

BRITISH STANDARD

Flooring, stair treads and handrails for industrial use –

Part 0: Common design requirements and recommendations for installation

ICS 91.060.30



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Foreword

Publishing information

This part of BS 4592 was published by BSI Standards Limited, under licence from the British Standards Institution and came into effect on 29 December 2006. It was prepared by Subcommittee B/208/1, *Stairs and walkways – Industrial*, under the authority of Technical Committee B/208, *Stairs and walkways*. A list of organizations represented on this committee can be obtained on request to its secretary.

BS 4592-0:2006+A1:2012 comes into effect on 1 January 2013.

Supersession

BS 4592-0:2006+A1:2012, together with Part 1 supersedes BS 4592-1:1995, together with Part 2 supersedes BS 4592-2:1987, together with Part 3 supersedes BS 4592-3:1987, together with Part 4 supersedes BS 4592-4:1992 and together with Part 5 supersedes BS 4592-5:1995, together with BS 4211:2005+A1:2008, BS EN ISO 14122-1:2001+A1:2010, BS EN ISO 14122-2:2001+A1:2010, BS EN ISO 14122-3:2001+A1:2010, BS EN ISO 14122-4:2004+A1:2010, supersedes BS 5395-3:1985 which will be withdrawn on 31 December 2012.

Information about this document

Text introduced or altered by Amendment No. 1 is indicated in the text by tags A1. Minor editorial changes are not tagged.

BS 4592 is published in seven parts, as follows:

- *Part 0: Common design requirements and recommendations for installation;*
- *Part 1: Metal open bar gratings – Specification;*
- *Part 2: Expanded metal sections – Specification;*
- *Part 3: Cold formed metal planks – Specification;*
- *Part 4: Glass reinforced plastics (GRP) open bar gratings – Specification;*
- *Part 5: Solid plates in metal and glass reinforced plastics (GRP) – Specification;*
- *Part 6: Glass reinforced plastics (GRP) moulded open mesh gratings – Specification¹⁾.*

The requirements in this part cover areas that are not addressed by BS EN ISO 14122, *Safety of machinery – Permanent means of access to machinery*, which is published in the following parts:

- *Part 1: Choice of fixed means of access between two levels;*
- *Part 2: Working platforms and walkways;*
- *Part 3: Stairways, stepladders and guard-rails;*
- *Part 4: Fixed ladders.*

¹⁾ In preparation.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

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.

Requirements in this standard are drafted in accordance with *The BSI guide to standardization – Section 2: Rules for the structure, drafting and presentation of British Standards*, subclause **11.3.1**, which states, “Requirements should be expressed using wording such as: ‘When tested as described in Annex A, the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

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.

1 Scope

This part of BS 4592 specifies requirements for the design, manufacture, supply and installation of ~~flooring and stair treads~~ and handrails for industrial use for manufacturers and suppliers that are common to BS 4592 (all parts). ~~Text deleted~~

In addition to the definitive requirements, this standard also requires the items detailed in Clause 4 to be documented. For compliance with this standard, both the definitive requirements and the documented items have to be satisfied.

NOTE 1 Annex A gives methods of calculation and testing of the strength and deflection of flooring and walkways.

NOTE 2 Annex B gives recommendations for installation of floor panels.

NOTE 3 Annex C gives details of slip resistance testing.

This standard does not cover agricultural uses (see BS 5502).

Parts 1 to 6 of BS 4592 give specific requirements additional to those in this part (see Foreword).

For permanent protective barriers in and about buildings whether permanently fixed or secured by counter balance weights reference should be made to BS 6180:2011.

For temporary protective barriers in and about buildings reference should be made to BS EN 13374.

2 Normative references

The following referenced documents are indispensable for the application 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.

BS 5950-1:2000, *Structural use of steelwork in building – Part 1: Code of practice for design – Rolled and welded sections*

BS 6180:2011, *Barriers in and about buildings – Code of practice*

~~Text deleted~~

BS EN 1991-1-1, *Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings*

BS EN 13845, *Resilient floor coverings – Polyvinyl chloride floor coverings with particle based enhanced slip resistance – Specification*

BS EN ISO 14122-2, *Safety of machinery – Permanent means of access to machinery – Part 2: Working platforms and walkways*

3 Terms and definitions

For the purposes of this part of BS 4592, the following terms and definitions apply.

3.1 support

member supporting flooring

3.2 cut-out

area where flooring has been removed to permit services, plant or structural members to pass through or to clear obstructions

3.3 straight shaping

part of cut-out with straight edges

3.4 curved shaping

part of cut-out with curved edges

3.5 toe plate

upstand on a walkway or landing, or the lower part of a guard-rail, to prevent feet or objects sliding off (also known as a kicking plate)

3.6 span

clear distance between supports

3.7 elastic deflection

difference between the maximum deflection and the average of the end deflections

3.8 slip resistant flooring

floor surface that is suitable for use where users are walking or turning in dry or water contaminated conditions, which produces a coefficient of friction (CoF) results of 0.4 or more

NOTE See Annex C.

3.9 enhanced slip resistant flooring

floor surface that is suitable for use where users are engaged in strenuous activity (for example, pushing or pulling equipment) in dry or water contaminated conditions, which produces CoF results of 0.6 or more

NOTE See Annex C.

