

BS 8442:2022+A1:2023



BSI Standards Publication

Miscellaneous road traffic signs and devices – Requirements and test methods

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Published by BSI Standards Limited 2023

ISBN 978 0 539 26318 3

ICS 93.080.30

The following BSI references relate to the work on this document:

Committee reference B/509/3

Drafts for comment 21/30439740 DC; 23/30471179 DC

Amendments/corrigenda issued since publication

Date	Text affected
October 2023	A1. See Foreword for details.

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Summary of pages

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 28 February 2022. It was prepared by Subcommittee B/509/3, *Construction of road traffic signs*, under the authority of Technical Committee B/509, *Road equipment*. A list of organizations represented on this committee can be obtained on request to the committee manager.

Supersession

BS 8442:2022 superseded BS 8442:2015, which has been withdrawn.

BS 8442:2022+A1:2023 supersedes BS 8442:2022, which is withdrawn.

Information about this document

BS 8442:2022 was a full revision of the standard, and introduced the following principal changes:

- a) references to legislation and other standards were updated and duplication of their content within this standard has been avoided where possible. This has the effect of making the full range of colours for permanent signs available also for temporary ones, with the identical chromaticity and luminance requirements;
- b) non-retroreflective roads studs were removed, as these are specified in the relevant Statutory Instrument (TSRGD);
- c) non-illuminated post requirements were simplified and the option of offset brackets added;
- d) a maximum luminance of 1 200 cd·m⁻² is given for beacon globes, including any device designed to improve the conspicuousness of the globe;
- e) the chromaticity of flashing amber signals is now to Yellow Class C2 of [BS EN 12966:2014+A1:2018](#);
- f) head and body components were distinguished for foreign object and water ingress and reference made to [BS EN 60529](#);
- g) clarification of purchaser information to be supplied has been made in some instances; and
- h) formulae in [Annex F](#) were corrected.

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

- 1) the values in [Table 3](#) (see [12.2.2.1.1](#)) have been updated;
- 2) in [13.3.2](#) the reference has been expanded;
- 3) edit to [A.2.2](#): the cross-reference has been changed from “4b)” to “4f)”;
- 4) edit to [A.3.2](#): “[Table 4](#), class RA2 or above” has been deleted from end of sentence.

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Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

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.

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. “organization” rather than “organisation”).

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

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

- The Traffic Signs Regulations and General Directions 2016 [[1](#)]
- Electrical Equipment Safety Regulations 2016 [[2](#)]
- Radio Equipment Regulations 2017 [[3](#)]
- Electromagnetic Compatibility Regulations 2016 [[4](#)]
- Traffic Signs Manual [[5](#)]
- Safety at Streetworks and Road Works: A Code of Practice [[6](#)]

1 Scope

This British Standard specifies requirements and test methods for rigid and flexible portable signs, barriers, self-supporting portable signs, “Stop/Go” and “Stop/Works” signs, school crossing patrol signs, flat traffic delineators, flap signs, pedestrian crossing and refuge beacons, internally illuminated posts, twin amber flashing light units and retroreflective self-righting bollards.

NOTE The tests given in this British Standard are suitable for both initial type testing and production testing.

Road studs are not covered by this British Standard.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

[BS 3424-5:1982](#), *Testing coated fabrics – Part 5: Methods 7A, 7B and 7C – Methods for determination of tear strength*

[BS 7263-1](#), *Precast concrete flags, kerbs, channels, edgings and quadrants – Part 1: Precast, unreinforced concrete paving flags and complementary fittings – Requirements and test methods*

[BS EN 40-2:2004](#), *Lighting columns – Part 2: General requirements and dimensions*

[BS EN 40-6:2002](#), *Lighting columns – Requirements for aluminium lighting columns*

[BS EN 485-1](#), *Aluminium and aluminium alloys – Sheet, strip and plate – Part 1: Technical conditions for inspection and delivery*

[BS EN 12332-1](#), *Rubber- or plastics-coated fabrics – Determination of bursting strength – Part 1: Steel ball method*

[BS EN 12665](#), *Light and lighting – Basic terms and criteria for specifying lighting requirements*

[BS EN 12767](#), *Passive safety of support structures for road equipment – Requirements and test methods*

[BS EN 12899-1:2007](#), *Fixed, vertical road traffic signs – Part 1: Fixed signs²⁾*

[BS EN 12966:2014+A1:2018](#), *Road Vertical Traffic Signs – Variable message traffic signs³⁾*

