BRITISH STANDARD

Industrial type flooring and stair treads –

Part 6: Glass reinforced plastics (GRP) moulded open mesh gratings and protective barriers – Specification

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 7 and a back cover.

Foreword

Publishing information

This part of BS 4592 was published by BSI and came into effect on 30 September 2008. 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.

Information about this document

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 grating – 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 – Specification* (this part).

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.*

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.

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 glass reinforced plastics (GRP) moulded open mesh gratings intended for industrial flooring, walkways and stair treads.

It is not applicable where access to machinery is required, in which case the requirements of BS EN ISO 14122 apply.

NOTE For the common requirements for industrial flooring and stair treads, see BS 4592-0.

In addition to the definitive requirements, this standard also requires the items detailed in BS 4592-0:2006, Clause **4** to be documented. For compliance with this standard, both the definitive requirements and the documented items have to be satisfied.

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 4592-0:2006, *Industrial type flooring and stair treads – Part 0: Common design requirements and recommendations for installation*

BS 4592-1, *Industrial type flooring and stair treads – Part 1: Metal open bar gratings – Specification*

BS EN 14020, *Reinforcements – Specification for textile glass rovings*

3 Terms and definitions

For the purposes of this part of BS 4592, the terms and definitions given in BS 4592-0, BS 4592-1 and the following apply.

NOTE Definitions of some common terms are illustrated in Figure 1.

3.1 General terms

3.1.1 installed panel
grating panel cut or supplied to installation size

3.1.2 mesh
regular pattern of orthogonal ribs

NOTE Typical mesh shapes are square and rectangular.

3.1.3 mesh size (pitch)
centre to centre spacing of the structural elements of the moulded grid

3.1.4 moulded open mesh grating panel
panel moulded as a single unit with orthogonal mesh holes where the ribs are reinforced by continuous interlocking glass fibres

