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Space systems — Space experiments — General requirements

Systèmes spatiaux — Expériences spatiales — Exigences générales

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 14619 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

Introduction

This International Standard establishes the requirements for preparation of space experiments, execution of the experiment and processing of the collected data. Space systems have been used for solving various practical problems of humanity. The possibilities for expanding the use of these systems are far from being exhausted. At the same time, special studies are needed to identify these opportunities, and the results of these studies must be verified by space experiments. The space environment provides ideal conditions for certain scientific studies.

Expenditures for the experiments should be minimal for the initiator of the proposed practical applications of space systems. It often happens that an experiment is conducted on board a space system that is available and has already been in operation (i.e. the experiment becomes part of the operation of the space system itself). The space experiment is carried out using both hardware and software subsystems. This poses the problem of accomplishing two interrelated objectives:

— to ensure successful execution and performance of the experiment;

— to avoid interfering with an operational space system so as not to impair its functioning.

One method of solving this problem is to standardize the procedure for integrating (introducing) space experiments into the operational processes of the carrier space system. This International Standard specifies the procedures for the preparation on the ground for, the execution of, and the processing of the experimental results from space experiments carried out using a space system that is already operational.

Space systems — Space experiments — General requirements

1 Scope

This International Standard specifies the procedure for preparing and carrying out space experiments and processing the resulting data, and applies to both manned and unmanned space systems, excluding exploratory rockets with associated probes. It may be tailored to the specific needs of different kinds of experiments and their carrier space vehicles.

2 Normative references

The following referenced documents are indispensable for the application 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 14300-1, *Space systems — Programme management — Part 1: Structuring of a programme*

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

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

ISO 14620-2, *Space systems — Safety requirements — Part 2: Launch site operations*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
space experiment
SE
system of operations, actions, and/or observations performed in space with the objective of obtaining information on the subject under study

3.2
space experiment system
set of equipment designed for the performance of the space experiment and specifically integrated into the space system and support facilities

3.3
space experiment system designer
person responsible for the development, delivery, and performance of the SE system

3.4
space experiment project manager
person responsible for overall management of the space experiment programme

3.5
space experiment operations manager
person responsible for managing operations through all stages of the space experiment and for organizing the operations during the execution of the space experiment

3.6
space experiment scientific observation
method of collecting information and data during the functioning of space experiment instrumentation

4 SE organizational requirements

4.1 Phases

A space experiment shall be implemented by participants in accordance with the following phases:

a) planning;

b) development;

c) execution;

d) processing of the results and preparation of the final report.

4.2 Participants

The organization and execution of a space experiment shall be the responsibility of the following participants:

a) SE operations manager;

b) SE system designer;

c) SE project manager.

4.3 Simultaneous operations

Several space experiments may be performed simultaneously in the same space system. The decision to combine the experiments shall be made by the SE project manager and shall be subject to agreement by the SE operations manager.

4.4 General modes

Execution of a space experiment in a space system shall be in accordance with the International Standards[1)] in the areas of programme management and safety, specifically ISO 14300-1, ISO 14300-2, ISO 14620-1, and ISO 14620-2.

5 Planning phase

5.1 General

The objective of operations at the planning phase of a space experiment shall be to assess the feasibility of conducting a particular space experiment in a particular space system. The organization of a space experiment shall be achieved through the following steps:

a) preparation of a proposal;

b) preparation of the input data on the space system;

c) preparation of a technical assessment.

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1) Provisions of ISO 14620-3, *Space systems — Safety requirements — Part 3: Flight safety systems*, currently under preparation will also be applicable.

5.2 Proposal

The proposal shall contain sufficient data to allow the project manager to assess the feasibility of implementing a particular space experiment in a particular space system. An example of a proposal for an SE is presented in Annex A.

5.3 Input data requirements

The SE project manager shall prepare the input data associated with the space system for an SE based on the information available in the proposal. The input data shall include the following information:

a) size and mass parameters of the spacecraft into which the SE equipment will be integrated;

b) basic operating conditions;

c) power available on board the spacecraft for powering the SE equipment;

d) characterization of devices for controlling the SE equipment;

e) data handling and transmission;

f) information on the ballistics and the modes of orientation of the spacecraft;

g) on-board maintenance required for the SE equipment;

h) existing space-system restrictions on the SE.

5.4 Technical assessment

5.4.1 General

The technical assessment of the SE shall be prepared by the SE operations manager and the SE system designer, in co-ordination with the SE project manager. The technical assessment shall include the following sections:

a) SE tasks;

b) requirements for SE equipment;

c) requirements for equipment designed to support scientific observations;

d) requirements for ground support for the SE;

e) technical requirements for the carrier space system;

f) responsibilities of the SE participants;

g) scientific and engineering justification for the SE (as an annex to the technical assessment).

5.4.2 SE objectives

This section of the technical assessment shall include information on the subject under study, scope of the study (the type and number of scientific observations), the form(s) of data recording and the data quality during the SE.