BS 8474:2013

BSI Standards Publication

Furniture – Chairs with electrically operated support surfaces – Requirements

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 12, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 July 2013. It was prepared by Subcommittee FW/0/2, *Domestic and contract furniture*, under the authority of Technical Committee FW/0, *Furniture*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 8474:2006, which is withdrawn.

Information about this document

This is a full revision of the standard and incorporates the following principle changes.

a) The standard now specifies performance requirements for chairs suitable for users weighing up to 110 kg and up to 160 kg.

b) Requirements regarding shear and squeeze points are not specified. Instead, a motion lockout control is specified that can be operated by the user or a responsible person to prevent unintended movement of the chair.

The requirements of this standard are based on tests intended to reproduce normal use and common types of misuse to which chairs with electrically operated support surfaces could be subjected. However, the tests do not reproduce any abuse to which the chair might be subjected.

Manufacturers and importers of chairs with electrically operated support surfaces should be aware that if any part of the marketing of their products can be interpreted as claiming that a product is:

> "intended by the manufacturer to be used for human beings for the purpose of:
>
> - treatment or alleviation of disease;
> - treatment, alleviation of or compensation for an injury or handicap;"

such chairs might be considered to be medical devices and therefore subject to the provisions of EC Directive 93/42/EEC (the Medical Devices Directive) [1].

All aspects of marketing may be considered when deciding if a product is a medical device, including point of sale claims. Manufacturers who do not have control over claims made at the point of sale are advised to consider whether they should take legal advice regarding their position.

Hazard warnings

WARNING. This British Standard calls for the use of procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

In particular, attention is drawn to the following specific regulations:

- The Furniture and Furnishings (Fire) (Safety) Regulations 1988 (as amended) [2];
- The Electrical Equipment (Safety) Regulations 1994 [3].

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1 Scope

This British Standard specifies requirements and test methods for chairs with support surfaces the position of which can be adjusted electrically by the seated person and/or a responsible person, including riser chairs, recliner chairs and rise and recline chairs. It specifies chairs suitable for adult users weighing up to 110 kg and up to 160 kg, with a normal body mass distribution. The standard is applicable to single and multiple seating units.

In the text of this standard the term "chairs" is used to refer to chairs with electrically operated support surfaces. The term "chairs" also refers to multiple seating units.

The standard is applicable to chairs intended for domestic and non-domestic use.

This standard specifies only the safety, strength, stability and durability of the chair structure. It does not specify the fire resistance or durability properties of filling materials, upholstery fabrics or foam cushions. Also, it does not specify the electrical safety of the support surface adjustment mechanism. The requirements in this standard are applicable to chairs in the fully assembled condition, ready for use. The standard does not specify resistance to degradation of the structural materials by sunlight or chemical attack.

This standard does not cover any ancillary devices attached to, or built into, the chair structure, such as a table, refrigerator or television remote control (see Note 2).

NOTE 1 Chairs which are medical devices are required to conform to EC Directive 93/42/EEC (the Medical Devices Directive) [1].

NOTE 2 If conformity to a standard is to be claimed for such ancillary devices, conformity assessment against the relevant standard(s) would need to be carried out separately.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 1022:2005, *Domestic furniture – Seating – Determination of stability*

BS EN 1728:2012, *Furniture – Seating – Test methods for the determination of strength and durability*

BS EN 13759:2012, *Furniture – Operating mechanisms for seating and sofa beds – Test methods*

BS EN ISO 3696:1995+A1:1995, *Water for analytical laboratory use – Specification and test methods*

3 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

3.1 riser chair
chair designed to provide a means to move a user from a seated to a near standing position and back

3.2 recliner chair
chair designed to provide a means to move a user from a seated to a reclined position and back

3.3 rise and recline chair
chair designed to provide a means to move a user from a seated to a near standing position and back and from a seated to a reclined position and back

3.4 medical device
any instrument, apparatus, appliance, software, material or other article, whether used alone or in combination, including the software intended by its manufacturer to be used specifically for diagnostic and/or therapeutic purposes and necessary for its proper application, intended by the manufacturer to be used for human beings for the purpose of:

- diagnosis, prevention, monitoring, treatment or alleviation of disease;
- diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap;
- investigation, replacement or modification of the anatomy or of a physiological process;
- control of conception;

and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means

[EC Directive 93/42/EEC] [1]

3.5 battery operated reset system
battery operated system for moving the chair once from any position other than the seated position back to the seated position, in the event of the loss of mains power

NOTE Also known as an emergency lowering system.

