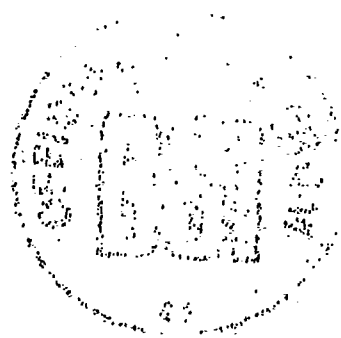




BS 1892 : Part 2 : Section 2.1 : 1972

UDC 685.64:796.4

Specification for
**Gymnasium
Equipment**



Part 2. Particular requirements
Section 2.1. Wall bars, window ladders,
booms, beam saddles and
related equipment

British Standards Institution • 2 Park Street • London W1A 2BS
Telephone 01-629 9000
T 01-629 9000

This British Standard was published under the authority of the Executive Board on 30 November, 1972.

© British Standards Institution, 1972.

First published October 1952
First revision March 1957
Second revision November, 1972.

ISBN: 0 580 07242 8

Copyright

Users of British Standards are reminded that copyright subsists in all BSI publications. No part of this publication may be reproduced in any form without the prior permission in writing of BSI. This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols and size, type or grade designations. Enquiries should be addressed to the BSI Secretariat.

Contract requirements

Attention is drawn to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

Revision of British Standards

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions. Full information on all BSI publications, numbering over 6000, will be found in the *British Standards Yearbook*. This information is supplemented by details published each month in *BSI News* of new publications, revisions and amendments.

BSI News is available to Subscribing Members of the Institution. All other publications may be purchased direct from Sales Department. Enquiries concerning subscribing membership, which has considerable advantages, will be welcomed, and should be made to Subscriptions Department. Both departments are located at:

101 Pentonville Road, London N1 9ND (Telephone 01-837 8801: Telex 23218).

The following references relate to the work on this standard:
Committee reference M/52 Draft for comment 67/9898

CO-OPERATING ORGANIZATIONS

The Gymnasium and Sports Equipment Committee, under whose supervision this British Standard was prepared, consists of representatives of the following Government departments and scientific, industrial and other organizations:

Association of Municipal Corporations
British Association of Organizers and
Lecturers in Physical Education
British Leather Federation
City of Birmingham
Corporation of Glasgow
County Architects' Society

Greater London Council
Gymnastic Equipment Manufacturers'
Association
Home Office (Prison Department)
Institute of Purchasing and Supply
Ministry of Defence, Army Department
Ministry of Defence, Navy Department



BS 1892 : Part 2 : Section 2.1 :
November 1972

UDC 685.64:796.4

Specification for
**Gymnasium
Equipment**

Part 2. Particular requirements
Section 2.1. Wall bars, window ladders,
booms, beam saddles and related equipment

Amendments issued since publication

Amd. No.	Date of issue	Text affected

BS 1892 : Part 2 : Section 2.1 : 1972

CONTENTS

	Page
Co-operating organizations	Inside front cover
Foreword	2

SPECIFICATION

1. Scope	3
2. Fixed wall bars	3
3. Hinged wall bars and wall frames	5
4. Portable horizontal poles for use between hinged frames	5
5. Portable horizontal ladders for use between hinged frames	6
6. Fixed window ladders	7
7. Hinged window ladders	9
8. Booms	9
9. Hinged beams	14
10. Beam saddles	14

FIGURES

1. General arrangement of wall bar	16
2. Details of bar and fixing	17
3. Window ladder	18
4. General arrangement of booms	19
5. Details of boom	20
6. Typical beam sections	21
7. Type A beam saddle	22
8. Type B beam saddle	23

FOREWORD

This revised British Standard is one of a series of sections of the specification for Gymnasium equipment.

This Section, 2.1, specifies requirements which depart from, or are additional to, those given in BS 1892 : Part 1 'General requirements'.

BRITISH STANDARD SPECIFICATION FOR GYMNASIUM EQUIPMENT

Part 2. Particular requirements

Section 2.1. Wall bars, window ladders, booms,
beam saddles and related equipment

1. SCOPE

This Section 2.1 of BS 1892 covers fixed wall bars, hinged wall bars and wall frames, portable horizontal poles for use between hinged frames, portable ladders for use between frames, fixed window ladders, hinged window ladders, booms* and beam saddles.

It is to be read in conjunction with Part 1 of the standard and equipment is required to comply in all respects with Part 1, except in so far as they are modified by this Section 2.1.

