
**Furniture — Chairs and stools —
Determination of strength and
durability**

*Ameublement — Chaises et tabourets — Détermination de la
résistance et de la durabilité*



This document is a preview generated by ELS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

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	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General test conditions	3
4.1 Preliminary preparation	3
4.2 Application of forces	3
4.3 Tolerances	3
5 Test equipment and apparatus	4
5.1 General	4
5.2 Seat loading point template	4
5.3 Floor	7
5.4 Stops	7
5.5 Seat loading pad	7
5.6 Smaller seat loading pad	7
5.7 Back loading pad	8
5.8 Local loading pad	8
5.9 Foam for use with loading pads	8
5.10 Seat impactor	8
5.10.1 General	8
5.10.2 Circular body	8
5.10.3 Springs	9
5.10.4 Striking surface	9
5.11 Impact hammer	9
5.12 Armrest durability test apparatus	10
5.13 Test surface for castor testing	11
5.14 Front load locator device	11
5.15 Loading discs	11
6 Test procedures – Seating other than work chairs	11
6.1 General	11
6.2 Determination of seat and back loading points	12
6.2.1 General	12
6.2.2 Seating with a backrest	12
6.2.3 Seating without a backrest	12
6.3 Determination of angle of backrest inclination	13
6.4 Seat static load and backrest static load test	14
6.4.1 General	14
6.4.2 Seating with rocking runners	15
6.5 Seat front edge static load test	16
6.6 Vertical load test on backrests	16
6.7 Horizontal forward static load test on backrests	17
6.8 Footrest static load test	17
6.9 Apply a vertical force by means of the local loading pad (5.8) — Legrest static load test	18
6.10 Armrest sideways static load test	18
6.11 Arm rest downwards static load test	19
6.12 Headrest static load test	20
6.13 Vertical upwards static load test on armrests	20
6.13.1 Seating which can be moved when occupied	20
6.13.2 Stacking seating	20
6.14 Vertical static load test on auxiliary writing surfaces	20
6.15 Leg forward static load test	20

6.16	Leg sideways static load test.....	22
6.17	Combined seat and backrest durability test.....	23
6.17.1	General.....	23
6.17.2	Seating with rocking runners.....	24
6.18	Seat front edge durability test.....	26
6.19	Durability test on outdoor seating with a multi-position backrest.....	27
6.20	Armrest durability test.....	28
6.21	Footrest durability test.....	28
6.22	Auxiliary writing surfaces durability test.....	28
6.23	Tipping seat operation test.....	28
6.24	Seat impact test.....	29
6.25	Backrest impact test.....	29
6.26	Armrest impact test.....	30
6.27	Drop tests.....	31
6.27.1	Drop test for multiple seat units.....	31
6.27.2	Drop test for stacking seating.....	32
6.27.3	Drop test from the height of a table.....	33
6.28	Backward fall test.....	33
6.29	Castor and chair base durability test.....	34
6.29.1	Castor and chair base durability test for chairs with castors on all legs.....	34
6.29.2	Castor and chair base durability test for chairs with castor and glide combinations.....	34
6.30	Rolling resistance test of the unloaded chair.....	34
6.31	Seat side-to-side durability test in D-G points for single column seating.....	34
6.31.1	General.....	34
6.31.2	Loading points.....	34
7	Test procedures – Work chairs.....	35
7.1	General.....	35
7.2	Loading points.....	37
7.2.1	General.....	37
7.2.2	Loading point A.....	37
7.2.3	Loading point B.....	37
7.2.4	Loading point C.....	37
7.2.5	Loading point D.....	37
7.2.6	Loading point E.....	37
7.2.7	Loading point F.....	37
7.2.8	Loading point G.....	37
7.2.9	Loading point H.....	37
7.2.10	Loading point J.....	37
7.3	Combined seat and backrest static load test.....	39
7.4	Seat front edge static load test.....	39
7.5	Armrest downward static load test – central.....	39
7.6	Armrest downward static load test – front.....	40
7.7	Armrest sideways static load test.....	40
7.8	Footrest static load test.....	40
7.9	Seat and backrest durability test.....	41
7.10	Armrest durability test.....	42
7.11	Swivel test.....	42
7.12	Footrest durability test.....	42
7.13	Castor and chair base durability test.....	42
7.14	Rolling resistance test of the unloaded chair.....	42
8	Test procedures – Loungers.....	42
8.1	General.....	42
8.2	Seat and backrest static load test.....	43
8.3	Additional seat and legrest static load test.....	43
8.4	Seat and backrest durability test.....	44
8.4.1	Seat and backrest durability test procedure.....	44

8.4.2	Additional seat durability test procedure	44
8.5	Durability test on backrest mechanism	45
8.6	Armrest downwards static load test	45
8.7	Armrest durability test	45
8.8	Impact test	45
8.9	Lifting test for mobile loungers	47
9	Test report	47
Annex A (normative)	Seat loading pad data	48
Annex B (informative)	Armrest loading pad details	51
Annex C (normative)	Front load locator device (5.14)	52
Annex D (informative)	Purpose and applicability of test methods	57
Annex E (informative)	Suggested loads and cycles	62
Annex F (informative)	Example construction of front load locator device	68
Bibliography		70

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 136, *Furniture*.

This second edition cancels and replaces the first edition (ISO 7173:1989), which has been technically revised.

The main changes are as follows:

- the scope has been revised;
- terms and definitions were added;
- test methods for work chairs and seating other than work chairs were added;
- new Annexes were 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.

Furniture — Chairs and stools — Determination of strength and durability

1 Scope

This document specifies test methods for the determination of strength and durability of the structure of all types of seating without specific regard to end use, materials, design/construction or manufacturing process.

This document does not apply to children's highchairs, table mounted chairs and bath seats.

Test methods for the assessment of ageing, degradation, ergonomics and electrical functions are not included.

The test methods are not intended to assess the durability of upholstery materials.

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 48-4, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 4: Indentation hardness by durometer method (Shore hardness)*

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 structure

load bearing parts of furniture such as the frame, seat, backrest and arm supports and suspension

3.2 legrest

extension of the seat area intended to support the legs of the user

Note 1 to entry: A legrest can or cannot be permanently attached to the structure of the item of seating and may not be suitable for use as an item of seating itself.

3.3 footrest

extension of the seat area, whether attached or not to the structure of the item of seating, intended to support the feet of the user