3.6 battery back-up system
battery operated system for moving the chair multiple times from any position other than the seated position back to the seated position, in the event of the loss of mains power

4 General requirements

4.1 Edges and corners

Components or parts of the chair with which the user and/or a responsible person might come into contact during normal use shall not have burrs, sharp edges or sharp corners.

4.2 Tubular components accessible during use

Tubular components accessible during use shall be closed, capped or plugged.

If the chair has tubular legs, the bottom of each leg shall be capped or plugged.

5 Strength and durability

5.1 Strength and durability of chairs

5.1.1 Requirements

After the seating has been tested in accordance with **5.1.2**, at the selected test level, none of the following shall have occurred:

a) any fracture of any member, joint or component, including seat suspensions and castors;

b) any fracture or cracking through the full thickness of any part of a structural shell;

c) any loosening, shown to be permanent by hand pressure applied to suitable members, of joints intended to be rigid;

d) any loosening, relative to the shell surface, of the underframe or base inserts moulded into a structural shell, shown to be permanent by means of hand pressure applied to the underframe or base;

e) any free movement in the back, arms, legs or other components of the article greater than that noted in the initial inspection (see **5.1.2.2**);

f) any deformation or cracks that will adversely affect the appearance or strength of any part of the sample;

g) any impairment of the operation of any mechanical part.

5.1.2 Testing

5.1.2.1 Samples

All the tests shall be carried out on the same sample. If any failure occurs during the sequence of tests, all the tests shall be repeated on a completely new sample.

5.1.2.2 Inspection before testing

Immediately before testing, the sample shall be thoroughly inspected. Any defects in the members, joints or attachments shall be noted so that they are not attributed to the tests. A complete dimensional check shall be carried out on all articles likely to suffer permanent deformation as a result of testing. The dimensions shall be recorded. Any minor defects detected as a result of this inspection shall be recorded in the test report. If the sample is found to have a major defect as described in **5.1.1**, the sample shall be rejected.

5.1.2.3 Procedure

The sample shall be tested in accordance with BS EN 1728:2012, as specified in Table 1. All tests shall be carried out at the same test level (see Table 1), and in the sequence given in Table 1.

5.1.2.4 Inspection after testing

Immediately after completion of the tests, the sample shall again be thoroughly inspected. Any apparent defects as given in **5.1.1** shall be noted, together with any other changes that have taken place since the initial inspection.

5.2 Durability of chair surface adjustment mechanisms

After testing in accordance with Annex A for 20 000 cycles, all chair surface adjustment mechanisms shall remain fully operational.

Table 1 **Tests for strength and durability**

Test	BS EN 1728:2012 Clause	Loading	110 kg user (approx. 17 stone)	160 kg user (approx. 25 stone)
1. Seat static load and back static load test	**6.4**	Seat force, N Back force, N Minimum back force, N 10 times	1 600 560 410	2 300 800 410
2. Seat front edge static load test	**6.5**	Force, N 10 times	1 600	2 300
3. Arm rest sideways static load test	**6.10**	Force, N 10 times	400	600
4. Arm rest downwards static load test	**6.11**	Force, N 10 times	800	1 250
5. Leg forward static load test	**6.15**	Force, N Seat load, N 10 times	500 1 000	800 1 600
6. Leg sideways static load test	**6.16**	Force, N Seat load, N 10 times	400 1 000	640 1 600
7. Combined seat and back durability test	**6.17**	Cycles: 100 000 Seat force, N Back force, N Minimum back force, N	 1 000 300 300	 1 600 480 300
8. Seat front edge durability test	**6.18**	Cycles: 50 000 Force, N	 1 000	 1 600
9. Arm rest durability test	**6.20**	Cycles: 50 000 Force, N	 400	 640
10. Seat impact test	**6.24**	Drop height, mm 10 times	180	240
11. Back impact test	**6.25**	Height of fall, mm/angle degrees 10 times	210/38	330/48
12. Arm rest impact test	**6.26**	Height of fall, mm/angle degrees 10 times	210/38	330/48
13. Drop test for multiple seat units	**6.27.1**	Drop height, mm 5 cycles	200	300

6 Stability

When subjected, in turn, to each of the tests given in BS EN 1022:2005 applicable to the type of chair under test, as given in Table 2, the chair shall not overturn.