[BS EN 13032-1](#), *Light and lighting – Measurement and presentation of photometric data of lamps and luminaires – Part 1: Measurement and file format*

[BS EN 50293](#), *Road traffic signal systems – Electromagnetic compatibility*

[BS EN 60529](#), *Degrees of protection provided by enclosures (IP code)*

[BS EN 60598-1:2000](#), *Luminaires – Part 1: General requirements and tests*

[BS EN ISO 877-1:2010](#), *Plastics – Methods of exposure to solar radiation – Part 1: General guidance*

[BS EN ISO 877-2:2010](#), *Plastics – Methods of exposure to solar radiation – Part 2: Direct weathering and exposure behind window glass*

[BS EN ISO 1421](#), *Rubber- or plastics-coated fabrics – Determination of tensile strength and elongation at break*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

²⁾ This standard also gives informative references to BS EN 12899-1:2007.

³⁾ This standard also gives an informative reference to BS EN 12966:2014+A1:2018.

[BS EN ISO 1461](#), *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

[BS EN ISO 2286-2:1998](#), *Rubber- or plastics-coated fabrics – Determination of roll characteristics – Methods for determination of total mass per unit area, mass per unit area of coating and mass per unit area of substrate*

[BS EN 10240](#), *Internal and/or external protective coatings for steel tubes – Specification for hot dip galvanized coatings applied in automatic plants*

Other publications

[N1] INTERNATIONAL COMMISSION ON ILLUMINATION CIE 17.4, *International lighting vocabulary*

[N2] INTERNATIONAL COMMISSION ON ILLUMINATION CIE 15, *Colorimetry*

[N3] INTERNATIONAL COMMISSION ON ILLUMINATION CIE 54.2, *Retroreflection: definition and measurement*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in CIE 17.4 [N1] and the following apply.

3.1 coefficient of retroreflection R_A

luminous intensity of a surface in the direction of observation, divided by the product of the illuminance on a plane perpendicular to the direction of incident light and the area of the surface

NOTE R_A is expressed in candelas per lux per square metre: $\text{cd} \cdot \text{lx}^{-1} \cdot \text{m}^{-2}$.

3.2 conspicuity panel

part of the body of a self-righting bollard that enhances its conspicuity in all lighting conditions

3.3 entrance angle β

angle between the illumination axis and the retroreflector axis

NOTE In signing applications the entrance angle is less than 90° .

3.4 fluorescent

material that exhibits fluorescence

NOTE Fluorescence is an attribute of daytime appearance based on absorption of light at shorter wavelengths and emission at longer wavelengths.

3.5 ground line

level of surface on which a device is mounted

3.6 luminance

physical measure of optical stimulus that produces the sensation of brightness measured by the luminous intensity of light emitted or reflected in a given direction from a surface element divided by the area of the element projected in the same direction

NOTE The unit of measurement is candelas per square metre ($\text{cd} \cdot \text{m}^{-2}$).

3.7 luminance factor β

ratio of the luminance of a surface to that of a perfect diffuse reflector, identically illuminated and viewed

3.8 observation angle α

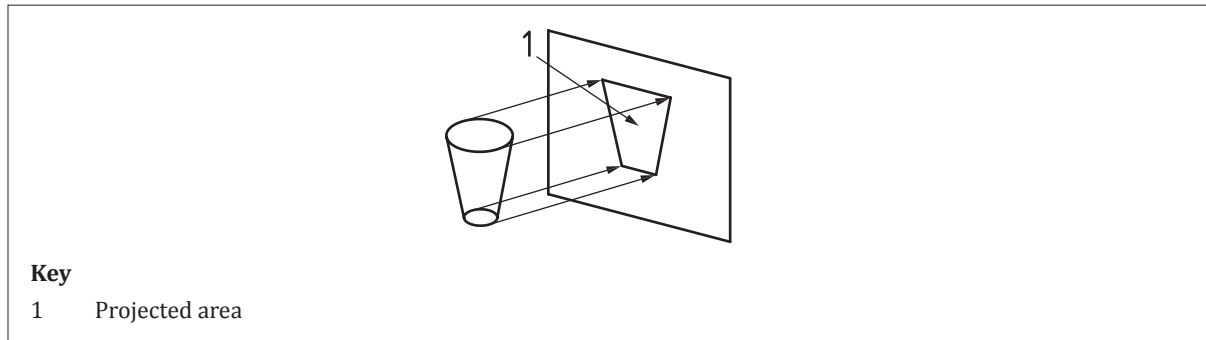
angle between the illumination axis and the observation axis

3.9 projected area

area of a three-dimensional object when projected on to a plane surface at right angles to the direction of viewing

NOTE See [Figure 1](#) for an example of projected area.

