BRITISH STANDARD

BS 5266-6:1999

# Emergency lighting —

## Part 6: Code of practice for non-electrical low mounted way guidance systems for emergency use — Photoluminescent systems

Confirmed January 2010

ICS 91.160.10

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CPL/34/9, Emergency lighting, upon which the following bodies were represented:

Association of British Theatre Technicians
Association of Building Engineers
Association of County Councils
Association of Manufacturers of Power Generating Systems
British Cable Makers Confederation
British Fire Consortium
Chartered Institution of Building Services Engineers
Chief and Assistant Chief Fire Officers Association
Cinema Exhibitors Association
Department of the Environment, Transport and the Regions
Department of Trade and Industry — Consumer Safety Unit, CA Division
District Surveyors Association
Electrical Contractors Association
Electricity Association
Engineering Industries Association
GAMBICA (BEAMA Ltd.)
Home Office
Industry Committee for Emergency Lighting Ltd. (ICEL)
Institute of Fire Prevention Officers
Institute of Fire Safety
Institution of Electrical Engineers
Institution of Lighting Engineers
Lighting Industry Federation Ltd.
London Transport
National Illumination Committee of Great Britain
National Inspection Council for Electrical Installation Contracting
Photoluminescent Safety Products Association
Tenpin Bowling Proprietors Association

This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 October 1999



**Amendments issued since publication**

| Amd. No. | Date | Comments |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

The following BSI references relate to the work on this standard:
Committee reference CPL/34/9
Draft for comment 94/209174 DC

**ISBN 0 580 33034 6**

# Contents

# Foreword

This part of BS 5266 has been prepared by Technical Committee CPL/34/9, Emergency Lighting.

This standard is supplementary to, and is intended to be used as an addition to, BS 5266-1.

The aim of this standard is to promote wider understanding of non-electrical low mounted way guidance systems, to encourage uniformity of application and to give advice on their most effective use within buildings.

Owing to the developing nature of the technology, a review of this part of BS 5266 will commence three years after the date of publication, as opposed to the usual five early review period.

Annex A is informative. Annex B is normative.

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

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 6, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

## Introduction

Photoluminescent way guidance systems use lines of light emitting visual markers to assist in indicating the location of escape routes and exits. Photoluminescent materials and products need sufficient pre-excitation by normal lighting. On failure of the normal lighting supply, the photoluminescent system emits the stored energy over a period of time with diminishing luminance. The photoluminescent components remain visible during the period of light decay when the lighting fails.

## 1 Scope

This part of BS 5266 gives recommendations for the planning, design, installation and servicing of photoluminescent low mounted way guidance systems, for use within emergency lighting systems.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 5266-1:1988, *Emergency lighting — Code of practice for the emergency lighting of premises other than cinemas and certain other specified premises used for entertainment.*

BS EN 60529:1992, *Specification for degrees of protection provided by enclosures (IP code).*

BS EN 60598-1:1997, *Luminaires — Part 1: General requirements and tests.*

IEC 60598-2-22:1997, *Luminaires — Particular requirements — Luminaires for emergency lighting.*

IEC 60092-101, *Electrical installations in ships — Part 101: Definitions and general requirements.*

## 3 Definitions

For the purposes of this standard the definitions given in BS 5266-1 apply, together with the following.

**3.1**

**non-electrical low mounted way guidance system**

low mounted luminous tracks positioned on escape routes in combination with exit indicators, exit marking and intermediate direction indicators along the route, provided for use when the supply to the normal lighting fails, which do not rely on an electrical supply for their luminous output

**3.2**

**photoluminescent system**

non-electrical low mounted way guidance system incorporating photoluminescent pigments that, if excited by UV or visible radiation, store energy which is emitted as light over a period of time with diminishing luminance

**3.3**

**photoluminescent escape route marker**

marker forming part of the way guidance system, readily visible in low ambient light

NOTE Lines of these markers are provided to clearly delineate an escape route or define an escape path through an open area.

**3.4 exit indicator**

illuminated indicator forming part of the way guidance system, provided to clearly identify an exit

NOTE It may be used with or without a supplementary sign mounted adjacent to the exit at low level for use when any overhead safety sign may be less effective or obscured.

