



**SLOVENSKI STANDARD**  
**oSIST prEN 9227-1:2024**  
**01-junij-2024**

---

**Aeronavtika - Upravljanje programa - Vodilo za nadzor zanesljivosti in varnosti**

Aerospace series - Programme management - Guide to dependability and safety control

Luft- und Raumfahrt - Programm-Management - Richtlinien für die RAMS-Management

Série aérospatiale - Management de programme - Guide pour la maîtrise de la sûreté de fonctionnement

**Ta slovenski standard je istoveten z: prEN 9227-1**

---

**ICS:**

49.140

Vesoljski sistemi in operacije Space systems and operations

**oSIST prEN 9227-1:2024**

**en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 9227-1**

April 2024

ICS 49.140

English Version

## Aerospace series - Programme management - Guide to dependability and safety control

Série aérospatiale - Management de programme -  
Guide pour la maîtrise de la sûreté de fonctionnement

Luft- und Raumfahrt - Programm-Management -  
Richtlinien für die RAMS-Management

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Türkiye and United Kingdom.

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.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

<https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024>



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

<b>Contents</b>	<b>Page</b>
European foreword .....	4
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms and definitions</b> .....	<b>5</b>
<b>4 List of acronyms</b> .....	<b>9</b>
<b>5 Fundamental notions and principles</b> .....	<b>11</b>
<b>6 Organisational provisions</b> .....	<b>12</b>
<b>6.1 RAMS positioning in relation to the programme</b> .....	<b>12</b>
<b>6.2 RAMS resources</b> .....	<b>13</b>
<b>6.3 Distribution of the responsibilities for RAMS</b> .....	<b>14</b>
<b>6.3.1 Responsibilities of the customer</b> .....	<b>14</b>
<b>6.3.2 Responsibilities of the users</b> .....	<b>14</b>
<b>6.3.3 Responsibility of the suppliers</b> .....	<b>14</b>
<b>6.4 Documentation management</b> .....	<b>15</b>
<b>7 Construction of RAMS</b> .....	<b>15</b>
<b>7.1 General</b> .....	<b>15</b>
<b>7.2 RAMS targets</b> .....	<b>16</b>
<b>7.2.1 Responsibilities</b> .....	<b>16</b>
<b>7.2.2 Principles for defining and expressing targets</b> .....	<b>17</b>
<b>7.3 Technical risk control</b> .....	<b>18</b>
<b>7.3.1 General</b> .....	<b>18</b>
<b>7.3.2 Identification and analysis of technical risks</b> .....	<b>18</b>
<b>7.3.3 Criticality assessment</b> .....	<b>19</b>
<b>7.3.4 Prioritization of the identified risks</b> .....	<b>19</b>
<b>7.3.5 Selection of unacceptable risks</b> .....	<b>19</b>
<b>7.3.6 Reduction of unacceptable risks</b> .....	<b>20</b>
<b>7.3.7 Management of technical risks</b> .....	<b>21</b>
<b>7.4 Execution logic</b> .....	<b>21</b>
<b>7.4.1 General</b> .....	<b>21</b>
<b>7.4.2 Activities during the feasibility phase</b> .....	<b>21</b>
<b>7.4.3 Activities during the definition and development phases</b> .....	<b>22</b>
<b>7.4.4 Activities in the production phase</b> .....	<b>23</b>
<b>7.4.5 Activities during the operating phase</b> .....	<b>23</b>
<b>7.4.6 Activities during the disposal phase</b> .....	<b>23</b>
<b>7.5 Growth of RAMS</b> .....	<b>24</b>
<b>7.5.1 General</b> .....	<b>24</b>
<b>7.5.2 Integrated RAMS growth programmes</b> .....	<b>25</b>
<b>7.5.3 Specific RAMS test and growth programmes</b> .....	<b>25</b>
<b>7.6 Documentation of the RAMS studies and digital continuity</b> .....	<b>26</b>
<b>7.6.1 Documentation of the RAMS studies</b> .....	<b>26</b>
<b>7.6.2 Digital continuity</b> .....	<b>27</b>
<b>8 RAMS management</b> .....	<b>28</b>
<b>8.1 General principles</b> .....	<b>28</b>
<b>8.2 Provisions</b> .....	<b>29</b>