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

2. FIXED WALL BARS

2.1 Dimensions. Fixed wall bars shall be generally as shown in Fig. 1 and a set shall consist of two or more sections, each of which shall conform to the following dimensions:

Height overall

2692 mm (8 ft 10 in)**

Height to centre of topmost bar

2620 mm (8 ft 7 3/8 in)

Centre to centre spacing of bars

130 mm (5 1/8 in) $\pm$ 3 mm (1/8 in)

Centre to centre of uprights

838 mm (2 ft 9 in max.) $\pm$ 6 mm (1/4 in)

Sections of uprights (including front pieces)

143 mm x 33 mm (5 5/8 in x 1 3/8 in)

Section of rear pieces, not less than

95 mm x 33 mm (3 3/4 in x 1 3/8 in)

Section of front pieces, not less than

44 mm x 33 mm (1 3/4 in x 1 3/8 in)

Section of bottom wall pads

95 mm x 44 mm (3 3/4 in x 1 3/4 in)†

* In this standard the term 'boom' has been used to define the complete apparatus; the cross bar is designated the 'beam'.

** When specially agreed between the purchaser and the manufacturer, these heights may be altered. The purchaser should then state what re-arrangement, if any, should be made in the disposition of the bars.

† For a maximum distance of 1.8 m (6 ft) between fixings. Any increase on this span should utilize a larger section of wood filled channel or any other suitable stiffener.

BS 1892 : Part 2 : Section 2.1 : 1972

Section of top wall pads
95 mm x 38 mm ($3\frac{3}{4}$ in x $1\frac{1}{2}$ in)*

Section of bars (oval) not more than
44 mm x 35 mm ($1\frac{3}{4}$ in x $1\frac{3}{8}$ in)
not less than
41 mm x 32 mm ($1\frac{5}{8}$ in x $1\frac{1}{4}$ in)

Section of bars (round tube)
32 mm diameter x 1.6 mm ($1\frac{1}{4}$ in x 0.064 in)

2.2 Materials. The following materials shall be used in the construction of the wall bars:

Horizontal oval bars: Softwood, Group A, excluding Sitka spruce, or alternatively aluminium tubing alloy BS 1471 HT 30 TF 32 mm ($1\frac{1}{4}$ in) o.d. x 1.6 mm (0.064 in) smooth finish, or its equivalent in performance, or mild steel tubing 32 mm ($1\frac{1}{4}$ in) o.d. x 1.6 mm (0.064 in) smooth finish, electrically welded in conformity with BS 1387.

Uprights, front pieces
and walling: Softwood, Group A.

Pads for wall fixings: Softwood, Group A, or
hardwood, Group A.

NOTE. Wall pads will be supplied by the manufacturer in the absence of other agreement with the purchaser and will be fixed, either by the manufacturer or by the general contractor, to the manufacturer's requirements as arranged.

2.3 Construction

2.3.1 Fixed wall bars. For fixed wall bars the uprights shall be fixed to the top wall pads housed over the bottom wall pad as shown in Fig. 1 of this Section, fixing being by means of a metal angle bracket measuring 100 mm x 76 mm x 25 mm x 4 mm (4 in x 3 in x 1 in x $\frac{3}{16}$ in) drilled with six staggered countersunk holes and secured by six size No. 12 countersunk woodscrews 32 mm ($1\frac{1}{4}$ in) in lengths, two such brackets being provided for each upright. Where it is necessary to avoid pipework, etc., the uprights may be fixed to the floor and the brackets extended and strengthened accordingly.

The horizontal members shall be of oval or round section and shall be fitted into accurately machined recesses, half into the upright and half into the front piece, as shown in Fig. 2 of this Section. The front piece shall be 44 mm ($1\frac{3}{4}$ in) in thickness, secured by No. 12 countersunk woodscrews 70 mm ($2\frac{3}{4}$ in) in length, which shall be at centres not exceeding 305 mm (12 in) and have flush type screw cups under their heads. The outer corners of the front pieces shall have a 6 mm ($\frac{1}{4}$ in) radius throughout their length.

Except in single sections each oval or round bar shall be of sufficient length to span at least two sections of uprights. Where joints are unavoidable these shall be distributed over several uprights in such a manner that in any particular upright there shall not be more than one joint in any three adjacent bars. All bars shall be drilled and screwed to each upright.

The wall pads for attaching the wall bars to the walls shall be either included as part of the wall bar equipment or, where site conditions warrant, special provision may be made by the builder during construction of the building. Where the walls are of brick or concrete, the linings shall be attached by means of

* For a maximum distance of 1.8 m (6 ft) between fixings. Any increase in span should utilize a larger section of wood filled channel or any other suitable stiffener.

