



**International
Standard**

ISO 11892

**Space systems — Subsystems or
units to spacecraft interface control
document**

*Systèmes spatiaux — Document de contrôle des interfaces entre
les sous-systèmes ou unités et le véhicule spatial*

**Second edition
2024-07**

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Published in Switzerland

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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 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 11892:2012), which has been technically revised.

The main change is as follows:

— removed Clause 6 “Verification”.

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.

Space systems — Subsystems or units to spacecraft interface control document

1 Scope

This document provides space system manufacturing organizations with the minimum interface related items and generic format for creating the interface control document (ICD) which subsystems or units suppliers prepare for spacecraft systems (SC) integrators.

In this document, ICD is not defined to contain descriptions regarding various properties of subsystems or units or tasks to be done by suppliers, i.e. performance, functions, endurance to launch mechanical environment, or quality assurance provisions. Such descriptions are presumed to be defined in other contractual documents such as technical specifications.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 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:

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

3.1.1

subsystem

assembly or group of electrical, thermal and/or mechanical *units* (3.1.3) which is dedicated to specific functions of a spacecraft system (SC)

3.1.2

subsystem to spacecraft ICD

subsystem to spacecraft interface control document

set of documents that defines and controls the electrical, thermal, and mechanical interface requirements between a *subsystem* (3.1.1) and the spacecraft system (SC)

3.1.3

unit

independently handled device at the lowest level of hardware assembly that works with specified complex electrical, thermal and/or mechanical functions

Note 1 to entry: Several units build up a *subsystem* (3.1.1). A single unit may occasionally comprise a subsystem by itself.

3.1.4

unit to spacecraft ICD

unit to spacecraft interface control document

set of documents that defines and controls the electrical, thermal, and mechanical interface requirements between a *unit* (3.1.3) and the spacecraft system (SC)

Note 1 to entry: Figure 1 illustrates the hierarchy of a space system and the ranges where various interface control documents are applicable.