**3.5**

**exit marking**

that part of the way guidance system provided to clearly identify an exit by using the luminous marking to outline part or all of the exit surround

**3.6**

**intermediate information and exit direction indicators**

that part of the way guidance system provided to identify exit routes and to clearly indicate direction towards an exit

**3.7**

**excitation**

process by which UV or visible radiation provokes the phosphorescent ability of a product

**3.8**

**excitation lighting**

lighting sufficient to produce the necessary excitation for a particular application

**3.9**

**light decay**

time dependent decrease of luminance after the end of excitation

**3.10**

**period of light decay**

period after the end of excitation in which the luminance decreases to 0.3 mcd/m$^2$

## 4 Planning

### 4.1 Consultation

The consultation recommendation given in BS 5266-1:1988, **3.1** and the recommendations for the provision of plans given in BS 5266-1:1988, **3.2** should be followed. In addition, the level of integration between photoluminescent low mounted way guidance, overhead normal lighting providing excitation, and illumination of signs should be considered. The type of light sources should be noted and site illuminance measurements should be conducted.

For new installations, the supplier/provider of the photoluminescent products should specify the lighting criteria of daylight and artificial light required to excite the product.

### 4.2 Selection of escape route

Photoluminescent low mounted way guidance relies for its effectiveness on a line of visible markers along the escape route. It is therefore important that the following are identified on the plans:

a) all routes suitable for use in an emergency;

b) all exits on escape routes, such as intermediate doors, storey exits and final exits;

c) all doors situated within the escape route and which do not form part of the means of escape;

d) any route which crosses an open area and an appropriate form of marking for that route;

e) location of normal lighting luminaires, the type of light source and luminaire cover, and predicted illuminances at placement positions for photoluminescent components.

### 4.3 Modes of operation

It is essential that the photoluminescent way guidance system should either be continuously excited by normal lighting or be sufficiently illuminated at all material times needed to produce the required luminance.

## 5 Components

Components fixed on the surface of an escape route should not have a significant effect on the combustibility or surface spread of flame characteristics of the surface. Photoluminescent components should either conform to the requirements of the 850 °C glow wire test as given in IEC 60598-2-22 or the appropriate flame spread requirements given in IEC 60092-101.

Components may be adversely affected by excessive exposure to UV. Manufacturers should supply documentation on the protection against UV built into their product and agree with the customer on the suitability of the performance of the product for the expected environmental conditions.

As components are mounted in exposed positions on or close to the floor they should have:

a) a minimum degree of ingress protection of IP54 (dust proof/splash proof) in accordance with BS EN 60529:1992;

b) adequate mechanical strength. The component should conform to the category of impact energy for road and street lighting luminaires as given in BS EN 60598-1:1997, Table 4.3 by showing no visible cracking of the material when tested in accordance with that standard;

c) adequate methods of fixing to the mounting surface, following the manufacturer's instructions.

## 6 Design

### 6.1 General

Photoluminescent low mounted way guidance systems are intended to complement emergency escape lighting systems. Guidance on the use and suitability of a photoluminescent low mounted way guidance system should be sought from the relevant enforcing authority and can be obtained by the appraisal of the system against an appropriate risk assessed safety programme. The inter-relationships of specific forms of emergency lighting are illustrated in Figure 1.

A low mounted way guidance system should be designed to ensure that the escape route is clearly marked with a visible "line of light" (see **6.3**).

The escape route corridors should be indicated by a line of markers on both sides of the escape route. When the escape route crosses an open area, the location of the route should be indicated by two parallel lines of route markers.

With the exception of stairs, it is essential that the lines of markers do not cross the route which is to be used in an emergency and do not cross the threshold of an exit. An exit's use should be identified by indicators or markers. This should be achieved by extending the escape route markers up to door handle height adjacent to the exit or to completely outline the surround of the exit.

For doors which are not used as part of the escape route (e.g. cupboard doors), the visual line of the wall mounted marker system should be continued by introducing a floor mounted marker system past the doorway.

A photoluminescent indicator should be mounted at a level no higher than 1 m above the floor adjacent to any exit. In all cases the indicator should be sited in such a position that it can be seen from the approach side of the exit.

NOTE All exit signs provided in a premises to which the Health and Safety (Safety signs and signals) Regulations 1996 [1] apply are subject to those regulations.

