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BS ISO 24113:2011



BSI Standards Publication

Space systems — Space debris mitigation requirements

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This British Standard is the UK implementation of ISO 24113:2011.

Growth in the volume of space debris is of major international concern. The aim of ISO 24113 is to reduce this growth by setting out high level debris mitigation measures applicable to all elements of unmanned systems launched into, or passing through, near-Earth space, including launch vehicle orbital stages, operating spacecraft and any objects released as part of normal operations or disposal actions. These internationally agreed measures are derived from and are consistent with broader space debris mitigation guidelines published by organizations such as the Inter Agency Space Debris Coordination Committee (IADC) and the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

Global agreement that the growth in space debris needs to be reduced, and international consensus on the measures contained in ISO 24113 and associated lower level standards, offer a basis for a globally consistent approach to space debris mitigation. Measures for the mitigation of space debris can be adopted voluntarily, or be brought into effect through commercial contract, or incorporated as a condition in National regulation.

UK nationals and entities incorporated in the UK which launch, procure the launch or operate a space object or undertake any other activity in outer space must be licensed under the Outer Space Act 1986 (OSA). Before issuing a licence, the licensing authority – currently the UK Space Agency – assesses if the proposed space activity conforms to international treaties (e.g. the requirements on liability and registration) and other applicable laws and regulations. A safety evaluation is required by the UK Space Agency before issuing a licence. The safety evaluation aims to determine whether a licence applicant can safely conduct the launch, operation and disposal of a space system. In particular, the evaluation seeks to assess whether an applicant can demonstrate a clear understanding of the hazards involved, and that an appropriate risk management regime exists to limit those hazards. This is necessary to ensure that the activity will not jeopardize public health or the safety of persons or property.

The assessment carried out by the UK Space Agency also considers whether the proposed activity is compliant with international guidelines such as those relating to space debris mitigation. ISO 24113 and associated ISO debris mitigation standards provide implementable and verifiable requirements that can be used by UK nationals or entities to demonstrate compliance with the broader debris mitigation guidelines mentioned above.

As the implementation of debris mitigation measures can have a significant impact on the design and operation of space systems and consequently mission cost, it is clearly in the interest of those applying for a licence to confirm, at an early stage, which debris mitigation measures apply to their specific space system and with which the applicant must demonstrate compliance. ISO 24113 can be used as a basis for such an assessment by the UK Space Agency prior to granting an applicant a licence pursuant to the OSA.

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Technical Committee AEL/00/75, Space systems and operations
- Operations and Ground Support.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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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 24113 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 24113:2010), of which it constitutes a minor revision.

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Introduction

Space debris comprises all non-functional, man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the Earth's atmosphere. The growing population of these objects poses an increasing hazard to missions. In response to this problem, there is international consensus that space activities need to be managed to minimize debris generation and risk. This consensus is embodied in space debris mitigation guidelines published by organizations such as the International Telecommunication Union (ITU)^[1], the Inter-Agency Space Debris Coordination Committee (IADC)^{[2][3]} and the United Nations (UN)^[4]. The transformation of debris mitigation guidelines into engineering practice is a key purpose of this International Standard.

The importance of this International Standard can be seen within the context of four UN treaties^[5] that were established under the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) to govern the involvement of nations in space activities. These are the *Outer Space Treaty*, the *Liability Convention*, the *Registration Convention* and the *Rescue Agreement*. Through some of these treaties, a Launching State has total liability for damage caused by its spacecraft or launch vehicle orbital stages (or any parts thereof) on the surface of the Earth or to aircraft in flight, as well as in outer space where fault can be proven.

All countries are encouraged to abide by these international agreements in order not to endanger or constrain existing and future space missions. A Launching State can choose to appoint licensing or regulatory authorities to administer its approach for complying with the above-mentioned UN treaties. In several Launching States, these authorities have implemented national legislation to enforce the UN treaties. Such legislation can include the mitigation of space debris. Some Launching States meet their obligations by appointing non-regulatory government bodies, such as national space agencies, to provide the necessary guidelines or requirements, including those for space debris mitigation.

The general aim of space debris mitigation is to reduce the growth of space debris by ensuring that spacecraft and launch vehicle orbital stages are designed, operated and disposed of in a manner that prevents them from generating debris throughout their orbital lifetime. This is achieved by the following actions:

- a) avoiding the intentional release of space debris into Earth orbit during normal operations;
- b) avoiding break-ups in Earth orbit;
- c) removing spacecraft and launch vehicle orbital stages from protected orbital regions after end of mission;
- d) performing the necessary actions to minimize the risk of collision with other space objects.

Such actions are especially important for a spacecraft or launch vehicle orbital stage that has one or more of the following characteristics:

- a large collision cross-section;
- remains in orbit for many years;
- operates near manned mission orbital regions;
- operates in highly utilized regions, such as protected regions;
- operates in regions of high debris population.

This International Standard transforms these objectives into a set of high-level debris mitigation requirements. Methods and processes to enable compliance with these requirements are provided in a series of lower-level implementation standards.

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Space systems — Space debris mitigation requirements

1 Scope

This International Standard defines the primary space debris mitigation requirements applicable to all elements of unmanned systems launched into, or passing through, near-Earth space, including launch vehicle orbital stages, operating spacecraft and any objects released as part of normal operations or disposal actions.

The requirements contained in this International Standard are intended to reduce the growth of space debris by ensuring that spacecraft and launch vehicle orbital stages are designed, operated and disposed of in a manner that prevents them from generating debris throughout their orbital lifetime.

This International Standard is the top-level standard in a family of standards addressing debris mitigation. It will be the main interface for the user, bridging between the primary debris mitigation requirements and the lower-level implementation standards that will ensure compliance.

This International Standard does not cover launch phase safety for which specific rules are defined elsewhere.

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 9000:2005, *Quality management systems — Fundamentals and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000:2005 and the following apply.

3.1

approving agent

entity from whom approval is sought for the implementation of space debris mitigation requirements with respect to the procurement of a spacecraft, or its launch, or its operations in space, or a combination of those activities

EXAMPLE Regulatory or licensing authorities; national or international space agencies.

3.2

break-up

event that destroys an object and generates fragments that are released into space

3.3

casualty risk

probability that a person is killed or seriously injured