In addition, when a riser chair is tested in accordance with Annex B, the chair shall not overturn.

Table 2 **Tests for stability**

Test	BS EN 1022:2005 Clause	Loading	110 kg user (approx. 17 stone)	160 kg user (approx. 25 stone)
1. Forwards overbalancing, all seating	**6.2**	Seat load, N Horizontal force, N	600 20	950 20
2. Sideways overbalancing, all seating without arms	**6.4**	Seat load, N Horizontal force, N	600 20	950 20
3. Sideways overbalancing, all seating with arms	**6.5**	Arm load, N Seat load, N Horizontal force, N	350 250 20	550 400 20
4. Rearwards overbalancing, all seating with backs	**6.6**	Seat load, N Back force, N	600 0.285 7 × (1 000 - *H*) *	950 0.457 1 × (1 000 - *H*) *
5 Rearwards stability test, reclining chairs with footrest	**7.5**	Back rest, discs Footrest, discs	8 3	13 5

* *H* is the height of the seat above the floor, in millimetres.

7 Control system requirements

7.1 General

7.1.1 In riser chairs and rise and recline chairs, the control system shall be fitted with a motion lockout control that can be employed by the user or a responsible person, to prevent unintended movement of the chair.

NOTE Examples of suitable motion lockout systems are removable handsets and key locks which the user or responsible person can remove, on/off switches, a standby function and pressure pads which lock out the system when the user rises from the chair.

7.1.2 For all chairs, the control system shall be such that movement of a support surface only occurs whilst a control device is being manually operated.

7.1.3 When each chair surface adjustment mechanism is operated in turn, no part of the relevant support surface shall move at a speed that exceeds the following:

- 0.15 m/s when the chair is loaded to the manufacturer's maximum recommended load; and
- 0.25 m/s when the chair is unloaded.

7.1.4 On removal, or in the event of loss, of the movement actuation signal, all movement shall cease within 0.5 s and the mechanism shall remain in its last position until the actuation signal is re-introduced.

7.1.5 In the event that more than one movement actuation signal actuating the same motor is initiated at any one time, e.g. the signals for the raise function and the lower function, no movement shall occur.

7.1.6 For systems not fitted with a battery back-up system or a battery operated reset system, in the event of a loss of power from the electrical supply mains, all movement shall cease within 0.5 s and the mechanism shall remain in its last position until the mains power and the actuation signal are both re-introduced.

7.1.7 For systems that include a battery back-up system for use in the event of loss of power from the electrical supply mains, the system shall incorporate a means of indicating when the charge in the battery has fallen to the minimum safe level; this level being that which would allow safe operation of the chair, loaded in accordance with Table A.1, through at least one complete cycle of all the electrically operated support surfaces.

7.1.8 For systems fitted with a battery operated reset system, in the event of loss of power from the electrical supply mains, the system, with the battery fully charged, shall be capable of at least returning the chair, loaded in accordance with Table A.1, to the sitting position.

7.1.9 For systems fitted with a battery back-up system, in the event of loss of power from both the electrical supply mains and the battery back-up system, all movement shall cease within 0.5 s and the mechanism shall remain in its last position until the power and the actuation signal are both re-introduced.

7.2 Control devices

7.2.1 A marking shall be placed on, or adjacent to, each control device which clearly indicates the direction in which the chair will move.

7.2.2 Where buttons are used, the surface of each button, or each button icon on a touch screen, that initiates movement of the chair, shall cover a circle of minimum 10 mm in diameter.

NOTE Buttons/icons may have any shape, e.g. they do not need to be circular.

7.2.3 The force to operate control devices shall be less than 6 N.

NOTE This does not apply to touch screens.

7.2.4 Control/indicator markings shall be durable and shall not be removed when tested in accordance with Annex C.

8 Marking

Chairs shall be permanently marked with the following information:

a) the number and date of this British Standard [1)] ;

b) the name, registered trade name or registered trade mark of either the manufacturer, the distributor or the retailer, together with additional means of identifying the product.