Figure 1 — Projected area



3.10 retroreflection

reflection in which the reflected rays are preferentially returned in directions close to the opposite of the direction of the incident rays, this property being maintained over wide variations in the direction of the incident ray

3.11 Retroreflective Self-Righting Bollard (RSRB)

retroreflective self-righting device normally mounted on a refuge or a traffic island

NOTE 1 An RSRB can contain a prescribed traffic sign or a plain white area. It incorporates conspicuity panels made from fluorescent yellow to enhance both daytime and night-time visibility. It is level A “non-harmful” (see [BS EN 12767](#)) when tested for passive safety and the depth of the body is limited so that, when deflected under impact, a vehicle can pass over it.

NOTE 2 RSRB are defined as traffic bollards for the purposes of the Traffic Signs Regulations and General Directions [1].

3.12 RSRB body

part of an RSRB above the lower edge of the front conspicuity panel

3.13 substrate

material that supports the sign face

3.14 traffic sign

any object or device, whether fixed or portable, for conveying, to traffic on roads or any specified class of traffic, warnings, information requirements, restrictions or prohibitions of any description

4 Information to be obtained from the purchaser

The following information shall be obtained from the purchaser when ordering to ensure products supplied are suitable for intended use:

- the properties of the retroreflective material (see [Annex A](#));
- the level of protection against electric shock (see [12.1](#));

- c) the degree of ingress protection required if it is higher than that specified in [12.2.1](#), [12.3.1](#) and [12.4.1](#);
- d) the length of a zebra crossing or refuge beacon post above ground (see [12.3.2.1](#) and [12.3.2.2](#));
NOTE 1 Attention is drawn to the Traffic Signs Regulations and General Directions 2016 [1] with regard to the prescribed limits.
- e) the method of securing a flashing amber light unit to a post (see [12.4.1](#));
- f) the substrate to which sign face material is to be applied if other than 3 mm aluminium sheet (see [A.2.2](#)); and
- g) the location ambient light levels and level of required luminance needed for the location of installation (or dimming facility) for belisha beacons, illuminated posts and flashing amber units.

NOTE 2 Purchasers should consider levels in relation to the background against which the product is viewed.

5 Self-supporting rigid portable signs, other than barriers

5.1 General

Self-supporting rigid portable signs shall be constructed in such a way that, when erected, the lowest edge of the sign, or of any supplementary plate, shall be not less than 300 mm above the supporting surface. The sign shall be so constructed that, when erected, the sign face is either normal to the supporting surface or inclined so that the top of the sign leans away from the viewer, at an angle not greater than 22.5° from the normal to the supporting surface when observed from the front.

NOTE 1 Retroreflective materials are designed to provide more reflected light to drivers when mounted vertically.

The sign assembly shall be designed to enable ballasting so that the sign resists the wind forces in its intended location. The sign assembly manufacturer shall indicate the minimum recommended ballast required and its positioning on the sign assembly's supports for the sign assembly to resist the wind speed class(es) for which it is designed [see [Table 1](#), [14.1e](#)] and [Annex B](#)].

NOTE 2 See further TMCA Guidance on Ballasting of Temporary Road Signs (TTM Advice Note 4) [7].

The minimum recommended ballast required for the sign assembly to resist Class A, Class B and Class C wind speeds shall be calculated using the methods described in [Annex C](#).

NOTE 3 Attention is drawn to the TSRGD [1] where the front of any backing board or background against which the sign is displayed is required by the TSRGD [1] to be grey or yellow.

Table 1 — Classification of effective wind speeds V_e

Class of wind speed	Effective wind speed, V_e ms ⁻¹
A	26.3
B	17.6
C	8.7

NOTE 4 Pressure due to passing vehicles is small by comparison and is not included in the calculation of effective wind speed. A guide to wind speed classes is given in [Annex D](#).

5.2 Visual performance of sign face material

The visual performance of the sign face material shall conform to [A.3](#).

