
Space systems — Interface control documents between ground systems, ground support equipment and launch vehicle with payload

Systèmes spatiaux — Documents de contrôle d'interface entre les systèmes au sol, l'équipement de soutien au sol et le véhicule de lancement de charge utile

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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.

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 documents 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 17689:2015), which has been technically revised.

The main changes are as follows:

- terms were updated.

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 for application at realization of interstate, intergovernmental or non-governmental space activities, between operators of different countries and organizations on the basis of their space activity contracts.

Interfaced (connected) devices development by two and more designers (commands, organizations, developers of other specializations, etc.) creates a need for coordination between them to prevent interfaces incompatibility, taking into account unlimited possibilities for design (structure) improvement in the course of space systems development.

Interface control documents (ICDs) make it possible to systematically create (develop), operate and manage interfaces (see [Clause 1](#)) at all stages of the life cycle of a launch system. They are necessary in order to ensure the normal functioning of a launch system, prevent accidents and reduce acceptable risks when implementing joint space projects and providing spacecraft launch services. ICD between payload and a launch vehicle is defined in ISO 15863.

Application of this document at design and development stages improves control and compatibility of interfaces (see [Clause 1](#)).

Application of this document at operation stage improves a launch system safety and facilitates control of interfaces.

Interface control documents format defined in this document does not contain the descriptions regarding various properties of ground support equipment (i.e. performance, functions or endurance to launch mechanical environment or quality assurance provisions), which are defined in technical specifications.

Control of interfaces, independently of its frequency or depth, cannot replace stages of parameters definition of high-quality production and development of technical requirements of project, design and development. Interfaces control is used as a control process that can provide necessary verification of successful finishing of design at a stated in contract period.

Space systems — Interface control documents between ground systems, ground support equipment and launch vehicle with payload

1 Scope

This document establishes basic requirements for interface control documents (ICD) writing and interface control procedures for the following items included in the launch system: payload, launch vehicle, ground support equipment (according to ISO 14625) and launch site (buildings with utility systems), specifically:

- a) ICD between the ground support equipment and the payload;
- b) ICD between the ground support equipment and the launch vehicle;
- c) ICD between items of the ground support equipment;
- d) ICD between the ground support equipment and the launch site.

This document is applicable to organizations developing ground support equipment and to operators performing space activity.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

acceptable risk

safety risk, the severity and the probability of which can be reasonably accepted by humanity, without durable or irreversible foreseeable consequence on health, Earth, and the environment, at the present time and in the future

EXAMPLE A safety risk can be acceptable for crew members of a manned space vehicle when it is comparable to that of test pilots, for the personnel participating in hazardous activities when it is comparable to that of industrial workers, for people, public and private property, and the environment when it is comparable to that of other hazardous human activities (e.g. high-speed surface travel).

3.2

accident

undesired event arising from operation of any project-specific items which results in:

- a) human death or injury;
- b) loss of, or damage to, project hardware, software or facilities that can then affect the accomplishment of the mission;

c) loss of, or damage to, public or private property; or

d) detrimental effects on the environment

[SOURCE: ISO 14620-1:2018, 3.1.1, modified — "and" has been changed to "or" at the end of item c); note 1 to entry has been removed.]

3.3

ground support equipment

non-flight systems, equipment or devices necessary to support the operations of transporting, receiving, handling, assembly, inspection, test, checkout, servicing, launch and recovery of a space system at launch, landing or retrieval sites

[SOURCE: ISO 14625:2023, 3.1.5, modified — The abbreviated term "GSE" has been removed.]

3.4

hazard

existing or potential condition that can result in an *accident* (3.2)

[SOURCE: ISO 14623:2003, 2.30]

3.5

ICD for ground support equipment

interface control document for ground support equipment

document which describes mechanical, hydraulic, pneumatic, thermal, electric and other parameters of interfaces between the *ground support equipment* (3.3) and the *launch vehicle* (3.10), items of the ground support equipment, the ground support equipment and *launch site* (3.8) objects (building constructions with technical systems), and which is used to control these parameters

3.6

interfaces controller

specialist in the scope of *launch complexes* (3.7) or organization of space activity which controls interface control document (ICD) observance by organization-executor at realization of contract of space technics creation

Note 1 to entry: Interfaces controllers may be indicated in the contract between the space technics leading developers and executors. The leading developer can let a contract with the interfaces controller.

