im Weltraum - Planetarer Schutz

This European Standard was approved by CEN on 25 November 2019.

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European Foreword

This document (EN 16604-20:2020) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN (Germany).

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of an identical text or by endorsement, at the latest by July 2020, and conflicting national standards shall be withdrawn at the latest by July 2020.

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

This document (EN 16604-20:2020) originates from ECSS-U-ST-20C.

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).

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Sustainability in the context of space activities is a concept that becomes more relevant. Planetary protection regulations have applied this concept at the international scale already for over half a century.

The legal basis for planetary protection was established in Article IX of the United Nations Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies (Outer Space Treaty).

The Committee on Space Research (COSPAR) provides a forum for international consultation and has formulated a planetary protection policy with associated requirements as an international standard to guide compliance with Article IX of the Outer Space Treaty.

COSPAR's planetary protection policy and associated requirements are based on two rationales:

1. *The Earth must be protected from the potential hazard posed by extraterrestrial matter carried by a spacecraft returning from an interplanetary mission (backward planetary protection).*
2. *The conduct of scientific investigations of possible extraterrestrial life forms, precursors, and remnants must not be jeopardized (forward planetary protection).*

This standard describes the planetary protection requirements for spaceflight missions based on the COSPAR planetary protection policy and requirements. The content of this document has been coordinated with the already existing ESA and NASA standards to ensure that requirements, documentation and reviews cover the needs and obligations of international partners for joint missions or contributions to a third party mission.

1 Scope

This standard contains planetary protection requirements, including:

- Planetary protection management requirements;
- Technical planetary protection requirements for robotic and human missions (forward and backward contamination);
- Planetary protection requirements related to procedures;
- Document Requirements Descriptions (DRD) and their relation to the respective reviews.

This standard may be tailored for the specific characteristic and constraints 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 16602-10-09	ECSS-Q-ST-10-09	Space product assurance – Nonconformance control system
EN 16602-40	ECSS-Q-ST-40	Space product assurance - Safety
EN 16602-70-01	ECSS-Q-ST-70-01	Space product assurance – Cleanliness and contamination control
EN 16602-70-53	ECSS-Q-ST-70-53	Space product assurance – Materials and hardware compatibility tests for sterilization processes
EN 16602-70-55	ECSS-Q-ST-70-55	Space product assurance – Microbial examination of flight hardware and cleanrooms
EN 16602-70-56	ECSS-Q-ST-70-56	Space product assurance – Vapour phase bioburden reduction of flight hardware
EN 16602-70-57	ECSS-Q-ST-70-57	Space product assurance – Dry heat bioburden reduction of flight hardware
EN 16602-70-58	ECSS-Q-ST-70-58	Space product assurance – Bioburden control of cleanrooms
	IADC-WD-00-03	Interagency Debris Committee Protection Manual

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.

b. For the purpose of this Standard the following terms and definitions from ECSS-Q-ST-70-53 apply:

1. micro-organism

c. For the purpose of this Standard the following terms and definitions from ECSS-Q-ST-70-58 apply:

1. bioburden
2. biodiversity
3. sterilization

3.2 Terms specific to the present standard

3.2.1 assay

collection and analysis of biological contamination with a specified procedure

3.2.2 controlled condition

condition that avoids degradation of material samples and that allows traceability of flight project hardware

3.2.3 encapsulated bioburden

bioburden inside the bulk of non-metallic materials not manufactured with ALM

NOTE 1 Examples are bioburden inside paints, conformal coatings, thermal coatings, adhesives, composite materials, closed-cell foam.

NOTE 2 The encapsulated bioburden of ALM manufactured materials is currently unknown.

3.2.4 exposed surfaces

internal and external surfaces free for gas exchange

3.2.5 extant life

form of life, or signatures thereof, whether metabolically active or dormant

3.2.6 extinct life

form of life, or signatures thereof, that is unambiguously no longer metabolically active or dormant

3.2.7 highly controlled

bioburden control of cleanroom by use of full body coverall, hood, face mask, gloves and boots, restricted access, dedicated cleaning and periodic microbiological monitoring

3.2.8 inbound leg

<CONTEXT: sample return missions>

part of the mission returning to Earth

3.2.9 life detection investigation

scientific investigations that can detect signatures of life

3.2.10 Mars special region

area or volume with sufficient water activity and sufficiently warm temperatures to permit the replication of Earth organisms

[COSPAR's Planetary Protection Policy, Space Research Today, 200, 2017 [2]]

NOTE See also parameter and feature definition in clause 4.3.

3.2.11 mated surfaces

surfaces joined by fasteners rather than by adhesives

3.2.12 normally controlled

use of gowning equivalent to the specific cleanroom particulate class

3.2.13 organic material

material that contain either covalent C-H or C-C bonds and functional groups

NOTE Organic material can fall in several of the material groups of a DML.

3.2.14 outbound leg

<CONTEXT: sample return missions>

part of the mission leaving Earth

3.2.15 planetary protection approval authority

entity that specifies, for a given project, the planetary protection categorization, detailed technical planetary protection requirements, and reviews their implementation

NOTE Such an entity is a space agency or federal agency, i.e. customer, under delegation by the government signatory of the UN Outer Space Treaty.

3.2.16 planetary protection category

category assigned to reflect the interest and concern that terrestrial contamination can compromise future investigations and depends on the target body and mission type

NOTE Different requirements are associated to the various categories.

3.2.17 protected Solar system body

<CONTEXT: probability of impact analysis>

Solar system bodies, including planets and moons, for which there is significant scientific interest relative to the process of chemical evolution and the origins of life and for which scientific opinion provides a significant chance that contamination by a spacecraft can compromise future investigations

NOTE In accordance with this definition and the categories defined in 4.2, protected Solar system bodies are assigned to planetary protection category III and IV.

3.2.18 restricted Earth return

planetary protection sub-category V for sample return missions from Solar system bodies deemed by scientific opinion to have a possibility of harbouring indigenous life forms

3.2.19 safety critical function

function that can lead to the risk of releasing unsterilized material from a specific solar system body and flight hardware exposed to unsterilized material from a specific solar system body into the terrestrial environment

3.2.20 services

launch services, communication services and relay functions provided

3.2.21 swab

tool to collect biological contamination with a specific procedure

NOTE See also 3.2.1 “assay”.

3.2.22 unrestricted Earth return

planetary protection sub-category V for sample return missions from Solar system bodies deemed by scientific opinion to have no indigenous life forms

3.2.23 water activity

ratio of the vapour pressure of water in a material to the vapour pressure of pure water at the same temperature

3.2.24 wipe

tool to collect biological contamination with a specific procedure

NOTE See also 3.2.1 “assay”.

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	assembly, integration and verification
ALM	additive layer manufacturing
BAT	Best Available Technique
CDR	critical design review
COSPAR	Committee on Space Research
DHMR	dry heat microbial reduction
DML	declared material list
DRD	document requirements definition
ECSS	European Cooperation for Space Standardization
ESA	European Space Agency
FAR	flight acceptance review
FRR	flight readiness review
ISO	International Organization for Standardization
LRR	launch readiness review
MSR	Mars sample return
NASA	National Aeronautics and Space Administration
PPAA	planetary protection approval authority
PRA	Probabilistic Risk Assessment
PRR	preliminary requirements review
SB	small body
SRR	system requirements review
SSB	space studies board
STP	standard temperature and pressure
VCD	verification control document