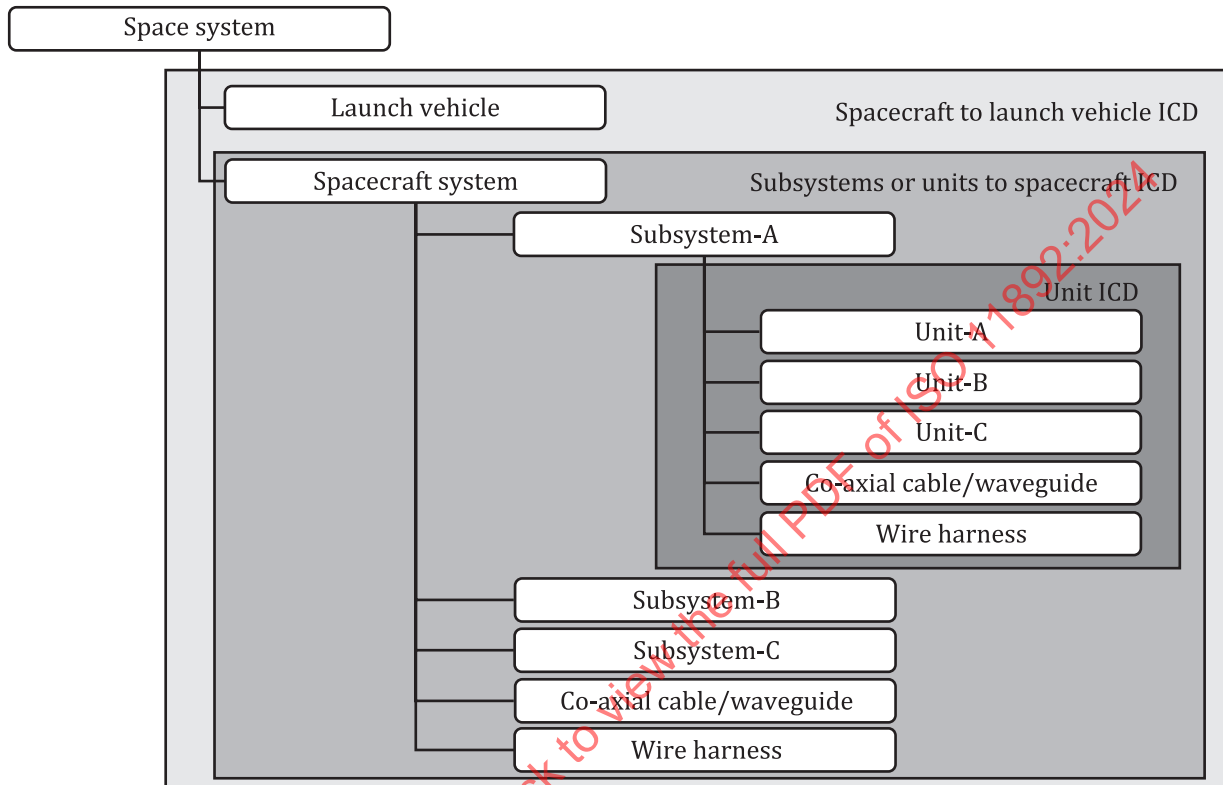


Figure 1 — Hierarchy of a space system and related interface control document (ICD)

3.2 Abbreviated terms

CAD	computer aided design
ICD	interface control document
IDS	interface data sheet
MOI	moment of inertia
RF	radio frequency
RLC	resistor (R), inductor (L), and capacitor (C)

4 Subsystem to spacecraft ICD

4.1 General

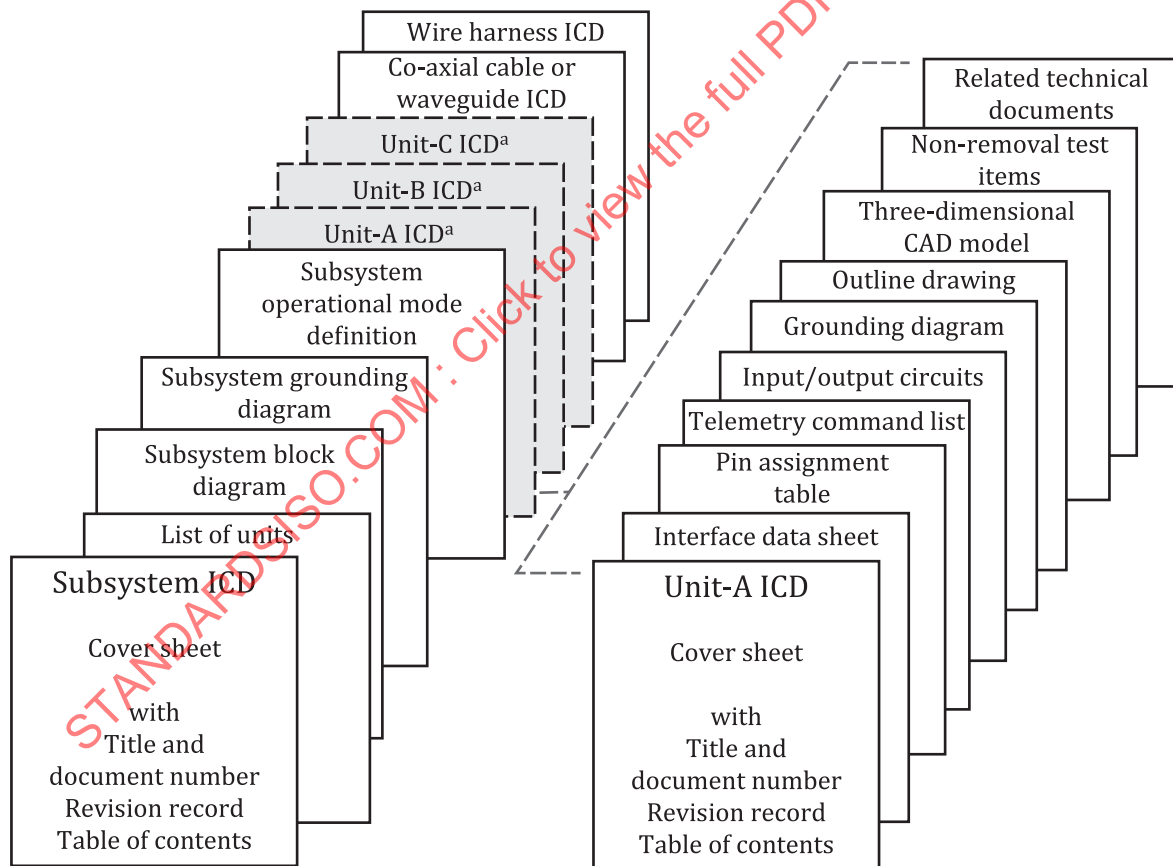
A subsystem ICD is a package constructed of sub-documents as shown in Table 1. It shall contain configuration control information, subsystem definition diagrams, and if applicable, co-axial cable or waveguide or wire