<b>8.3</b>	<b>RAMS plan.....</b>	<b>29</b>
<b>8.4</b>	<b>Relations with quality assurance.....</b>	<b>30</b>
<b>8.5</b>	<b>Relations with system engineering.....</b>	<b>30</b>
<b>8.6</b>	<b>Relation with the Integrated Logistics Support (ILS) process.....</b>	<b>31</b>
<b>8.7</b>	<b>Relations with the human factors analysis process.....</b>	<b>31</b>
<b>8.8</b>	<b>Relations with cybersecurity.....</b>	<b>31</b>
	<b>Annex A (informative) Examples of a RAMS plan template.....</b>	<b>33</b>
	<b>Annex B (informative) Examples of RAMS requirements in programmes .....</b>	<b>34</b>
	<b>Annex C (informative) Tasks to be performed in the various phases of a programme .....</b>	<b>35</b>
	<b>Bibliography .....</b>	<b>39</b>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[oSIST prEN 9227-1:2024](https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024>

## **prEN 9227-1:2024 (E)**

### **European foreword**

This document (prEN 9227-1:2024) has been prepared by ASD-STAN.

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[oSIST prEN 9227-1:2024](https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024>

## 1 Scope

The success of a programme depends on optimizing the compromise between the expected technical and operational performance of the products, the cost of these products and the lead-time to realize them.

In this context, products dependability and safety control is a key activity which cannot be separated from other product performance control or programme management.

This document is thus one of the documents supporting EN 9200 concerning the programme management specification.

The purpose of this document is to provide customers and their suppliers with a document specifying the notions of “construction” and “management” of product dependability and safety (RAMS).

It offers programme directors and project managers information likely to help them:

- determine the tasks to be performed and the application procedures, according to the specific nature of the programme and its goals;
- define and implement the provisions necessary for performing these tasks;
- within programme execution, situate the various tasks involved in constructing and managing the RAMS of a product.

This document applies to all programmes that involve customer/supplier relation.

RAMS management concerns not only all the products covered by these programmes, but also the components of these products and the production and support resources and processes to be implemented.

The provisions of this document can be negotiated at all levels between the parties directly concerned by a given programme. This implies, on the part of the ordering parties, that each lower level is provided with the information needed to perform the tasks and meet the specified targets. This also implies, on the part of suppliers, an escalation of information pertaining to the RAMS results of the products for which they are responsible.

<https://standards.iteh.ai/> This document is mainly concerned with the technical aspects, aspects of a legislative (in particular safety at work and regulatory conformity) and confidential nature are not dealt with in this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 9200, *Aerospace series — Programme management — Guidelines for project management specification*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 9200 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

**prEN 9227-1:2024 (E)****3.1****availability**

aptitude of a product to be in a condition to perform a required function in given conditions, at a given time

Note 1 to entry: This ability depends on the combined aspects of the reliability performance, the maintainability performance and the maintenance support performance.

[SOURCE: adapted from EN 13306:2017]

**3.2****durability**

ability of an item to perform a required function, under given conditions of use and maintenance, until the end of its useful life

Note 1 to entry: Useful life ends with the definitive cessation of use of the entity, and is determined by a limit state, i.e. when the risk of failure becomes unacceptable or when the entity is considered non-repairable following a failure. The limit state is linked most often to wear or degradation. An entity may be considered non-repairable when a repair cost is deemed unacceptable.

Note 2 to entry: In the case of non-repairable equipment, durability and reliability are synonymous. In the case of repairable equipment, the limit state is decided in relation to economic reasons, a benefit/risk balance, etc.