NOTE The retroreflective classes from which specifiers can choose characterize reflective performance when mounted vertically. However, temporary traffic signs are often mounted non-vertically in use. The retroreflective performance of a sign mounted non-vertically is lower than that provided if that same sign was installed vertically. As no method exists to test reflective performance in non-vertical orientation, specifiers are encouraged to mount

signs vertically whenever possible. Where non-vertical mounting is unavoidable, specifiers should take into account the resulting reduced reflective performance when determining the reflective class to specify.

5.3 Physical performance of the sign face

The physical performance of sign face material shall conform to [A.4](#).

5.4 Physical performance of the sign assembly

When tested in accordance with [Annex E](#), the sign assembly shall not:

- a) begin to overturn by rotating at the back of the base when the force is applied from the front;
- b) begin to overturn by rotating at the front of the base when the force is applied from the back; or
- c) slide along the surface if the force is applied in either direction.

6 Portable barriers

6.1 General

Barrier units, comprising barrier boards, tapping rails, supports and bases, shall be capable of being incorporated into systems used to mark part of a highway that is closed to traffic or to guide traffic or pedestrians past an obstruction.

The barrier unit shall be constructed so as to allow the use of ballasting. The manufacturer shall indicate the minimum recommended ballast required, including its positioning on the barrier assembly's supports, for the barrier assembly to resist the wind speed class(es) for which it is designed [see [Table 1](#) and [14.1e](#)] and [Annex B](#)].

NOTE 1 Barrier units incorporating traffic signs intended to close a traffic lane, or guide traffic or pedestrians past works, are regulated by the TSRGD [1].

NOTE 2 The minimum recommended ballast required for the barrier assembly to resist Class A, Class B and Class C wind speeds should be calculated in accordance with [Annex E](#).

6.2 Visual performance

Visual performance of any traffic sign incorporated into portable barriers shall conform to [A.3](#).

6.3 Physical performance

Physical performance of portable barriers shall conform to [A.4](#).

7 Self-supporting flexible portable signs

7.1 General

The self-supporting portable sign shall be constructed in such a way that, when erected, the lowest edge of the sign or of any supplementary plate shall be not less than 300 mm above the supporting surface. The sign shall be so constructed that, when erected, the sign face is either normal to the supporting surface or inclined so that the top of the sign leans away from the viewer at an angle not greater than 22.5° from the normal to the supporting surface when observed from the front.

NOTE 1 The self-supporting portable sign should be designed in such a way that ingress of moisture does not impair the photometric or colorimetric performance of the sign.

NOTE 2 Vertical mounting should be used as this improves the retroreflective performance of virtually all sign face materials.

When tested in accordance with [Annex E](#), the sign assembly shall conform to [5.4](#).

NOTE 3 The front of any backing board or background against which the sign is displayed is required by the TSRGD [1] to be grey or yellow.

7.2 Visual performance

Visual performance shall conform to [A.3](#).

7.3 Physical properties of substrate material

The properties of the substrate to which the sign face is applied shall conform to the properties specified in [Table 2](#), when tested in accordance with the relevant standards specified in [Table 2](#).

NOTE 1 As these signs are generally transported and stored folded or rolled, the performance and legibility of the sign should remain intact after being transported. More details are given in the Traffic Signs Manual [5].

NOTE 2 Substrate material is not required to conform to [A.4](#).

Table 2 — Physical properties of substrate material

Property	Value	Test method
Minimum mass per unit area	500 g/m ²	BS EN ISO 2286-2:1998 , Method B
Minimum tensile strength	1 000 N/50 mm	BS EN ISO 1421
Maximum extension at break	15%	BS EN ISO 1421
Minimum tongue tear strength	400 N	BS 3424-5:1982 , Method 7A
Minimum bursting strength	2 750 kN/m ²	BS EN 12332-1

8 Manually operated portable “Stop/Go” and “Stop Works” signs

8.1 General

The sign shall be supported on a stand or pole constructed in such a way that the height to the centre of the sign measured from the road surface is between 1.2 m and 1.8 m.

Where a stand is provided, it shall be so constructed that the operator can rotate the sign about a vertical axis to present either face to an adjacent observer. Where specified by a purchaser, a device shall be incorporated in the stand that halts the movement of the sign in one direction, so that it presents only one of its faces, and only allows it to revolve enough to present the other face before again being stopped.

The sign shall be fixed to the stand or pole in such a way that the fixing does not alter or obscure the layout or colouring on either side of the sign.