harness in the subsystem. An individual ICD of each unit in the subsystem is normally a separate document. However, it may be contained as part of the subsystem ICD.

Layered construction of a subsystem ICD package is illustrated in [Figure 2](#).

Table 1 — Construction of subsystem to spacecraft ICD package

No	Title	Description (Subclause)
1	Cover sheet (with title and document number, revision record and table of contents)	4.2
2	Applicability	4.3
3	List of units	4.4
4	Subsystem block diagram	4.5
5	Subsystem grounding diagram	4.6
6	Subsystem operational mode definition (if applicable)	4.7
7	Unit ICD (if applicable)	4.8
8	Co-axial cable or waveguide ICD (if applicable)	4.9
9	Wire harness ICD (if applicable)	4.10



^a The individual ICD of each unit may be contained as a part of the subsystem ICD.

Figure 2 — Layered construction of subsystem ICD package

4.2 Cover sheet

4.2.1 Title and document number

The cover sheet of the subsystem ICD shall contain the following items:

- title of the subsystem ICD package;
- document number of the ICD package;
- issue date;
- issuing organization.

4.2.2 Revision record

The revision record shall contain the following items:

- revision number;
- revision date;
- summary of revision contents;
- authorization.

4.2.3 Table of contents

The table of contents shall indicate the name, document number and revision number of the following sub-documents which build up the subsystem ICD:

- list of units;
- subsystem block diagram;
- subsystem grounding diagram;
- subsystem operational mode definition (if applicable);
- unit ICD (if applicable);
- co-axial cable or waveguide ICD (if applicable);
- wire harness ICD (if applicable);
- non-removal test items (if applicable).

4.3 Applicability

The following information shall be addressed in the ICD:

- applicable documents;
- definitions;
- physical units.

4.4 List of units

The list of units shall contain all units included in the subsystem, including the co-axial cable or waveguide and/or wire harness provided to the spacecraft system by the subsystem organization. The list of units shall include the document number and revision record of each unit ICD if it is a separate document.

4.5 Subsystem block diagram

The subsystem block diagram shall graphically indicate the connection and relationship of all of the units included in the subsystem. The subsystem block diagram shall also show the connection and relationship between the subsystem and other relevant subsystems.

4.6 Subsystem grounding diagram

The subsystem grounding diagram shall graphically indicate the grounding and bonding configuration of all the units included in the subsystem.

4.7 Subsystem operational mode definition (if applicable)

The subsystem operational mode definition shall indicate all of the operational modes of the subsystem if applicable.

For this document, "operational mode" is defined as any operational status which has different power consumption or heat dissipation from another status. Operational modes can also be differentiated by mechanical configurations, e.g. before and after deployment.

The definition shall also describe whether transition to the designated mode is caused by the subsystem itself or by a trigger from another subsystem.

4.8 Unit ICD (if applicable)

The unit ICD shall show the interface information of each unit contained in the subsystem. Details are defined in [Clause 5](#).

4.9 Co-axial cable or waveguide ICD (if applicable)

The co-axial cable or waveguide ICD shall show the interface information of the co-axial cable or waveguide connecting the units in the subsystem or connecting the units to other subsystems.

4.10 Wire harness ICD (if applicable)

The wire harness ICD shall show the interface information of the wire harness connecting the units in the subsystem or connecting the units to other subsystems.

5 Unit ICD in detail

5.1 General

A unit ICD is a document package constructed from a sub-document as shown in [Table 2](#).