Note 3 to entry: Not to be confused with sustainable development performance.

Note 4 to entry: Lifetime is the necessary time between commissioning and reaching the limit state.

[SOURCE: adapted from EN 13306:2017 – notes added]

**3.3****reliability**

aptitude of a product to perform a required function, in given conditions, for a given period of time

Note 1 to entry: It is assumed that the item is in a state to perform this required function at the beginning of the time interval.

Note 2 to entry: Generally, reliability performance is quantified using appropriate measures. In some applications, these measures include an expression of reliability performance as a probability, which is also called reliability.

[SOURCE: EN 16601-00-01:2015, 2.3.170 and ISO 10795:2019]

**3.4****incident**

unforeseen event or combination of such events, disrupting a process and likely to have adverse effects on dependability, safety and security of a product during a phase of its life

EXAMPLE An incident may be:

- a deviation from a specification;
- failure of the test, manufacturing, measuring, implementation, other means and/or procedures;
- failure of the product concerned (in its condition at that time);
- any other unforeseen event or problem.



**3.5****maintainability**

ability of an item to be maintained in, or restored to, a state in which it can perform as required under given conditions of use and maintenance

Note 1 to entry: Given conditions of use may include storage.

Note 2 to entry: Given conditions of maintenance include the procedures and resources for use.

Note 3 to entry: Maintainability may be quantified using such measures as mean time to repair, or the probability of repair within a specified period of time.

Note 4 to entry: Testability (ability to detect failures or their effects and to locate their origin) is a component of maintainability.

[SOURCE: ISO 10795:2019]

**3.6****maintenance**

combination of actions allowing to maintain or restore a product in a specified state or in a state which it is able to perform the required function(s)

Note 1 to entry: Maintenance includes management and supervision activities for support (see RG.Aero 000 76).

Note 2 to entry: In the operation phase, maintenance contributes to the preservation over time of the safety, security and availability aptitudes of the product.

**3.7****product RAMS maturity**

through a RAMS growth process, attainment of complete development of a product when its RAMS characteristics can be considered stabilised in relation to the specifications

Note 1 to entry: Maturity is the result of a process of gradual elimination of attributable causes of failure on the product concerned and associated processes (RAMS maturing process). The stabilized level may be higher than the specifications.

**3.8****product**

result of activities or processes

Note 1 to entry: Product categories can be services, hardware, software, processed materials, systems, intermediate work products from elementary activities, such as documents or models.

Note 2 to entry: In the frame of a product developed to satisfy a customer's need, the processes involved are the expression of the need, the establishment of the definition, the industrialization and the production.

Note 3 to entry: The product can be either a final product to be delivered to a customer (e.g. aircraft, equipment) or one of its components. In both cases, it represents the supply due under the contract.

Note 4 to entry: Solution and product can be considered synonymous for the purposes of this document.

**3.9****life profile**

chronological description of the situations in which a physical product is expected to be found, from ex-factory to disposal

**prEN 9227-1:2024 (E)**

Note 1 to entry: These situations could be: transport, handling, storage, maintenance, preparation for use, operational use, with all environmental conditions, durations and respective occurrences.

Note 2 to entry: The life profile is described for product/customer or product/job couples. For a given product, there may be several life profiles depending on the considered concepts of use or deployments.

Note 3 to entry: Not to be confused with lifecycle (which includes life profile).

Note 4 to entry: The disposal phase is part of the lifecycle but is not part of the life profile.

Note 5 to entry: Depending on the organization, the terms “use profile” or “mission profile” may be used.

**3.10****robustness**

property of a product resulting in a reduced sensitivity of its performance to possible deviations from the environmental constraints to which it is subjected, to dispersions of its constituent components and to deviations from its manufacturing processes

Note 1 to entry: Robustness largely results from actions aimed at both obtaining sufficient operating margins and reducing all forms of variability.

