

Gymnasium equipment —

Part 2: Particular requirements —

Section 2.10 Specification for safety requirements for mats, mattresses and landing areas

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Textiles and Clothing Standards Policy Committee (TCM/-) to Technical Committee TCM/14, upon which the following bodies were represented:

- Birmingham City
- British Amateur Athletic Board
- British Association of Advisers and Lecturers in Physical Education
- British Leather Confederation
- Central Council of Physical Recreation
- City of Glasgow
- Consumer Policy Committee of BSI
- Department of Education and Science
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- English Basketball Association
- Gymnasium Equipment Manufacturers' Association
- Home Office
- Institute of Trading Standards Administration
- Ministry of Defence
- Physical Education Association of Great Britain and Northern Ireland
- Recreation and Leisure Trade Association
- Scottish National Ski Council Limited
- Sports Council

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Amateur Gymnastics Association
- British Rubber Manufacturers' Association
- British Textile Technology Group
- Department of Economic Development (Northern Ireland)
- Institute of Leisure and Amenity Management
- Nottinghamshire County Council Leisure Services
- RAPRA Technology Ltd.

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Foreword

This Section of BS 1892 has been prepared under the direction of the Textiles and Clothing Standards Policy Committee and is a revision of clause 6 in BS 1892-2.3:1972.

This Section of BS 1892 applies to mats, mattresses and landing areas for gymnastic and sports use. The principal changes introduced by this revision are that performance testing requirements have been included. Ignitability requirements are also covered in response to the tragic fire in the Maysfield Leisure Centre in Belfast, Northern Ireland, in January 1984, which focussed attention on the subject of fire hazards arising out of sports equipment, particularly that which is foam filled.

Ignition resistance is the initial approach to fire safety. This preventative approach has in human terms and property protection terms the most benefits and is accepted as the primary approach to the problem. Accepting that the chance of ignition by various means can occur, the fire safety in life terms has to be considered according to the circumstances that exist in each case.

Where premises have no additional factors and other risks to consider, and the means of escape is good, then this situation is obviously better than a premises that has additional fire hazards.

In the light of present problems being experienced in meeting the Home Office Fire Circular Ignition 1/88 (FSC1/88) recommendations for criteria of 0 and 5 as defined in BS 5852-1 and BS 5852-2, other compensatory features are required. In some situations, a realistic assessment of the situation will require that the recommended resistance criteria have to be met if the premises is to be used.

An assessment of a premises by a joint survey of the management and the Local Authority Fire Prevention Officer is a basic starting point to allowing a lower ignition resistance to certain equipment. The ultimate aim of the producers of mats should be that the recommended 0 and 5 levels should be met as early as possible.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Section of BS 1892 specifies requirements for mats, mattresses and landing areas.

Recommendations for the use and storage of these products are given in Appendix A.

NOTE 1 Requirements for soft play areas are not included in this standard, though certain requirements such as flammability may be applicable to these products.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Section of BS 1892 the following definitions apply.

2.1

shock absorption

the ability of a mattress or landing area to reduce impact loads on an athletes body by deforming to increase the deceleration distance

2.2

athlete stability

the ability of a mat or mattress to provide a surface upon which controlled movements can be made. This is only achieved within specific ranges of frictional and deformation properties

2.3

ignition source

source of energy which is used to ignite combustible materials or products

2.4

primary source

in a test, the initial heat supply

2.5

progressive smouldering

an exothermic oxidation, not accompanied by flaming, that is self-propagating, i.e. independent of the ignition source. It may or may not be accompanied by incandescence

2.6

flaming

undergoing combustion in the gaseous phase with the emission of light

2.7

flammability

the ability of a material or product to burn with a flame under specified test conditions

2.8

ignitability

a measure of the ease with which a material, product or component can be ignited so as to flame or progressively smoulder

2.9

gymnasium mat

in a test, a gymnasium mat refers to any mat, mattress or landing area and includes items such as gymnasium, judo and wrestling mats, landing areas, materials used in landing pits, etc.