12 mm ($\frac{1}{2}$ in) diameter mild steel rag bolts, 9.5 mm ($\frac{3}{8}$ in) diameter expanding bolts or 9.5 mm ($\frac{3}{8}$ in) coach screws of suitable length. Where the building is of steel-framed construction, the wall linings shall be fastened to the stanchions by means of two 12 mm ($\frac{1}{2}$ in) diameter mild steel bolts at each stanchion. Where two sections of linings are joined end to end the ends shall be halved and lapped over one another for a distance of not less than 76 mm (3 in). Wall fixings shall be such as to ensure that the apparatus is rigid. Floor fixings may be used when necessary but are deprecated as unhygienic at the floor level.

3. HINGED WALL BARS AND WALL FRAMES

The design shall be to suit the space available, within the following limits:

Frames shall not exceed a width of 2787 mm (9 ft $1\frac{3}{4}$ in) centres between inner and outer uprights (i.e. 2819 mm (9 ft 3 in) approximately overall).

The frame shall not exceed a height of 4952 mm (16 ft 3 in) to the centre line of the top rib or rung from finished floor level.

The minimum sections of uprights for large frames shall be not less than:

(1) ex. 150 mm x 50 mm (6 in x 2 in) timber for inner and outer uprights

(2) ex. 100 mm x 50 mm (4 in x 2 in) timber for mid uprights.

The sections of uprights for frames for infants and juniors shall be not less than:

(1) ex. 100 mm x 38 mm (4 in x $1\frac{1}{2}$ in) timber for inner and outer uprights;

(2) ex. 76 mm x 50 mm (3 in x 2 in) timber for mid uprights.

All uprights to have a 6 mm ($\frac{1}{4}$ in) radius on all corners throughout their length.

The sections of horizontal members shall be not less than:

(1) 41 mm x 32 mm ($1\frac{5}{8}$ in x $1\frac{1}{4}$ in) standard oval timber rib or more than 45 mm x 35 mm ($1\frac{3}{4}$ in x $1\frac{3}{8}$ in).

(2) 32 mm ($1\frac{1}{4}$ in) outside diameter alloy tube;

(3) 32 mm ($1\frac{1}{4}$ in) diameter electrically welded mild steel tube.

Tensioning wires shall have a positive locking, quick release type of attachment.

The minimum length of engagement of the shoot of the top bolts shall be 25 mm (1 in) and a means of holding the shoot positively engaged shall be incorporated.

4. PORTABLE HORIZONTAL POLES FOR USE BETWEEN HINGED FRAMES

The pole shall consist of aluminium alloy BS 1471 HT 30 TF or equivalent tube up to 3048 mm (10 ft) long x 50 mm ($1\frac{7}{8}$ in) diameter x 4.0 mm (0.176 in) thick. Each end of the tube shall be fitted with a metal locking device of adequate strength to take the loads imposed and this shall have a protective covering with a non-slip surface.

BS 1892 : Part 2 : Section 2.1 : 1972

Lengths of 3048 mm to 3646 mm (10 ft to 12 ft) shall be of a similar material but 50 mm ($1\frac{1}{8}$ in) diameter x 5.0 mm ($\frac{3}{16}$ in) thick. Lengths over 3646 mm (12 ft) are not recommended as overloading can effect elasticity.

The tube, when suspended between two points 3048 mm (10 ft) apart and subjected to a loading of 350 kg (7 cwt) equally spaced along the length of tube, shall show no deformation and shall return to its original true line after showing a deflection not exceeding 152 mm (6 in) under load and thus remaining within its elastic limit.

5. PORTABLE HORIZONTAL LADDERS FOR USE BETWEEN HINGED FRAMES

5.1 Aluminium ladders. Aluminium ladders shall be nominally either 3048 mm (10 ft) or 3646 mm (12 ft) in length with a width between stiles of 356 mm (14 in). The stiles or sides shall be made from BS 1471 HT30 TF aluminium alloy of hollow section. The rungs shall be of BS 1471 HT9 TF aluminium alloy of 25 mm (1 in) minimum, 35 mm ($1\frac{1}{4}$ in) maximum diameter tube set at 457 mm (18 in) maximum, 305 mm (12 in) minimum centres, and shall be 1.6 mm (0.064 in) thick. The ladder shall be fitted with rubber or plastic covered hook ends which shall be provided with a locking device for securing the ladder to other apparatus.

If, at the purchaser's request, hooked end attachments are not fitted, the ends of the stiles should be protected to avoid damage to floors.