**3.11****safety**

aptitude of a product, throughout its lifecycle, to guarantee acceptable levels of a risk of accident likely to injure personnel or lead to a major deterioration of the product or its environment

Note 1 to entry: It is safety in the sense of unintentional events, unlike the notion of security. Therefore, malevolence is excluded from this definition.

Note 2 to entry: For unacceptable risks, see 7.4.5.

**3.12****security**

following a malevolent act, aptitude of a product to guarantee, throughout all the phases of its life, an acceptable level of risk, so as not to cause:

- aggression against the personnel;
- serious damage to the product or its environment;
- a loss of the confidentiality, availability or integrity of data

Note 1 to entry: Cybersecurity is a subset of security, in particular with regard to the above data-related aspects.

**3.13****dependability and safety****RAMS**

all aptitudes (reliability, availability, maintainability, safety) of a product which enable it to have the specified functional performances, at the requested time, for the considered duration and without damage for itself and its environment

Note 1 to entry:

- for the user, this is a guarantee that the product will provide the expected services when they are needed;

— for the company, this is a guarantee that the product to be delivered will retain the specific functional performance, with an acceptable level of probability;

— for the expert, this means choosing and implementing exactly the right tools and methods for obtaining RAMS performance.

Note 2 to entry: For certain products, the RAMS concept can be expanded to other aptitudes such as survivability, invulnerability or durability.

Note 3 to entry: Certain fields of activity do not include the safety aspect.

Note 4 to entry: RAMS takes the interface with security into consideration.

Note 5 to entry: The aggressions of the environment on the product are to be taken into account at the level of the aptitudes.

### 3.14 system

arrangement of parts or elements that together exhibit a stated behaviour or meaning that the individual constituents do not

Note 1 to entry: A system is sometimes considered as a *product* or as the *services* it provides.

Note 2 to entry: In practice, the interpretation of its meaning is frequently clarified by the use of an associative noun, e.g. aircraft system.

Note 3 to entry: A complete system includes all of the associated equipment, facilities, material, computer programs, firmware, technical documentation, services, and personnel required for operations and support to the degree necessary for self-sufficient use in its intended environment.

[SOURCE: adapted from ISO/IEC/IEEE 15288:2023 – note 2 incomplete]

## 4 List of acronyms

ADMP	Allied dependability management publication
AMSAA	United States army material systems analysis activity
ANSSI	French national information systems security agency / <i>agence nationale de la sécurité des systèmes d'information</i>
CIL	Critical items list
CMMS	Computerized maintenance management system
CONOPS	Concept of operations
DJD	Definition justification dossier
DJP	Definition justification plan
EBIOS	Expression of need and identification of safety objectives / <i>expression des besoins et identification des objectifs de sécurité</i>
FMEA	Failure mode and effects analysis
FMECA	Failure modes, effects and criticality analysis
FPS	Functional performance specification
FRACAS	Failure reporting, analysis and corrective action system

**prEN 9227-1:2024 (E)**

HAZID	Hazard identification
HAZOP	Hazard and operability analysis
ILS	Integrated logistics support
LSA	Logistic support analysis
LSA DB	Logistic support analysis database
MBSA	Model-based safety analysis
MBSE	Model-based system engineering
MTBF	Mean operating time between failures
MTTR	Mean time to restoration
(N)TS	(Need) technical specification
PHA	Preliminary hazard analysis
PLM	Product life management
RAMS	Reliability, availability, maintainability, safety (also used as an acronym for safety and dependability)
RTCA	Radio technical commission for aeronautics
SIL	Safety items list
STANREC	NATO standardization recommendation
SPF	Single point of failure
WBS	Work breakdown structure

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[oSIST prEN 9227-1:2024](https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/5a25a211-9ea1-47cf-9cfe-c466b42b4f4a/osist-pren-9227-1-2024>