INTERNATIONAL STANDARD

ISO 24330

First edition
2022-07

Space systems — Rendezvous and Proximity Operations (RPO) and On Orbit Servicing (OOS) — Programmatic principles and practices

Systèmes spatiaux — Opérations de proximité et de rendez-vous et services sur orbite — Principes et pratiques programmatiques

Reference number
ISO 24330:2022(E)

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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 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

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 outlines the principles and practices that rendezvous and proximity operations and on-orbit servicing (RPO/OOS) service providers are expected to follow in order to ensure safe operations and to encourage a healthy RPO/OOS industry. International law, treaties, and agreements have been researched for compliance and reference. If additional, more specific requirements are needed for Human Spaceflight (HSF) these can be provided in the future.

This document is intended to be the highest-level standard for the discipline of RPO/OOS for spacecraft systems. As such, there are several places in the document where a requirement is stated, but alternative acceptable methods of verification of compliance exist. Examples include but are not limited to: notification of authorities (4.2.2); certifications of design or operational procedures (5.1.1, 5.1.2, 5.1.3). Clauses 4 and 5 specify programmatic principles and operational practices respectively. Annex A contains information related to Clause 4 (A.1) and Clause 5 (A.2). Annex B outlines notional RPO/OOS mission phases.

Initial drafts were produced by the Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) team, an international team of 26 initial companies promoting standardization for RPO/OOS missions to improve safety and promote development of the RPO/OOS industry. Work was performed over a period of 18 months at six international workshops in the US and Germany. With this issue, the draft has been handed over to ISO TC 20/SC 14 for vetting and processing with the normal ISO standardization processes. In the further development within ISO, parallel commercial and governmental RPO/OOS efforts have contributed to the consensus requirements herein.

CONFERS is an independent, self-sustaining forum created to advocate and promote the spacecraft servicing industry and encourage responsible commercial RPO/OOS. CONFERS collaborates on research, development, and publication of voluntary consensus principles, best practices, and technical and safety standards. CONFERS also engages with national governments and international bodies on policy and oversight of spacecraft servicing activities.

Space systems — Rendezvous and Proximity Operations (RPO) and On Orbit Servicing (OOS) — Programmatic principles and practices

1 Scope

This document establishes guiding principles and best practices at the programmatic level for all participants in the rendezvous and proximity operations (RPO) and on-orbit servicing (OOS) industry. These principles and practices establish the broadest boundaries for behaviour of participants in the RPO/OOS industry and precede more detailed standards. In principle, the document also covers both robotic and HSF missions, but requirements are derived from robotic missions.

This document is applicable to a broad array of RPO/OOS industry participants from spacecraft equipment manufacturers, spacecraft operators, service providers, developers of RPO/OOS simulation, planning and safety tools, and insurers. It helps to establish responsible norms of behaviour for RPO and OOS that industry participants are supposed to achieve and to promote throughout the global industry.

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 23312, *Space Systems — Detailed space debris mitigation requirements for spacecraft*

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

ISO 27875, *Space systems — Re-entry risk management for unmanned spacecraft and launch vehicle orbital stages*

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
capture
act of establishing a connection between two space objects

3.2
client
organization contracting for the service

3.3
proximity operations control volume
control volume
operations zone
volume of space established for non-interference and to assure relative navigation control while the *servicer spacecraft* (3.15) and *client* (3.2) space object are within close proximity