Draft for Public Comment

Form 36

DPC: 24/30461706 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000
Fax: +44 (0)20 8996 7400
www.bsigroup.com

Date: 13 June 2024
Origin: International

Latest date for receipt of comments: 06 August 2024

Project No. 2022/01987

Responsible committee: ACE/68 Space systems and operations

Interested committees:

Title: Draft BS ISO 10785 Space systems — Bellows —Design and operation.

Please notify admin.start@bsigroup.com if you are aware of any keywords that might assist in clarifying or identifying the standard or of the content of this standard:

i) has any issues related to 3rd party IPR, patent or copyright
ii) affects other national standard(s)
iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 06 August 2024

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop http://shop.bsigroup.com or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from https://standardsdevelopment.bsigroup.com/.

Documents
Document Sharing Hub

Full document details: 24/30461706 DC

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at **https://standardsdevelopment.bsigroup.com/**. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex **(e.g. 3.1)**	Paragraph/ Figure/Table/Note	**Type of comment**	**Commend (justification for change) by the MB**	**Proposed change by the MB**	**Secretariat observations on each comment submitted**
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

Documents
Document Sharing Hub

Full document details: 24/30461706 DC

DRAFT International Standard

ISO/DIS 10785

Space systems — Bellows — Design and operation

Systèmes spatiaux — Souffleries — Conception et fonctionnement

ICS: ISO ics

ISO/TC **20**/SC **14**

Secretariat: **ANSI**

Voting begins on:
2024-06-13

Voting terminates on:
2024-09-05

This document is circulated as received from the committee secretariat.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENTS AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

Reference number
ISO/DIS 10785:2024(en)

© ISO 2024

Documents
Document Sharing Hub

Full document details: 24/30461706 DC

COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

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: 24/30461706 DC

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Abbreviated terms ... **8**
5 Requirements ... **9**
5.1 General ... 9
5.2 Design requirements ... 9
5.2.1 Loads, pressures, and environments ... 9
5.2.2 Strength ... 9
5.2.3 Stiffness ... 9
5.2.4 Thermal effects ... 10
5.2.5 Stress analysis ... 10
5.2.6 LBB failure modes ... 10
5.2.7 Fatigue life ... 11
5.2.8 Leakage ... 11
5.2.9 Damage tolerance (safe life) ... 11
5.2.10 Miscellaneous ... 11
5.3 Material requirements ... 12
5.3.1 Material selection ... 12
5.3.2 Material evaluation ... 12
5.3.3 Material characterization ... 12
5.4 Fabrication and process control requirements ... 12
5.4.1 Introduction ... 12
5.4.2 Contamination control and cleanliness requirements ... 13
5.5 Quality assurance requirements ... 13
5.5.1 Quality assurance programme ... 13
5.5.2 Inspection plan ... 13
5.5.3 Inspection techniques ... 13
5.5.4 Inspection data ... 13
5.5.5 Acceptance test requirements ... 13
5.6 Operation and maintenance requirements ... 14
5.6.1 Operating procedures ... 14
5.6.2 Safe operating limit ... 14
5.6.3 Inspection and maintenance ... 15
5.6.4 Repair and refurbishment ... 15
5.6.5 Storage ... 15
5.6.6 Documentation ... 15
5.6.7 Reactivation ... 15
5.7 Specific qualification test requirements ... 16
Annex A (informative) **Design safety factors** ... **17**
Bibliography ... **18**

© ISO 2024 – All rights reserved

Documents
Document Sharing Hub
Full document details: 24/30461706 DC

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*.

This second edition cancels and replaces the first edition (ISO 10785:2011), which has been technically revised.

The main changes are as follows:

— Incorporated accepted comments from the Systematic Review of ISO 10785:2011

— Clarification of the scope

— Updates for the normative references and the citations from the normative sections.

— Updates for the terms and definitions to harmonize with the other ISO structural related standards.

— Requirement harmonization with ISO 24638 and ISO 21347.

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 2024 – All rights reserved

Documents
Document Sharing Hub
Full document details: 24/30461706 DC

Introduction

The bellows for space systems is usually used under severe conditions, such as high pressure, extremely low temperatures, large deflection, or high inner flow speed. The design safety factor of the bellows tends to be small to satisfy two different function requirements simultaneously. One is the function of the pressure bearing component, which all pressure components have, and the other is the special function to accommodate installation misalignment, thermal expansion or contraction and displacement induced by large deformation of the pressurized propellant tank.

There are many items to be considered for design and manufacture such as hoop stress, bulging stress, buckling strength, flow-induced vibration, and cyclic deflection.

This document establishes general and specific requirements for bellows to provide safe and reliable bellows hardware and operations.

Some examples of the design safety factors are shown in Annex A at the end of this document.

© ISO 2024 – All rights reserved

Documents
Document Sharing Hub
Full document details: 24/30461706 DC

Documents
Document Sharing Hub