2.10

upper surface

the surface normally facing the gymnast when the mat is in use

2.11

reverse surface

the surface normally in contact with the floor when the mat is in use

2.12

inner materials

materials exposed when a vertical section is cut through the centre of a horizontal mat

3 General requirements

Mats, mattresses and landing areas shall comply with the requirements of BS 1892-1, except insofar as they are modified by this Section.

4 Classification

4.1 Intended end-use

Mats, mattresses and landing areas for sports, educational and recreational activities shall be classified by the relative degrees of the opposing qualities of shock absorption and athlete stability which are provided and the intended end-use.

These shall be distinguished as shown in Table 1.

Table 1 — Classification and intended use

Classification	Intended use
L/S	Landing situations, e.g. formal gymnastic (landing), educational gymnastic (landing)
C/S	Combat situations, e.g. combat mats (martial arts), wrestling mats
F/S	Falling situations, e.g. polevault and highjump landing areas, safety mattresses in other falling situations
FE/S	Floor exercise situations, e.g. formal exercise mats, educational exercise mats

4.2 Risk of ignition

Mats shall also be classified according to the following risk of ignition criteria:

low risk hazard area (L);

- medium risk hazard area (M);
 high risk hazard area (H);
 very high risk hazard area (VH).

NOTE 1 It should be the responsibility of the building management to ensure that the use to which the building is put conforms to the ignition requirements for the appropriate classification.

In assessing which classification applies the following should be taken into account.

- a) Position and size of the premises:
 - 1) surrounding risk, adjacent premises or storage;
 - 2) number of floors, area;
 - 3) number and size of rooms, open plan, etc;
 - 4) staircases;
 - 5) single occupation, multiple occupation.
- b) Type of construction:
 - 1) brick, concrete, wooden;
 - 2) fire resistance;
 - 3) separation of risk areas, storage, kitchen, boiler rooms;
 - 4) age of building.
- c) Type of use:
 - 1) education, voluntary, private, public;
 - 2) numbers resorting to:
 - i) participants;
 - ii) spectators;
 - 3) density;
 - 4) licenced use, liquor, restaurant.
- d) Fire precautions:
 - 1) means of escape for proposed use;
 - 2) systems, alarm, manual and associated systems;
 - 3) fire fighting installations, hose reels, sprinklers, extinguishers;
 - 4) active system, automatic ventilation;
 - 5) separation of risk;
 - 6) evacuation procedures.
- e) Management:
 - 1) overall responsibility for the building and its use, maintenance and upkeep;
 - 2) type of management, voluntary, professional, part-time;
 - 3) numbers of staff available;
 - 4) training of staff;
 - 5) health and safety aspects;
 - 6) acquiring licences where necessary;
 - 7) liaison with emergency services;
 - 8) procedures for control, storage and maintenance of cellular foam equipment;
 - 9) changes to structure, liaison with Building Control Officer and Local Fire Authority;
 - 10) risk assessment made in liaison with Local Fire Authority and emergency services.

NOTE 2 For example a low risk hazard area (L) will be a small premises, no public admitted as spectators and management has control. A very high risk hazard area (VH) will be in a multi-occupied premises where the public is admitted in large numbers as spectators and management has no control.

5 Dimensions

When measured in accordance with Appendix B, the dimensions of mats and mattresses of types L/S, C/S and FE/S shall be as given in Table 2, subject to the tolerances given in Table 3 and Table 4. The diagonals of mats to be used in a close-fitting array shall also conform to the tolerances shown in Table 3.

NOTE 1 If it is essential that there be no gap between mats fitted in an area, the tolerances specified in Table 3 and Table 4 will not necessarily guarantee this situation. It is therefore desirable that mats purchased for this situation are in one lot. The attention of the manufacturer should be drawn to the fact that such mats are intended to be fitted in this way.