[1)] Marking BS 8474:2013 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of a manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

9 Information to be supplied by the manufacturer

At least the following information shall be supplied with the chair. This shall be headed, in letters not less than 5 mm high, ″IMPORTANT, READ CAREFULLY, RETAIN FOR FUTURE REFERENCE ″:

a) the number and date of this British Standard [2)];

b) the name and address of the manufacturer or the supplier (i.e. the agent, importer or retailer);

c) a means of identifying the chair, for example the model number and the batch number or date of manufacture;

d) the following warnings in letters not less than 5 mm high:

   1) WARNING. This is an electrical item and should be treated with caution.

   2) WARNING. The motion lockout control must be engaged when the chair is not in use.

   3) WARNING. Always ensure that there is nothing to obstruct the free movement of the chair, for example children or pets, or solid objects, e.g. a wall.

   4) WARNING. This chair is not suitable for use by children. Any children in the vicinity must be supervised at all times.

   5) WARNING. Take care when adjusting positions to avoid trapping or pinching of body parts.

   6) WARNING. Do not sit on footrest.

   7) WARNING. Only the occupant or a responsible person should operate the chair.

   8) WARNING. Exercise care when lowering into the chair as shock loads can severely damage the chair and the mechanism.

e) for chairs supplied ready to assemble, instructions for assembly of the chair;

f) the manufacturer's recommended maximum load for safe operation of the chair, i.e. 110 kg or 160 kg;

g) instructions for the safe operation of the chair;

h) information on the operation of the motion lockout control;

i) a statement that the chair is ready for use once the chair has been fully installed in the correct position, and the user has read and understood the operating instructions;

j) a statement that when the chair is not in use it should be returned to the seated position;

k) instructions for care and maintenance of the chair.

[2)] Marking BS 8474:2013 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (normative) Method of test for the durability of the support surface adjustment mechanism

The testing shall be carried out in accordance with BS EN 13759:2012.

The weight distribution of the test dummy shall be as given in Table A.1.

Table A.1 **Weight distribution of test dummy**

Test dummy section	Weight distribution	
	110 kg user [A)]	160 kg user
Head	5 kg	8 kg
Upper body	54 kg	86 kg
Upper leg	24 kg	39 kg
Lower leg	17 kg	27 kg

[A)] A 100 kg test dummy with this weight distribution is specified in BS EN 13759:2012 for testing reclining mechanisms for seating for a 110 kg user.

Annex B (normative) Method of test for stability of riser chairs in the raised position

B.1 Apparatus

B.1.1 *Horizontal impact device* (see Figure B.1), consisting of a basketball inflated to a pressure of (73.5 ± 5) kPa and attached by a network of elastic cords to a mounting ring. The mounting ring shall consist of a ring of timber (or timber derivative), as illustrated in detail in Figure B.1a), having an outside diameter of (150 ± 5) mm. The rear face of this ring shall be attached to the main body of the impact device and its front face shall be shaped to fit the ball.

The main body of the impact device shall consist of a mass supported by cords or flexible wires (850 ± 50) mm long arranged so that the longitudinal axis of the impact device remains horizontal when the support cords are displaced from the vertical.

The impact device shall be of such a mass that the total mass of all moving parts, excluding the cords, is 35 kg.

B.1.2 *Floor*, as specified in BS EN 1728:2012, **5.3**.

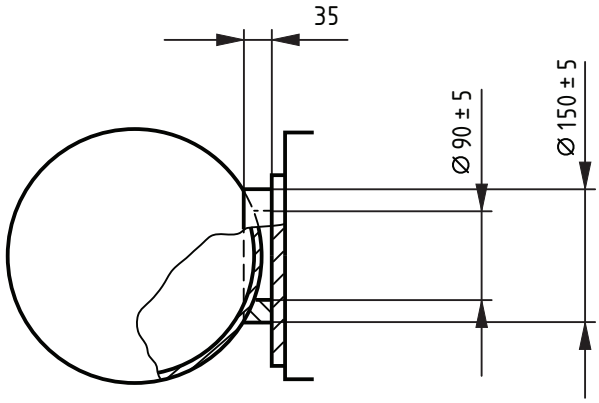
B.1.3 *Stops*, as specified in BS EN 1728:2012, **5.4**.

