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Space systems — Programme management — Product quality assurance requirements

Systèmes spatiaux — Management de programme — Exigences d'assurance qualité produit

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

This second edition cancels and replaces the first edition (ISO 27025:2010), which has been technically revised.

The main changes are as follows:

— updated the normative references in Clause 2;

— updated the terms and definitions references in Clause 3.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is intended to be applied for the management of product quality assurance in space programmes and applications.

The formulation of this document takes into account the existing International Standards prepared by ISO/TC 176 (notably ISO 9000 and ISO 10006) and the content of ISO 14300-1 and ISO 14300-2.

The requirements of this document and its associated referenced standards are tailored to the needs and classes of specific projects.

When viewed from the perspective of a specific project context, the requirements defined in this document are tailored to match the genuine requirements of a particular profile and circumstances of a project.

For programme management, and as required in ISO 14300-2, the following concepts apply.

— The objective of quality assurance is to provide adequate confidence to the customer that the end product or service satisfies the requirements.

— The quality assurance policy is to ensure, in conjunction with other integrated project and product assurance functions, that required quality is specified, designed-in and will be incorporated, verified and maintained in the relevant hardware, software and associated documentation throughout all project phases, by applying a programme where:

  — assurance is provided that all requirements are adequately specified;

  — design rules and methods are consistent with the project requirements;

  — each applicable requirement is verified through a verification programme which includes one or more of the following methods: analysis, inspection, test, review of design, audits;

  — design and performance requirements including the specified margin are demonstrated through a qualification process;

  — assurance is provided that the design is producible and repeatable, and that the specification of the resulting product can be verified and operated within the required operating limits;

  — adequate controls are established for the procurement of components, materials, software and hardware items, services;

  — fabrication, integration, test and maintenance are conducted in a controlled manner such that the end item conforms to the applicable baseline;

  — a nonconformity control system is established and maintained in order to track nonconformities systematically and to prevent reoccurrence;

  — records are maintained and analysed to report and detect trends in due time for preventive/corrective actions;

  — inspection, measuring and test equipment and tools in use on the contract are controlled to be accurate for their application;

  — procedures and instructions are established which provide for the identification, segregation, handling, packaging, preservation, storage and transportation of all items;

  — assurance that the operations including post-flight and disposal are carried out in a controlled way and in accordance with the relevant requirements.

Requirements in this document 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.

Space systems — Programme management — Product quality assurance requirements

1 Scope

This document defines the quality assurance (QA) requirements for the establishment and implementation of product QA programmes for projects covering mission definition, design, development, production and operations of space systems, including disposal.

It is applicable to the customer-supplier relationship for space products to the extent agreed by both parties.

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.

ISO 9000, *Quality management systems — Fundamentals and vocabulary*

ISO 10795, *Space systems — Programme management and quality — Vocabulary*

ISO 14300-1, *Space systems — Programme management — Part 1: Structuring a project*

ISO 14300-2, *Space systems — Programme management — Part 2: Product assurance*

ISO 14620-1, *Space systems — Safety requirements — Part 1: System safety*

ISO 14621-1, *Space systems — Electrical, electronic and electromechanical (EEE) parts — Part 1: Parts management*

ISO 14621-2:2019, *Space systems — Electrical, electronic and electromechanical (EEE) parts — Part 2: Control programme requirements*

ISO 21886, *Space systems — Configuration management*

ISO 23460, *Space projects — Programme management — Dependability assurance requirements*

ISO 23461, *Space systems — Programme management — Non-conformance control system*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000, ISO 10795 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/

3.1.1
business agreement
legally binding agreement, for the supply of goods or services, between two or more actors in the customer-supplier chain

Note 1 to entry: Business agreements are recorded in a variety of forms, such as:

— contracts;

— memoranda of understanding;

— inter-governmental agreements;

— inter-agency agreements;

— partnerships;

— bartering agreements;

— purchase orders.