NOTE 2 Thickness is not specified in Table 2 but will be fixed for particular constructions by the level of performance as shown in Table 5 for various applications. Preferred thickness may be specified by the appropriate governing bodies for particular sports.

Table 2 — Dimensions of mats and mattresses of types L/S, C/S and FE/S

Width	Length
mm	mm
1 000	Multiples of 500
1 200	Multiples of 200

Table 3 — Tolerances

Dimension	Tolerance on length and width of a single mat	Tolerance on length, width and diagonals of a close-fitting mat
mm	mm	mm
up to and including 250	+ 5, - 0	+ 4, - 0
over 250 up to and including 500	+ 10, - 0	
over 500 up to and including 1 000	+ 20, - 0	
over 1 000 up to and including 1 500	+ 30, - 0	+ 8, - 0
over 1 500 up to and including 2 000	+ 40, - 0	
over 2 000	+ 50, - 0	

Table 4 — Tolerances on thickness

Dimensions	Tolerance	
	Single mat	Close-fitting mat
mm	mm	mm
up to and including 25	+ 3, - 0	+ 2, - 0
over 25 up to and including 100	+ 4, - 0	
over 100 up to and including 200	+ 6, - 0	
over 200	+ 10, - 0	

Table 5 — Properties of mats, mattresses or landing areas

Property	Test procedure	L/S	C/S	F/S	FE/S
Peak deceleration (in m)	Method 4 of BS 7044-2.2	0.6 min.	1.0 min.	—	0.4 min.
	Appendix C	1.4 min.	2.0 min.	3.0 min.	—
Vertical deflection (in mm)	Appendix D	2.0 min.	12.0 max.	—	2.0 min.
		4.0 max.			4.0 max.
Traction coefficient	Method 1 of BS 7044-2.2 ^a	1.0 min.	1.0 min.	—	1.0 min.
Frictional force	Method 3 of BS 7044-2.2 ^b	5.0 min.	20.0 min.	10.0 min.	5.0 min.

^a Use an impregnated chrome retanned leather as the test sole having a slip resistance value of 65 ± 5 when tested against plate glass.

^b For this method:

a) use a wooden slider in place of the standard rubber giving a slip resistance of 35 ± 5 when tested against plate glass;

b) measure the mass of the mat under test to an accuracy of 0.1 kg;

c) frictional force is defined as $\frac{\text{mean slip resistance value} \times \text{mass of mat (in kg)}}{100}$

NOTE The limits laid down in this table, are minimum base criteria and for precise use the appropriate governing body should be consulted.

6 Sampling and performance

6.1 Sampling

Prototypes representative of a design shall comply with 6.2. All subsequent production shall be subjected to such supervision and inspection procedures as to provide reasonable assurance that the performance of each article when new is at least equal to that of the prototypes.

6.2 Performance

The mat, mattress or landing area as a complete composite [infill and covering material(s)] shall comply with Table 5, as appropriate, when tested in accordance with the methods specified therein.

The ignitability of the mat, mattress or landing area when tested in accordance with Appendix E shall comply with Table 6.

Infills shall comply with BS 3379.

Table 6 — Ignitability of mats, mattresses and landing areas

Construction of test specimen	Levels of hazard area ^a			
	L	M	H	VH
Composite	0 and 3	0 and 5	0 and 5	0 and 5
Cut test	—	—	0 and 3	0 and 5

^a Levels of ignition are defined in BS 5852-1 and BS 5852-2.

7 Marking

Each article complying with this Section of BS 1892 shall carry a permanently attached and clearly visible label of minimum size 50 mm × 80 mm.

The following wording¹⁾ shall appear either on the permanently attached label or on a second label if the second label is positioned such that it is clearly visible:

- a) “Complies with BS 1892-2.10:1990 for low risk hazard area”; or
- b) “Complies with BS 1892-2.10:1990 for medium risk hazard area”; or
- c) “Complies with BS 1892-2.10:1990 for high risk hazard area”; or
- d) “Complies with BS 1892-2.10:1990 for very high risk hazard area”.