3.10 uniformly distributed load (UDL)

equivalent uniformly distributed static load per m² of plan area

3.11 stair width

$\langle A_1 \rangle$ distance between handrails or any other obstruction either side of strings $\langle A_1 \rangle$

3.12 tread length

distance between the stair strings, plus $\begin{smallmatrix} 0 \\ -2 \end{smallmatrix}$ mm

4 Information and requirements to be agreed and documented $\langle A_1 \rangle$ for flooring products $\langle A_1 \rangle$

The following items to be agreed between the contracting parties are specified in the clauses referred to and shall be fully documented. For compliance with the standard, both the definitive requirements specified throughout the standard and the following documented items shall be satisfied.

a) Scale plans provided of the area to be covered shall indicate the:

1) position of all supporting members;

2) $\langle A_1 \rangle$ direction of the load bearing bars, etc.; $\langle A_1 \rangle$

- 3) size of any cut-outs necessary for columns, cable and pipe openings, etc.

NOTE This information would be used to determine the amount of curved shaping and straight shaping required for pricing purposes.

- 4) location and size of any toe plates to be fixed to the flooring or walkways;
 - 5) location of any cut-outs necessary for columns, cable and pipe opening, etc. (where pipe movement occurs, the manufacturer or supplier shall request the client to state the limits of the extreme conditions).
- b) Type of flooring.
 - c) Surface A1 type A1 (e.g., plain, serrated, raised pattern or coated).
 - d) Whether a slip resistant or enhanced slip resistant flooring is required.
 - e) Materials from which the flooring, walkway or stair treads are to be fabricated A1 e.g. mild steel, stainless steel, aluminium or GRP A1
 - f) Details of the loading for which the flooring, walkway or stair treads are being designed.
 - 1) For wheel loading, the tread area, maximum wheel load and direction of travel shall be stated.
 - 2) For other concentrated loads, the concentrated load area shall be stated.
 - g) Details of any limitation on the depth of the flooring or walkway.
 - h) Details of any limitation on the size or weight of A1 individual floor panels. A1
 - i) Details of any limitation on the use of flooring to span a number of supporting members.
 - j) Whether the flooring or walkway is removable.
 - k) Type of support and method of fixing, e.g. clips, bolts or welding (see Annex B).
 - l) Whether the flooring or walkway is internal or external to a building and whether any particular corrosive conditions exist.
 - m) Type of protective coating.
 - n) Colour (if applicable).
 - o) Details of any conditions affecting the sequence or time schedule or the erection of floors or walkways, including heights relative to ground level A1 and panel size restrictions A1.
 - p) A1 Text deleted. A1

5 Flooring requirements

5.1 General

A1 Text deleted. A1

The maximum openings within a working platform or walkway shall not permit the passage of a A1 35 mm A1 diameter sphere, except where the working platform or walkway is above a place where people are working, as opposed to passing occasionally, then the maximum openings shall not permit the passage of a 20 mm diameter sphere.

NOTE This does not preclude the use of grating with load bars at 41 mm centres, providing either additional bars or the cross bars are spaced to prevent the appropriate sphere from passing through (i.e. grating type 41/100 and 41/50 alone will not meet the standard) .

Where metal treads or landings are used for fire escapes, the gratings shall not allow passage of a 20 mm diameter ball. **A1**

A1 Text deleted. **A1**

When the walkway is usually subject to passage or crossing of several persons simultaneously, the minimum unobstructed width shall be 1 000 mm.

In all other cases, the minimum unobstructed width of a platform or walkway shall be 600 mm.

NOTE 3 Where a walkway forms part of an escape route, attention is drawn to the Building Regulations for England and Wales, Approved Document B [1]; the Building Regulations (Northern Ireland), Technical Booklet E [2]; and the Building Standards (Scotland) Regulations, Section 2 (Fire) [3].

NOTE 2 If possible, the recommended minimum unobstructed width of a platform or walkway is 800 mm.

A1 Text deleted. **A1**

5.2 **A1** Stairs used as a means of escape **A1**

A1 The strings shall be constructed from steel sections or steel hollow sections and be fire resistant with treads constructed from, for example, steel, cast iron or precast concrete.

Gratings, planks or plates used for treads and landings shall conform to the relevant part of BS 4592.

The minimum stair clear width shall be 1 000 mm unless supplied for hospitals where the minimum stair clear width shall be 1 200 mm. **A1**

5.3 **A1** Design loads **A1** and deflections **A1**

A1 5.3.1 **A1** Design loads **A1**

Taking into account any design load implications due to plant, equipment or any other items placed on walkways (or cut-outs made in the walkways), the platform or walkway shall be designed to carry either the appropriate uniformly distributed load (UDL) or concentrated load, whichever produces the most onerous conditions of stress or deflection in the section (see Table 1).

NOTE Additional allowance should also be made for dynamic loads, if applicable.

Where a cut-out is required, the remaining area of the grating shall be able to carry the same load as the adjacent floor area.

The positions of concentrated loads shall either be those that produce the maximum stresses or, where deflection is the design criterion, those that produce the maximum deflection.