The maximum weight of aluminium ladders shall be 10.2 kg (22 $\frac{1}{2}$ lb) for 3048 mm (10 ft) ladders, and 16.3 kg (36 lb) for 3646 mm (12 ft) ladders. When tested in accordance with 5.3 of this section, ladders shall be capable of supporting their classified test load, and shall not be permanently deflected after removal of the test load.

5.2 Timber ladders. Timber ladders shall be one of the following types:

Type 1. Length up to 3048 mm (10 ft), stiles 60 mm x 29 mm ($2\frac{3}{8}$ in x $1\frac{1}{8}$ in) section, minimum clear width between stiles 356 mm (14 in).

Rung spacing not less than 305 mm (12 in) nor more than 457 mm (18 in) centres. Rungs either 32 mm ($1\frac{1}{4}$ in) diameter or as for oval wall bars, 45 mm x 35 mm ($1\frac{3}{4}$ in x $1\frac{3}{8}$ in).

Type 2. Length up to 3962 mm (13 ft), stiles not less than 70 mm x 32 mm ($2\frac{3}{4}$ in x $1\frac{1}{4}$ in) section, minimum clear width between stiles 356 mm (14 in).

Rung spacing not less than 305 mm (12 in) nor more than 457 mm (18 in) centres. Rungs either 32 mm ($1\frac{1}{4}$ in) diameter or as for oval wall bars 45 mm x 35 mm ($1\frac{3}{4}$ in x $1\frac{3}{8}$ in) oval section.

Timber ladders shall be made of the following materials:

(1) **Stiles.** Douglas fir, Sitka spruce
Straight grained, very high quality material is needed when cutting strings to the minimum size.

(2) **Rungs.** Group A softwood, excluding Sitka spruce, for oval section. Ash for round section.

(3) **Hooks or clamps.** Mild steel, malleable iron, or aluminium.

Timber ladders shall be constructed as follows:

All ladder stiles shall be machined from straight grained Douglas fir or Sitka spruce only. The rungs shall fit the holes drilled for them in the stiles and shall be secured with pegs, with a glued joint, or wedged and glued.

Adequate allowance shall be made in the construction for the bending and twisting that the ladder must withstand during use.

A pair of hooks shall be attached to one end of the ladder stiles. These shall be of a type fitted with a securing device. They shall be adequately protected to minimize damage to the apparatus upon which they are mounted. A second pair of hooks may be specified by the customer.

The maximum weight of timber ladders shall be 3.4 kg per metre run (2 1/4 lb per foot) for Type 1 ladders, and 4.5 kg per metre run (3 lb per foot) for Type 2 ladders.

When tested in accordance with 5.3 of this Section, ladders shall be capable of supporting their classified test load.

5.3 Test for all ladders. The ladder shall be mounted on simple fulcrums 50 mm (2 in) from either end and covering both stiles. The appropriate test load shall then be placed on or suspended from a point up to 152 mm (6 in) either side of the mid point. The test load shall be:

For Type 1, up to 3048 mm (10 ft) long:

over 2134 mm (7 ft) up to 3048 mm (10 ft)	225 kg (500 lb)
over 1524 mm (5 ft) up to 2134 mm (7 ft)	200 kg (450 lb)
up to 1524 mm (5 ft)	180 kg (400 lb)

For Type 2, up to 3962 mm (13 ft) long:

over 3353 mm (11 ft) up to 3962 mm (13 ft)	275 kg (600 lb)
over 3048 mm (10 ft) up to 3353 mm (11 ft)	250 kg (550 lb)

6. FIXED WINDOW LADDERS

6.1 Dimensions. The principal dimensions of fixed window ladders shall be as follows:

overall height from floor to centre line of carrying wheel
not more than 5283 mm (17 ft 4 in)

spacing of vertical members
600 mm $\pm$ 6 mm (1 ft 11 in $\pm$ 1/4 in) or 685 mm $\pm$ 6 mm (2 ft 3 in $\pm$ 1/4 in)

spacing of horizontal members
Type A 532 mm $\pm$ 6 mm (1 ft 9 3/4 in $\pm$ 1/4 in) centres
Type B 610 mm $\pm$ 6 mm (2 ft $\pm$ 1/4 in) centres

section of outer and intermediate vertical members
70 mm (2 3/4 in) x 44 mm (1 3/4 in)

section of horizontal members*
not more than 44 mm (1 3/4 in) x 35 mm (1 3/8 in) oval,
not less than 41 mm (1 5/8 in) x 32 mm (1 1/4 in) oval,

section of bottom rail
70 mm (2 3/4 in) x 57 mm (2 1/4 in)

* Alternatively, 32 mm (1 1/4 in) o.d. HT 30WP (16 SWG) (1.626 mm) aluminium alloy tubing may be used.