The letters of the wording shall be legible and of minimum height 2 mm.

In addition the following information shall appear on the label: a complete identification of the product, including type, manufacturer’s reference number(s), name or trade mark.

¹⁾ Marking BS 1892-2.10:1990 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 therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Appendix A Use and storage guidance

A.1 Handling

Mats should be handled with care to avoid damage to the filling or to the cover which might expose the filling. Large or heavy mats or those of a bonded construction should always be lifted by two persons to avoid excessive bending which can damage the bonding between surface cover and filler. Lifting and laying of mats is best achieved by using a trolley of size, strength and stability to suit the load, with castor wheels of suitable design to enable the load to be correctly positioned in the store area.

A.2 Use

Permanently laid mats are likely to last considerably longer than removable ones. Mats should be aligned as they are laid, not pulled into position by their corners. If assemblies of mats are used, where possible they should be laid from the centre of the finished area outwards. Recommended patterns can be obtained from the relevant sports association or the mat manufacturers. In use any creeping of mats should be corrected immediately to ensure that they are correctly positioned and no gaps appear.

A.3 Maintenance

Anti-slip surfaces of mats need to be cleaned periodically to maintain their efficiency. Upper surfaces should be wiped clean as required with a cleaning or disinfecting solution according to the manufacturer's recommendations. Mats should be regularly checked for openings or tears in covers to ensure that the filling is not exposed, and, if necessary, the mat taken out of use and the cover repaired in accordance with the manufacturer's advice in order to avoid a greater risk of fire and user accidents.

Mats with damaged surfaces and edges offer a far greater fire hazard and are more prone to causing user accidents. The playing of the sport itself rarely causes damage. Most damage occurs during handling and transportation. Dragging and excessive folding of mats are main causes of excess wear.

A.4 Storage and fire precautions

Stored mats present a hazard and it is important that they are stored so that a fire occurring in them will not jeopardize means of escape from the premises. The following precautions should be observed:

- a) mats should be stored flat to present the least amount of surface area over which flame could travel vertically;
- b) they should be stored separately from any easily ignited materials;

- c) storage should be tidy with access being maintained both to the store and within it;
- d) there should be no source of heat likely to ignite material within the store;
- e) luminaires within the store should be of the protected type, e.g. bulkhead or enclosed;
- f) the store should not form part of a general circulation area.

Where a gymnasium or sports hall has access to a corridor either by a door or other opening forming an escape route from the hall or any other part of the building, in addition to those precautions already mentioned, the mats should be kept in a separate store that can be secured against unauthorized use or interference.

The store should not have direct access from the corridor and should be separated from it by imperforate and fire resisting construction of 1 h duration in accordance with BS 476-20 to BS 476-23.

Automatic smoke detection should be provided within the store linked to the main fire alarm system in the building. Ideally stores should be ventilated to the open air to the maximum area practicable, with ventilators operating by smoke detectors.

Where small numbers of mats are to be used the provision of a purpose built store may not be warranted, if the risk of vandalism is low and an outbreak of fire would present no risk to other occupants of the building. Mats may be stored in containers of robust construction made from non-combustible materials.

Further details concerning recommendations associated with the use of cellular foam in sports and recreational facilities may be obtained from the Local Fire Authority and the Sports Council.

Appendix B Method for measuring dimensions

Lay the mats and mattresses to be measured upon a smooth, plane horizontal surface larger than the mat.

NOTE 1 If they show residual distortion from storage they may be allowed to rest on the surface for 15 min and then smoothed by manual pressure to conform with the surface.

In cases of dispute condition the mat at a temperature of 23 ± 2 °C, 50 ± 5 % r.h. for a minimum of 16 h before measurement.

Measure the length and width in accordance with method 1C of BS 4443-1, at points at least 100 mm from a corner, parallel to the edge.