3.7

launch complex

site assigned to or owned by a *launch vehicle* (3.10) operator to operate a launch vehicle

[SOURCE: ISO 14620-2:2019, 3.9]

3.8

launch site

site necessary for the prelaunch and launch operations of a space vehicle and for the in-flight operations during the launch phase

[SOURCE: ISO 14620-2:2019, 3.11]

3.9

launch system

system made up of a *launch vehicle* (3.10), the associated *launch complex* (3.7), *launch site* (3.8), *payload* (3.11), *ground support equipment* (3.3) and associated airborne equipment (including software), control systems, navigation system, trajectories, procedures, necessary personnel, and any other associated items

[SOURCE: ISO 14620-2:2019, 3.13]

3.10**launch vehicle**

vehicle designed to transport *payloads* (3.11) to space

[SOURCE: EN 16601-00-01:2015, 2.3.127]

3.11**payload**

set of space segment elements (parts of a space system, placed in space, to fulfil the space mission objectives)

Note 1 to entry: A spacecraft payload is a set of instruments or equipment that performs the user mission.

Note 2 to entry: A launcher payload is a set of space segment elements carried into space in accordance with agreed position, time and environmental conditions.

[SOURCE: ISO 10795:2019, 3.165, modified — The abbreviated term "P/L" has been removed.]

4 General

4.1 An ICD for ground support equipment is developed as a separate document for each part included in the launch system: payload, launch vehicle, items of ground support equipment, launch site (building constructions with technical systems):

- a) ICD between the ground support equipment and the payload;
- b) ICD between the ground support equipment and the launch vehicle;
- c) ICD between items of the ground support equipment;
- d) ICD between the ground support equipment and the launch site.

The leading enterprise-developer of the ground support equipment is responsible for the development of a list of ICD for this equipment.

The leading enterprise-developer of a launch site supervises types, quantity, and location of interfaces of ground support equipment items, which are developed by the enterprises according to ICD for the items.

The developers of components of a launch site develop ICD and coordinate them with other enterprises, which are developers of the interface elements.

4.2 When a joint project is implemented by several participants, it is an enterprise, which owns a finished (existing) part or an element of a system, that has an advantage in making a decision about interface structures over participants, which have yet to develop an interface part of a system.

The organization, which provides spacecraft launch services, gives the full information about interfaces of the launch pad to the customer.

An organization, which is responsible for the payload, shall provide the interface status information to the operator.

4.3 The technical specification shall include a record that ICD for an element is available.

Each interface shall have the code, which contains the main information about it.

EXAMPLE 1 ICD XXXX-YYYY-000-AAA – interface code, where:

- XXXX is the source item code;
- YYYY is the consumer item code;

- 000 is the interface number;
- AAA is the code of place where the interface is located.

The interface number is followed by a reference number or code (in brackets), which may indicate the drawing (sheet) where this interface is demonstrated.

EXAMPLE 2 A110-B010-001-005 (A110.08.03.01).

The number of symbols and use of figures and letters in the index should correspond to approved codes in technical specifications.

4.4 ICD may be presented as a text, a picture (drawing), or as a combination (a text and a picture).

A special indicator, like the letter “G”, may be added to the picture (drawing) code (e.g. ICD XXXX-YYYY-000-AAA-G).

The internal ICD is developed when there are many interfaces between elements of the ground support equipment, which need to be controlled.

For simple search, items of the ground support equipment, to which the interface belongs, may be indicated.

4.5 The procedure of ICD preparation is as follows.

Launch site developers shall initiate the process of ICD preparation. The general requirements for an ICD are as follows:

- the ICD provides distribution of work and responsibility between developers;
- the ICD has a hierarchical structure (see [Figure 2](#));
- the ICD directs the control of works of developers during the creation of interfaces.