Figure 1 **Grating terms**

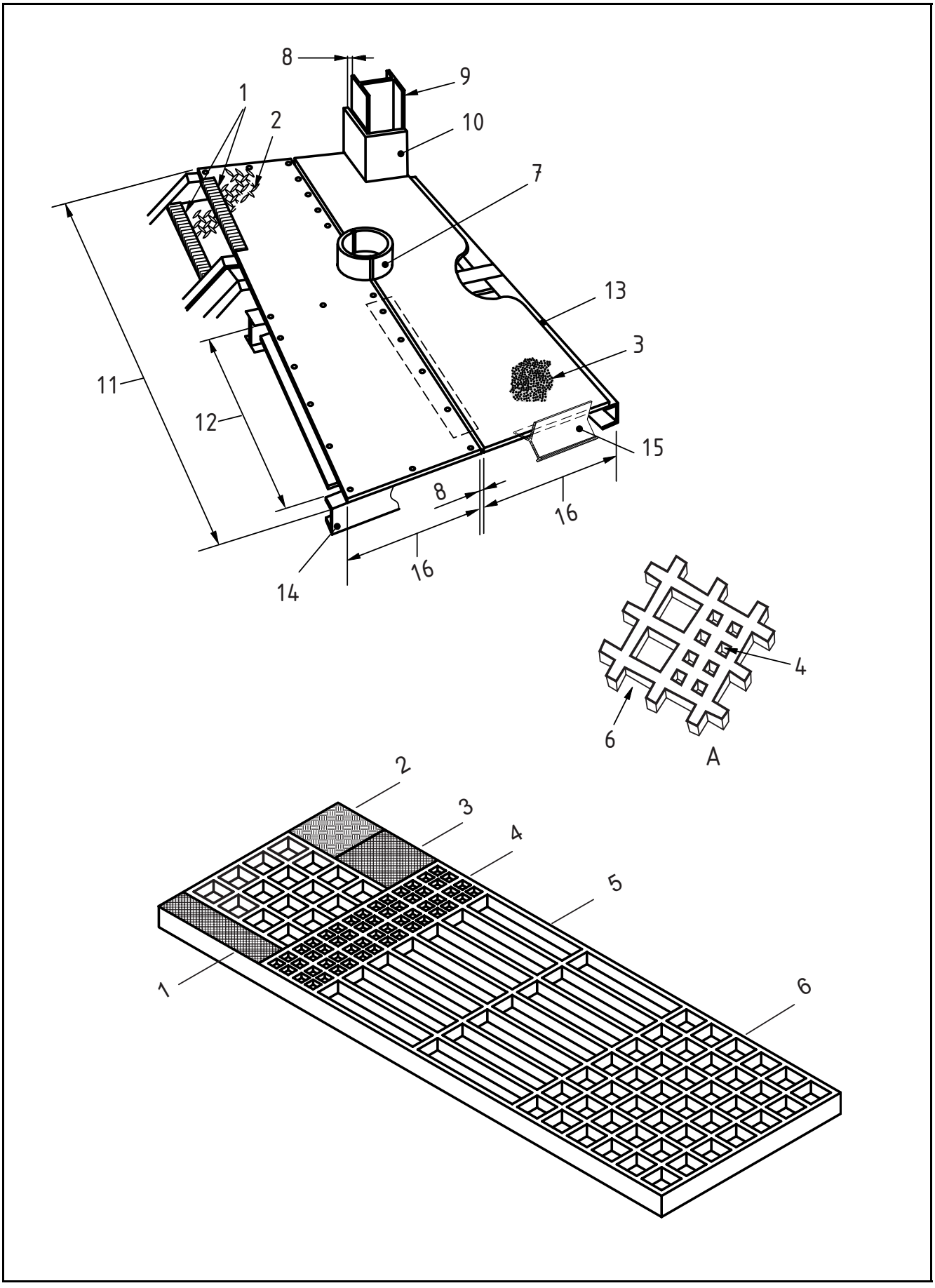

Figure 1 – Grating terms

Key

1	Nosing	9	Column or any other penetration requiring cover
2	Solid plated top with raised pattern surface	10	Cut-out with straight shaping and toe-plate
3	Solid plated top with gritted surface	11	Overall span
4	Mini mesh grating	12	Clear span (between primary supports)
5	Rectangular mesh grating	13	Secondary support
6	Square mesh grating	14	Primary support
7	Cut-out with curved shaping and toe-plate	15	Moulded curb angle (with continuous grouting tang)
8	Erection clearance	16	Width

3.1.5 nosing
single or composite section at the leading edge of a stair tread or to a grating at the head of a stair to provide additional reinforcement to the edge of the tread and/or additional slip resistance and/or a colour contrast to the main area of the tread

3.1.6 solid top grating
moulded open mesh grating panel to which a sheet of GRP has been bonded to the top surface during manufacture

3.2 Dimensions of grating panels

3.2.1 depth
overall thickness of the grating panel, including additional walking surface, if fitted

3.2.2 installed width
dimension of the installed panel at right-angles to the overall span

3.2.3 length
longest side of the grating panel, regardless of whether it is the overall span or the installed width

3.2.4 overall span
dimension of the installed panel at right-angles to the primary supports

3.2.5 width
shortest side of the grating panel regardless of whether it is the overall span or the installed width

4 Information to be supplied

Information shall be supplied by the purchaser in accordance with BS 4592-0:2006, Clause **4**.

5 Material requirements

The material shall be a composite of thermosetting resin reinforced with continuous glass fibre complying with BS EN 14020, with an equal number of layers in each direction. The top layer of reinforcement shall be not less than 4 mm below the top surface of the grating to provide maximum stiffness and prevent resin chipping from unreinforced edges. The glass content shall not exceed 40% w/w.

The top surface shall incorporate a suitable slip resistant surface to meet the requirements of BS 4592-0:2006, Clause **7**.

NOTE 1 For additional protection, surfaces that are subject to abrasion in service, should have a quartz grit applied, bonded on with an epoxy resin adhesive.

