International Standard

ISO 14622

Space systems — Structural design — Loads and induced environment

Systèmes spatiaux — Conception des structures — Charges et environnement induit

Second edition
2025-04

Reference number
ISO 14622:2025(en)

© ISO 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

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Determination of loads and the induced environment **4**
4.1 General input data 4
4.1.1 System inputs 4
4.1.2 Excitation sources 5
4.2 Determination of loading conditions 6
4.2.1 General 6
4.2.2 Types of loads 6
4.2.3 Mechanical loads 6
4.2.4 Pressure 7
4.2.5 Thermal loads 7
4.2.6 Load cases 7
4.3 Safety factors 8
4.4 Design load cases 9
Bibliography **10**

© ISO 2025 – All rights reserved

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).

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*.

This second edition cancels and replaces the first edition (ISO 14622:2000), which has been technically revised.

The main changes are as follows:

— updates of the terms and definitions to harmonize with the other structural-related ISO documents,

— clarifications on the value of safety factors,

— A bibliography has been added.

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

Introduction

The structures of a space system have to be designed in such a way that the capacity to fulfil the mission is ensured. During the different phases of the service life, structures are indeed submitted to a number of mechanical and/or thermal loads which may damage materials with a number of possible consequences:

— permanent deformation that may prevent the successive operation of a mechanical function,

— rupture of secondary structures which may indirectly endanger the mission (malfunction and/or release of dangerous debris),

— rupture of primary structures which directly lead to the loss of the mission.

The probability of such events has to be reduced to an acceptable level.

This is why the identification of the different loads both in terms of nature and intensity is of primary importance.

In the early developments of aeronautics, aircrafts were sized against a static force equivalent to a multiple of the gravity. This situation has soon changed to use estimations and measurements of the different loads. Nowadays, simulations of the different physics involved allows getting accurate assessments of the main loads and the corresponding statistical distribution.

This document describes the different types of load sources and the principle of the deterministic sizing, where safety of factors are applied on the loads.

© ISO 2025 – All rights reserved

Space systems — Structural design — Loads and induced environment

1 Scope

This document defines the principles used to determine loads and the induced environment during the service life of a space system and its components, taking account of the notions of probability, combined loads, corresponding safety factors and life cycle.

2 Normative references

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
authority
organization, institution or company responsible for the management of the development of a *space system* (3.13)

3.2
dynamic load
time-dependent load with deterministic or stochastic variation

3.3
environment
combination of thermal and acoustic fields applied on a structure and which, together with loads and pressure, define the mechanical condition of the structure

Note 1 to entry: Humidity and chemical conditions are not considered in this context but should be considered for the choice of material and or surface protection.

Note 2 to entry: Shocks are considered as loads and are thus not part of the environment.

[SOURCE: ISO 10786:2011, 3.18]

3.4
hydrostatic pressure
pressure at a level below the liquid level in the tank, which is induced by the height of liquid above this level, plus quasi-static accelerations

3.5
launch vehicle
vehicle designed to transport payloads to space

[SOURCE: ISO 10795:2019, 3.139, modified — The preferred term "launcher" has been removed.]

© ISO 2025 – All rights reserved