



**International
Standard**

ISO 20991

**Space systems — Requirements for
small spacecraft**

*Systèmes spatiaux — Exigences relatives aux petits engins
spatiaux*

**First edition
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 first edition cancels and replaces ISO/TS 20991:2018, which has been technically revised.

The main changes are as follows:

- reorganized Introduction and Scope to clarify the target;
- changed the wordings referring to contractual requirement, or legal or statutory requirements in [5.1](#), [5.3.3](#) and [5.5](#);
- changed the wordings to focus on the specification process of the applicable minimum requirements in the project, in [5.1](#), [5.2](#), [5.3.2](#), [5.3.3](#), [5.3.4](#) and [5.3.5](#);
- added [5.10](#) and [5.11](#);
- removed the wording of “In the event of any conflict regarding requirements between ISO 17770 and this document, the requirements in this document supersedes.” from [5.8](#);
- added ISO 17981 as a normative reference.

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

Since 2013, the number of small spacecraft built and launched has shown explosive growth. These small spacecraft are often built by universities, or by newcomers to the space sector, employing untraditional development and management philosophy that manages risks in cost and time effective manner to achieve low-cost and fast-delivery. Because of the risk taking approach, small spacecraft often fails in orbit. But the replacement spacecraft is quickly built and launched reflecting the lessons obtained in the previous spacecraft. As the launch cost depends on either the spacecraft size or mass, or both, the spacecraft size becomes “small”.

These spacecraft projects are usually budget-limited or mass-limited, which makes a single (exclusive) launch unaffordable. Therefore, small spacecraft is very often launched either with a main payload or in a grapple, which implies specific requirements.

Besides requirements regarding mission success or other goals, which are beyond the scope of this document, there are minimum requirements that apply to every small spacecraft regardless of its size, mission, value, capability or any other nature. The purpose of this document is to clearly state those minimum requirements. In that sense, this document serves as the top document to cover the minimum requirements for various stages of small spacecraft system life-cycle – with emphasis on design, launch, deployment, operation, and disposal phases. In this way, the following aspects are ensured:

- a) safety;
- b) harmlessness to co-passengers and launch vehicle;
- c) debris mitigation.

This document provides references to existing standards and documents that elaborate on those requirements, especially for the benefit of those who are entering the space sector through small spacecraft development and utilization.

Space systems — Requirements for small spacecraft

1 Scope

This document describes minimum requirements for small spacecraft.

This document covers different categories of small spacecraft – so-called mini-, micro-, nano-, pico- and femto-, as well as CubeSat, spacecraft. Therefore, for the sake of convenience, the term “small spacecraft” is used throughout this document as a generic term.

This document can be applied by small spacecraft developers, as well as dispenser providers and launch operators.

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 26869, *Space systems — Small-auxiliary-spacecraft (SASC)-to- launch- vehicle interface control document*

ISO 17770, *Space systems — Cube satellites (CubeSats)*

ISO 19683, *Space systems — Design qualification and acceptance tests of small spacecraft and units*

ISO 24113, *Space systems — Space debris mitigation requirements*

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

ISO 17981, *Space systems — Cube satellite (CubeSat) interface*

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

CubeSat

picosatellite measuring 100 mm cubic and weighting 1,33 kg or less

[SOURCE: ISO 17770:2017, 3.1, modified — Note 1 to entry has been removed.]

3.2

deployer

box that encloses *CubeSats* (3.1) within a confined volume with a lid at one side that closes the ejection port during the launch phase

EXAMPLE POD (picosatellite orbital deployer).

[SOURCE: ISO 17770:2017, 3.2, modified — "box that" has been added; note 1 to entry has been removed; EXAMPLE has been added.]