BS ISO 21740:2025

BSI Standards Publication

Space systems — Launch window estimation and collision avoidance

Documents
Document Sharing Hub

Full document details: BS ISO 21740:2025

National foreword

This British Standard is the UK implementation of ISO 21740:2025.

The UK participation in its preparation was entrusted to Technical Committee ACE/68, Space systems and operations.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2025
Published by BSI Standards Limited 2025

ISBN 978 0 539 27940 5

ICS 49.140

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2025.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO 21740:2025

International Standard

ISO 21740

Space systems — Launch window estimation and collision avoidance

Systèmes spatiaux — Estimation de la fenêtre de lancement et évitement des collisions

First edition
2025-07

Reference number
ISO 21740:2025(en)

© ISO 2025

Documents
Document Sharing Hub

Full document details: BS ISO 21740:2025

COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

Documents
Document Sharing Hub
Full document details: BS ISO 21740:2025

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative reference ... **1**
3 Terms and definitions ... **1**
4 Abbreviated terms ... **3**
5 Safety LCOLA requirements ... **3**
5.1 Conduct of a safety LCOLA ... 3
5.1.1 General ... 3
5.1.2 Launch vehicle stage(s) and deployed object(s) trajectories ... 4
5.1.3 Inhabitable vehicle ephemerides ... 4
5.2 Close encounter check for a safety LCOLA ... 4
5.3 Safety LCOLA launch hold criteria ... 5
5.4 Safety LCOLA screening timespan ... 5
5.5 LCOLA analysis run timing sequence ... 6
5.6 LCOLA standoff threshold ... 6
5.7 LCOLA standoff minimum threshold ... 6
6 LCOLA product ... **7**
Annex A (informative) **LCOLA analysis challenges and methodologies** ... **8**
Annex B (informative) **Mission assurance LCOLA assessment** ... **15**
Annex C (informative) **LCOLA survey** ... **17**
Bibliography ... **20**

© ISO 2025 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 21740:2025

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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.

© ISO 2025 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 21740:2025

Introduction

0.1 Overview

Human-inhabited and inhabitable space stations and space capsules are exposed to the risk of collision with new launch vehicle stage(s) and spacecraft during their launch and early orbit phase. While such collision threats also exist during on-orbit spacecraft operations, the launch and early orbit phase is unique in that potential collisions with inhabitable space stations and space capsules can be avoided at minimal cost (i.e. without the expenditure of on-orbit manoeuvring fuel) through the proper selection of suitable launch times.

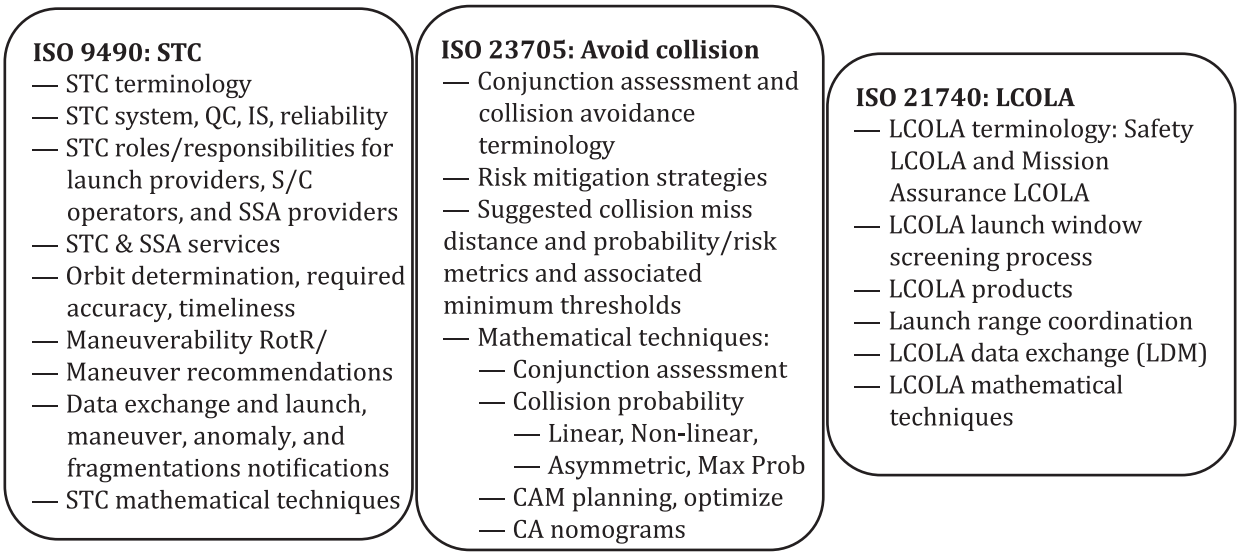
Consistent with Clause B.5 of the United Nations Long Term Sustainability guidelines[1] and to protect human missions from the danger of collision with newly launched objects, the LCOLA approving agent may apply launch collision avoidance (LCOLA) methods to assess either collision risk, close approach, or both. If this assessment determines that launch at certain times would incur unacceptable risk to the human missions, the LCOLA approving agent may delay the time of launch.

In addition to establishing requirements for the safety LCOLA process, Annex A provides details on algorithms, processes, and screening criteria that may be used to conduct safety LCOLA assessments. Annex A is intended to ensure the safety and integrity of human-inhabited or inhabitable space stations.

Annex B provides additional details on algorithms, processes, and screening criteria that may be used to conduct mission assurance LCOLA assessments. Annex B is intended to ensure the safety and integrity of both the newly launched space objects and any on-orbit active spacecraft that can potentially collide with the launched objects for the initial LCOLA screening time period, and also to reduce the risk of unintended fragmentation events caused by collision of the newly launched space objects with orbital debris during that same initial screening period. A selection of general procedures for the determination of unacceptable risk that result in the identification of all collision-safe launch opportunities is described.

0.2 Breakdown of space safety constituents across ISO standards

The space flight safety-relevant topics of space traffic coordination (STC), on-orbit collision avoidance, and launch collision avoidance are closely related. To minimize duplication and maximize document consistency, the various content that serve as the basis for these three disciplines has been divided up as shown in Figure 1.



NOTE ISO 9490 and ISO 23705 are under development.

Figure 1 — Division of space safety operations content spanning several ISO standards

© ISO 2025 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 21740:2025

Documents
Document Sharing Hub

Space systems — Launch window estimation and collision avoidance

1 Scope

This document establishes the general safety launch collision avoidance (safety LCOLA) requirements for the avoidance of collision between the collection of newly launched objects resulting from a space launch [including launch vehicle stage(s) and payloads or released objects] and human-inhabited or human-habitable space stations and space vehicles.

The document specifies the requirements for the analysis of launch times and procedures for identifying safe launch opportunities. It also describes the assessment and constraints for collision avoidance risk evaluation metrics (launch collision probability and standoff distance).

2 Normative reference

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
conjunction
event where the positional separation between two objects is at a local minimum and that minimum is either closer than a specified minimum distance threshold, or the estimated probability of collision at this local minimum exceeds a specified *launch collision probability* (3.5) threshold

3.2
integrated LCOLA
integrated launch collision avoidance
composite *launch window* (3.9) stemming from the combination of *safety LCOLA* (3.15) and *mission assurance LCOLA* (3.13) analyses

3.3
miss distance
minimum approach distance between a launching body and an orbiting body at their closest approach point

3.4
launch collision avoidance
LCOLA
process of mitigating the risk of collision between the newly launched objects resulting from a space launch and any space objects in their paths

© ISO 2025 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 21740:2025