B.2 Procedure

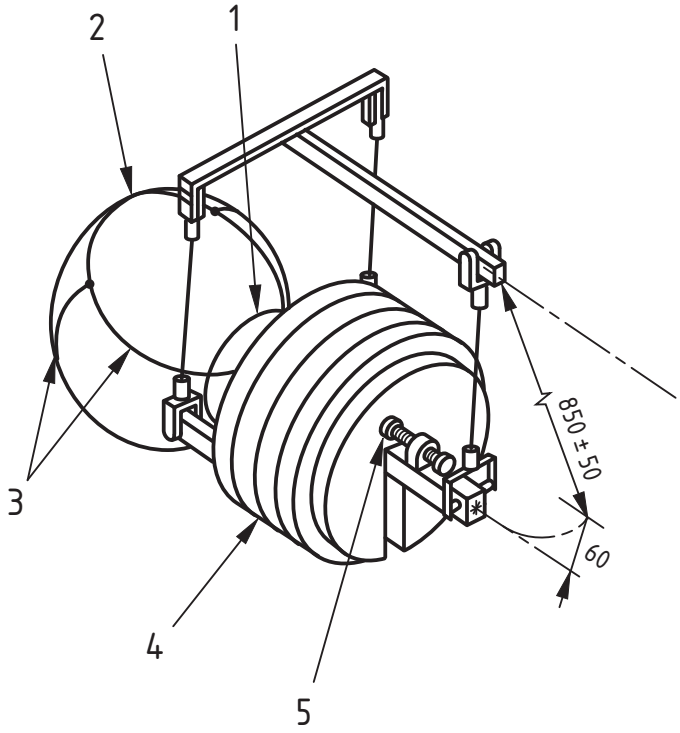
Place the chair on the floor (**B.1.2**) with the stops (**B.1.3**) positioned against the bottom of the rear legs. Actuate the riser mechanism so that the chair is in the fully raised position. Place the horizontal impact device so that the centre of the basketball is just in contact with the front face of the support surface at the point likely to have the most adverse effect when impacted. The maximum height of the point of impact from the floor shall be 1.6 m. Pull the horizontal impact device back until it has been raised through a distance of 60 mm and release it.

Figure B.1 **Horizontal impact device**

Dimensions in millimetres



a) Detail of ball mounting ring



b) Suggested construction

Key

1 Ball mounting ring
2 Basketball
3 Elastic bands
4 Disc weights
5 Safety clamp

Annex C (normative) Test for the durability of markings

C.1 Reagents

C.1.1 *Distilled water*, conforming to BS EN ISO 3696:1995+A1, Grade 3.

C.1.2 *Isopropyl alcohol*, 99.7% pure.

C.2 Apparatus

C.2.1 *Test cloths*, cotton fabric, weave plain 1/1, mass per unit area 100 g/m^2 to 120 g/m^2, warp and weft 20 threads/cm to 30 threads/cm, washed, no finishing agents.

C.3 Procedure

C.3.1 Testing durability of markings to dry rubbing

Using a test cloth, rub the marking(s) by hand, without undue pressure, for 15 s.

C.3.2 Testing durability of markings to rubbing with distilled water

Using a fresh test cloth soaked in distilled water (**C.1.1**), rub the markings by hand, without undue pressure, for 15 s.

C.3.3 Testing durability of markings to rubbing with isopropyl alcohol

Using a fresh test cloth soaked in isopropyl alcohol (**C.1.2**), rub the markings by hand, without undue pressure, for 15 s.

Bibliography

[1] EUROPEAN COMMUNITIES. Council Directive 93/42/EEC of 14 June 1993 concerning medical devices. Luxembourg: Office for Official Publications of the European Communities, 1993.

[2] GREAT BRITAIN. The Furniture and Furnishings (Fire) (Safety) Regulations 1988 (SI 1988 No. 1324) as amended by SI 1989 No. 2358, SI 1993 No. 207 and SI 2010 No. 2205. London: The Stationery Office.

[3] GREAT BRITAIN. The Electrical Equipment (Safety) Regulations 1994 (SI 1994 No. 3260). London: The Stationery Office.

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