The scheme of division of the launch site's components is presented in [Figure 1](#). The responsible developers are defined for working out and handing over to codvelopers requirements to interfaces of launch system components.

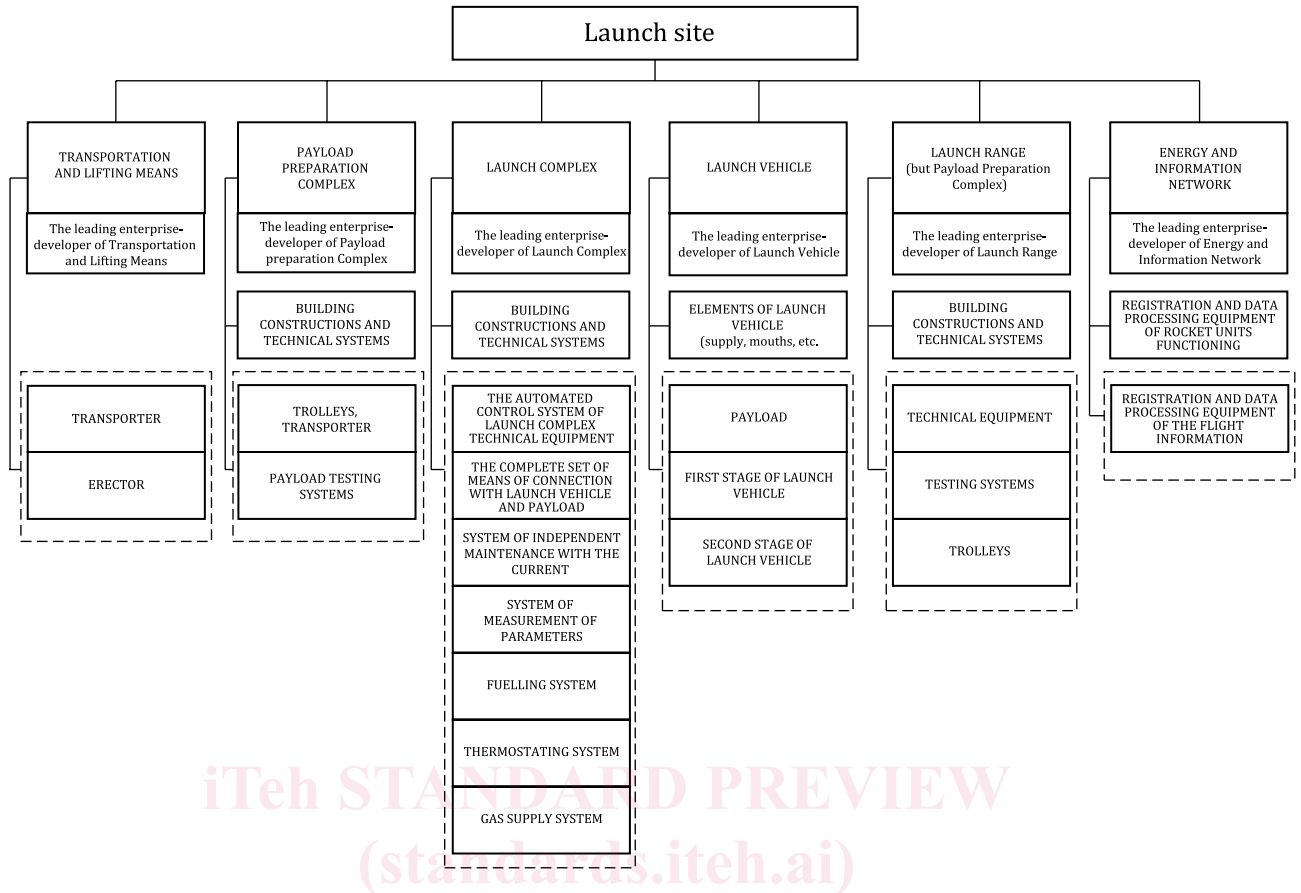


Figure 1 — Example structure of a launch site

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