Table 2 — Construction of unit ICD package

No	Title	Description (Subclause)
1	Cover sheet (with title and document number, revision record and table of contents)	5.2
2	Interface data sheet (IDS)	5.3
3	Pin assignment table	5.4
4	Telemetry command list	5.5
5	Input/output circuits	5.6
6	Grounding diagram	5.7
7	Outline drawing	5.8

Table 2 (continued)

No	Title	Description (Subclause)
8	Three-dimensional CAD model (if applicable)	5.9
9	Non-removal test items (if applicable)	5.10
10	Related technical documents (if applicable)	5.11

5.2 Cover sheet

5.2.1 Title and document number

The cover sheet of a unit ICD shall contain the following items:

- title of the unit ICD package;
- document number and revision of the ICD package;
- issue date;
- issuing organization.

5.2.2 Revision record

The revision record shall contain the following items:

- revision number;
- revision date;
- summary of revision contents;
- authorization.

5.2.3 Table of contents

The table of contents shall indicate the name, document number and revision number of each sub-document which builds up the unit ICD:

- interface data sheet;
- pin assignment table;
- telemetry command list;
- input/output circuits;
- grounding diagram;
- outline drawing;
- photographs (if applicable);
- three-dimensional CAD model (if applicable);
- structure mathematical model (if applicable);
- thermal mathematical model (if applicable);
- appendix.

5.3 Interface data sheet (IDS)

Each interface item shall be given in the standard tabular format. A sample is shown in [Table 3](#).

If the description is expressed with a drawing, figure or separate document, the ID number shall be listed.

Values shall be given with appropriate tolerances reflecting design maturity.

Table 3 — Interface data sheet (IDS) — Example

Name	Full name of the unit		Part number	Part number of the unit
Acronym	Abbreviation of unit name		Revision	Issue of the table
Category	No	Item	Description	Notes
Mechanical	1	Identification	Describe identification marking labelled on the unit. Indicate location of the label.	Refer to drawing
	2	Physical configuration	Indicate the physical configuration with outline dimensions.	In drawing
	3	Dynamic envelope (volume)	Indicate the envelope affected e.g. by vibrations, acoustic influence.	In drawing
	4	External surface finish	Describe surface finish of external surface except for mounting surface.	Refer to drawing
	5	Mounting surface finish	Describe surface finish of mounting surface.	
	6	Mounting surface roughness	Describe roughness of mounting surface.	
	7	Mounting surface flatness	Describe flatness of mounting surface.	
	8	Materials	Describe material of chassis, and connectors if they use non-standard materials.	May refer to declared material list if available
	9	Thickness of mounting foot	Describe the thickness of mounting foot.	Refer to drawing
	10	Key hole location	Indicate the key (datum) hole location.	In drawing
	11	Mounting hole location	Indicate the mounting hole location and quantity.	In drawing
	12	Fastener	Describe the type of fastener.	
	13	Fastener torque	Describe fastener torque with tolerance.	Unit: Nm
	14	Coordination system	Describe the coordination system of the unit.	
	15	Mounting requirement	Describe specific requirements for mounting, e.g. alignment.	
	16	Stiffness	Describe the lowest fundamental natural frequency in mounted configuration, for each axis if required.	Unit: Hz
	17	Mass	Describe mass with tolerance.	Unit: kg
	18	Center of mass location	Indicate the location of centre of mass.	In drawing
	19	Mass properties	Describe product of inertia and moment of inertia (MOI) for each axis through centre of mass with tolerance.	Unit: kg/m ²

Table 3 (continued)