Any visible supporting substrate to which the sign is applied shall be coloured grey.

NOTE 1 The signs to appear on each side of the substrate are specified in diagrams 7023, 7024 and 7031 in the TSRGD [1]. The substrate and any surrounding frame should be circular.

NOTE 2 The method of fixing the sign to the stand should be such that the sign cannot be dislodged or rotated from its position.

8.2 Visual performance

Visual performance shall conform to [A.3](#).

8.3 Physical performance

Physical performance shall conform to [A.4](#).

9 Portable school crossing patrol signs

9.1 General

The pole on which the sign is mounted shall be 1.4 m to 1.5 m in length. The sign shall be fixed to the pole in such a way that the fixing does not alter or obscure the layout or colouring on either side of the sign.

9.2 Visual performance

Visual performance shall conform to [A.3](#).

10 Portable flat traffic delineators (FTDs)

10.1 General

The blade and its attachment to the base or fixing shall be so constructed that the face of the blade presents a plane to the approaching traffic no more than 12.5° from the vertical.

The white portions shall be retroreflective; the red portions can also be retroreflective.

NOTE The general design and dimensions of FTDs are prescribed in diagram 7102 and other provisions of the TSRGD [1].

10.2 Visual performance

Visual performance shall conform to [A.3](#).

10.3 Physical performance

10.3.1 Impact resistance at low temperature

When tested in accordance with [Annex G](#), there shall be no cracking or delamination of any retroreflective surface from the substrate outside a circle of radius 6 mm, with the point of impact as its centre. The blade shall not become detached from its base. The FTD shall recover its original form after the impact.

10.3.2 Resistance to bending

When tested in accordance with [Annex H](#), the residual deflection of the top of the blade measured from the reference surface shall not exceed 5% of the height of the blade. The blade shall be neither damaged nor detached from its base.

10.3.3 Fatigue resistance

When tested in accordance with [Annex I](#), the blade shall be neither damaged nor detached from its base.

11 Fixed, permanent, manually operated flap signs

11.1 General

A flap sign shall consist of a sign plate constructed in such a way that the whole or part of the message can be concealed when not required or an alternative message displayed.

The sign shall be so constructed that not more than 5% of its surface is obscured by fittings used to effect the changes. Any hinge plates or other fittings shall be fitted to the back of the sign.

To avoid staining of the sign face, the fittings shall conform to [BS EN 12899-1:2007](#), 7.1.7, Table 15 for either SP1 or SP2.

NOTE When the message is concealed, the TSRGD [1] require the parts of the sign visible to drivers to be grey or black.

Means shall be provided for the assembly to be locked in both the displayed and concealed positions in such a manner that the sign face is not damaged.

11.2 Visual performance

Visual performance of the sign face material of flap signs shall conform to [A.3](#).

11.3 Physical performance

The flap sign shall conform to [BS EN 12899-1:2007](#).

12 Fixed, permanent pedestrian crossing and refuge beacons and twin amber flashing lights

12.1 Electrical requirements

Electrical components, including associated ballasts, flashing units and controllers, shall conform to [BS EN 50293](#) for electromagnetic compatibility.

Means shall be provided to correct the power factor to not less than 0.85 lagging or 0.95 leading.

Protection against electric shock shall be either Class 1 or Class 2 in accordance with [BS EN 60598-1:2000](#), 2.2, as specified by the purchaser [see 4b)].

Any base compartment housing electrical components shall be fitted with a secure lock.

NOTE Attention is drawn to the Electrical Equipment Safety Regulations 2016 (SI 2016/1101) [2] for further information on beacon globes, transilluminated posts and twin amber flashing lights.

12.2 Beacon globes

12.2.1 General

Unless otherwise specified by the purchaser [see 4c)], the level of ingress protection afforded by a beacon globe shall be IP 54 and conform to [BS EN 60529](#).

Account shall be taken of load bearing and the requirements of [BS EN 12767](#).

The globe shall be suitable for securely fixing to a post of nominal diameter 76 mm, 89 mm or 114 mm. Removal of the globe shall be possible only with the use of a tool.

The external surface of the globe shall be such that it does not retain dirt or moisture and is free from rough edges.

Globes shall remain permanently lit unless otherwise stated (e.g. flashing).

The light of a pedestrian crossing globe shall flash with the following characteristics:

- a) a flashing rate of (40 ± 4) flashes per minute; and
- b) a light-on period of between 50% and 60% of total cycle time.