3.2 Abbreviated terms

AIV assembly, integration, verification

BB breadboard

CI configuration item

DRB delivery review board

DRD document requirements definition

DWI deviation work item

EEE electrical, electronic, electromechanical

EGSE electrical ground support equipment

EIDP end item data package

FGSE fluidic ground support equipment

FM flight model

GSE ground support equipment

KIP key inspection point

ICD interface control document

MGSE mechanical ground support equipment

MIP mandatory inspection point

NRB nonconformity review board

OGSE optical ground support equipment

QA quality assurance

PA product assurance

PM project manager

PTR post-test review

PVS procedure variation sheet

QM qualification model

RFD request for deviation

RFW request for waiver

SOW statement of work

TRB test review board

TRR test readiness review

WI work item

4 QA programme management

4.1 QA programme

The supplier shall implement a QA programme for products whereby assurance is given that:

a) all requirements are specified through definition and implementation of adequate methods and procedures;

b) a set of design rules and methods has been set up and is consistent with the project techniques and technologies;

c) methods, procedures and tools have been defined and are implemented in order to prove that each applicable requirement is verified through one or more of the following methods: analysis, inspection, test, review of design, audits;

d) for each configuration item there is a defined and implemented qualification approach that makes it possible to demonstrate that the item is so designed that it performs satisfactorily in the intended environment;

e) the approach adopted guarantees that the design is producible and repeatable and that the resulting product can be verified and operated within the required operating limits;

f) adequate controls are established for the procurement of components, materials, software and hardware items, services;

g) fabrication, integration, test and maintenance are conducted in a controlled manner so that the end item conforms to the applicable baseline;

h) a nonconformity control system is established and maintained in order to systematically track and prevent recurrence;

i) records are maintained and analysed so that trends can be detected and reported in time to enable preventive or corrective actions to be taken;

j) equipment and tools used for inspecting, measuring and testing project items are regularly calibrated to ensure their accuracy;

k) procedures and instructions are established which provide for the identification, segregation, handling, packaging, preservation, storage and transportation of all items;

l) assurance is provided that the operations including post-flight and disposal are carried out in a controlled way and in accordance with the relevant requirements.

The specific requirements for ground support equipment (GSE) are defined in Annex A.

4.2 Organization

Organization and responsibilities in the frame of space programmes shall be in accordance with the general requirements defined in ISO 14300-1 and ISO 14300-2.

The supplier shall identify the personnel responsible for implementing and performing QA functions.

4.3 QA programme plan

The supplier shall prepare, maintain and implement a plan of the QA activities, in accordance with the general requirements in ISO 14300-2.

The plan may be part of the overall project product assurance plan.

4.4 QA status reporting

The supplier shall periodically prepare and submit to the customer reports on the status and progress of the QA programme, as part of the overall PA reporting.

4.5 Personnel training and certification

4.5.1 The supplier shall establish a documented training programme for QA personnel and all other personnel whose performance determines or affects product quality.

4.5.2 Operators performing critical processes shall be trained and certified by internal or external training programmes, or can demonstrate a regular and satisfactory use of the related skills.

4.5.3 Those inspecting or controlling critical processes, or performing non-destructive testing and evaluation, shall be trained and certified according to national or international training programmes and standards, or can demonstrate a regular and satisfactory use of the related skills.

4.6 QA programme audits

4.6.1 The supplier shall perform systematic audits on its own performance to verify the implementation and effectiveness of the provisions defined in the QA programme plan.

4.6.2 The supplier shall establish and maintain an audit plan for procurement activities on the project, designating the lower-tier suppliers to be audited, the current status and the schedule for auditing.

4.6.3 In addition to the planned audits, extra audits shall be performed when necessary to overcome failure, consistent poor quality, or other problems.

4.6.4 The customer shall have the right to be represented in the planned external audits. For this purpose, the external audit schedule shall be supplied to the customer and updated regularly.

4.6.5 The customer shall also have the right to audit any lower-tier supplier at any time; such audits shall be arranged by the supplier and the next or higher-level customers of the audited supplier as relevant.