Electrical	20	Radio frequency (RF) input/output connector	Indicate location and ID of RF connectors. Show pin assignment list as defined in Table 4 .	In drawing
	21	Grounding/bonding point	Indicate location of the grounding or bonding point where continuity check will be made.	In drawing
	22	Non-RF input/output connector	Indicate location and ID of non-RF connectors. Show pin assignment list as defined in Table 4 .	In drawing
	23	Operational modes	Describe operational modes defining power consumption and heat dissipation.	
	24	Power consumption	Describe power consumption in each operational mode with tolerance. Provide maximum and minimum values considering input voltage variation and temperature. Indicate time variation, if applicable.	Unit: W Refer to 2D plot for time variation
	25	RF power	Describe RF power in each operational mode with tolerance. Provide maximum and minimum values considering power variation. Indicate time variation if applicable.	Unit: W or W/m ²
Thermal	26	Contact area	Describe mounting surface contact area.	Unit: mm ² Refer to drawing or photograph
	27	Heat dissipation	Describe heat dissipation in each operational mode with tolerance. Provide maximum and minimum values considering input voltage and temperature. Indicate time variation, if applicable. Indicate the different localizations of heat dissipation (e.g. within an RF chain of units).	Unit: W Refer to 2D plot for time variation Refer to figure or drawing for localization
	28	Heat flow rate density	Describe heat flow rate density at mounting interface. Indicate heat spot location in drawing if required.	Unit: W/m ²
	29	Heat capacity	Describe heat capacity of the unit.	Unit: J/°C
	30	Allowable temperature range	Describe allowable temperature range in non-operational, operational, and start up (with qualification and acceptance limits). Describe allowable limits at launch with mechanical loads if applicable.	Unit: °C Refer to separate table if complicated
	31	Allowable temperature transition rate	Describe allowable temperature transition rate.	Unit: °C/min
	32	Temperature reference point	Indicate location where allowable temperature is defined on the unit.	In drawing
	33	Temperature sensor location	Indicate location of temperature sensor(s).	In drawing

Table 3 (continued)

Thermal	34	Temperature sensor type	Describe type of temperature sensor.	
	35	Interface temperature	Define temperature range of the spacecraft structure where unit is mounted. Define requirements for interface temperature stability and interface temperature homogeneity if applicable.	
	36	Emissivity	Describe the emissivity of external finish. Clarify whether value is for hemispherical or normal emissivity. Describe name/reference of the finish, area, temperature variation, ageing (beginning of life/end of life) and specularly.	Refer to separate table Refer to 2D plot, drawing and photograph if applicable.
	37	Absorptivity	Describe the solar absorptivity of external finish, if unit is exposed to space environment. Describe name/reference of the finish, area, temperature variation, ageing (beginning of life/end of life) and specularly.	Refer to separate table Refer to 2D plot, drawing and photograph if applicable.
	38	Active thermal control characteristics	Describe the characteristics of active thermal control, such as thermostat-controlled heaters, thermo electric coolers or cryogenic coolers. Describe temperature stability and homogeneity if applicable.	Refer to drawing, figure or photograph if applicable.
	39	Passive thermal control characteristics	Describe the characteristics of passive thermal control, e.g. multi-layer insulations, thermal insulating fixations, thermal straps. Describe temperature stability and homogeneity if applicable.	Refer to drawing, figure or photograph if applicable.

Table 3 (continued)

Misc.	40	Envelope for deployable portion	Indicate the envelope of the deployable elements of the unit in drawings.	
	41	Deployable characteristics	Describe the dynamic disturbance of the deployable elements.	
	42	Field of view	Indicate the field of view of the unit in drawings.	
	43	Rotor characteristics	Describe the dynamic characteristics of rotating elements, e.g. mass, speed, axis, MOI.	
	44	Structure mathematical model	Indicate the document number if applicable. The model shall be submitted in another package or electronically.	
	45	Thermal mathematical model	Indicate the document number if applicable. The model shall be submitted in another package or electronically.	
	46	Polarity	Describe specific requirements of unit regarding polarity and direction, which shall be managed by the SC integrator — Definition of geometrical axes and directions of attitude sensors, and their relationship with electrical signal polarity; — Definition of geometrical axes and directions of moving element or rotating object, and their relationship with electrical signal characteristics; — Definition of geometrical axes and directions of attitude control actuators, and their relationship with drive signals; — Relationship between switch positions and drive signals.	
	47	Standard signal interface	Define major frame rate and minor frame rate.	
	48	Electromagnetic compatibility	Indicate electrical and magnetic fields within which units stay at their full functional performance.	For particularly sensitive units
	49	Mechanical stay-out zone or authorised zone	Indicate stay-out zone or authorised zone for integration at higher levels of flight/test hardware (e.g. thermal control subsystem components as temperature sensors, heaters or multi-layer insulations).	In drawing

5.4 Pin assignment table

The pin assignment table of RF and non-RF connectors shall show the pin assignment and characteristics of the signals of each connector in the unit. A sample is shown in [Table 4](#).