NOTE 2 The glass fibre might include continuous strand mat reinforcing, and only those additives (stabilizers, fillers, etc.) that are necessary to enable conformance to the requirements of this standard should be used in the resin mix.

NOTE 3 A post-manufacture protective surface coat can also be applied, if required, to enhance ultraviolet degradation resistance.

NOTE 4 Flame retardency to meet the requirements of BS 476-7, Class 1 or Class II and toxic fume emission when subject to flame can also be kept to a minimum if specifically required, by adjusting the material composition appropriately during the course of manufacture.

6 Dimensional and manufacturing tolerances

6.1 General

The maximum permissible tolerance of the finished sizes of the grating panels shall be as given in Table 1.

Table 1 **Permissible grating panel size tolerances**

Location	**Tolerance** mm
Length of grating panel	+0 –5
Width of grating	+0 –5
Depth of grating Up to and including 25 mm deep	+1 –0
Over 25 mm deep	+1.5 –0

The maximum permissible manufacturing tolerance shall be given in Table 2.

Table 2 **Manufacturing tolerances**

Location	**Tolerance** mm
Difference of the length of diagonals	5 (out of squareness of grating panel)
Transverse bow of panel before fastening to supports	1:100
Longitudinal bow of panel before fastening to supports	1:200
Bearing bar or grid spacing	± 5 per 1 500 length/width of panel

6.2 Moulded open mesh grating

After moulding, no dry glass fibres shall be visible on any surface. With the exception of the walking surface, all surfaces shall be smooth and uniform. There shall be no evidence of fibre orientation irregularities, inter-laminar voids, resin rich or resin starved areas.

The grid pattern shall be consistent over the area of the panel, subject to variants to match mesh size to moulded panel size.

The tolerance of the width of the moulded ribs making up the grid shall be not more than ± 0.5 mm of the width declared by the manufacturer.

7 Installed panels

NOTE 1 Panels can be cut to suit required length or penetrations.

After cutting, all cut edges shall be sealed with a suitable resin compatible with the grating resin.

NOTE 2 Individual panels can be joined together by either bolting or clipping or they can be restrained, in order to prevent uneven deflection or trip hazards, by the provision of butt straps or secondary supports.

NOTE 3 The direction of rectangular mesh should be clearly stated on all documentation so that the long side is always in the direction of the overall span.

8 Structural performance requirements

8.1 General

When tested in accordance with **8.2** or **8.3**, as applicable, the gratings shall withstand the appropriate unfactored loads given in BS 4592-0:2006, Table 1. Where a cut-out is required, the remaining area of the grating shall be able to carry the same load.

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

8.2 Flooring and walkways

When tested in accordance with BS 4592-0:2006, Annex A, the flooring or walkway shall conform to the following requirements:

a) It shall have a load safety factor, for dead and imposed loads, of not less than 4.0 when subjected to the unfactored imposed load given in BS 4592-0:2006, Table 1.

b) It shall deflect elastically by not more than 1/200 times the effective span or 10 mm, whichever is the least amount, when subjected to the unfactored imposed load given in BS 4592-0:2006, Table 1.

NOTE Standard structural design theory can be used for calculations at the preliminary design stage. In such calculations, it is important that the appropriate mechanical properties for each moulded grating be taken into account (see manufacturer's literature).

8.3 Stair treads

For glass reinforced plastics (GRP) moulded gratings the requirements of BS 4592-0:2006, Clause **6** shall be met.

NOTE *See Note to* ***8.2***.

8.4 Protective barriers

For protective barriers, the requirements of BS 4592-0:2006, **5.4** shall be met.

NOTE *See Note to* ***8.2***.

Bibliography

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 476-7, *Fire tests on building materials and structures – Part 7: Method of test to determine the classification of the surface spread of flame of products*

BS EN ISO 14122, *Safety of machinery – Permanent means of access to machinery – Part 1: Choice of a fixed means of access between two levels*

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