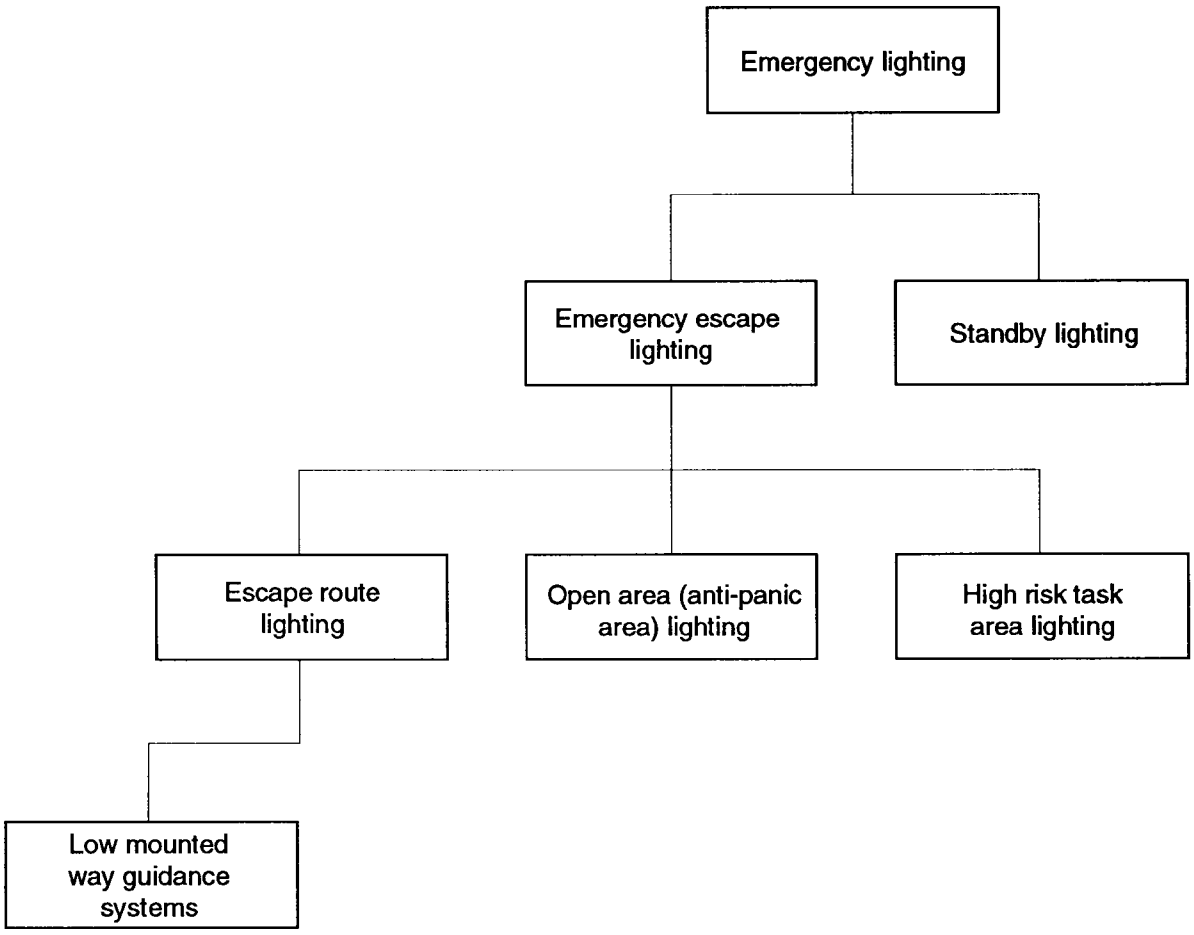


**Figure 1 – Inter-relationships of specific forms of emergency lighting**

Breaks may be necessary in the marker system when the escape route passes openings or intersecting corridors. Where such situations occur, breaks of up to 2 m in the marker system are acceptable.

Changes in level should be delineated by wall mounted components indicating the pitchline of a flight of stairs or contour of each tread of a flight of stairs, single steps and ramps. The beginning, passage and end of the change of level needs to be clearly marked. Escape route marker systems incorporated into stair treads should be visible when either ascending or descending the stairs. Marking on the guarding or handrail can provide an additional orientation aid.

Additional application factors which may need to be considered are given in annex A.

### 6.2 Mounting

Wall mounted marker systems should normally be mounted no higher than 300 mm above floor level.

Floor mounted marker systems should normally be mounted within 150 mm of the side of the escape route.

### 6.3 Gaps

Luminous elements within the lines of the marker system should be as continuous as possible. Any gaps between luminous elements within the marker system should be 300 mm or less.

### 6.4 Colour

The marker light source should be predominantly either white or green.

### 6.5 Luminance performance

Following excitation by the normal installed lighting for 15 min, the luminance performance of the product should be not less than the minimum installed luminance characteristics given in Table 1.

**Table 1 — Minimum installed luminance characteristics during light decay**

| At 1 min mcd/m$^2$ | At 10 min mcd/m$^2$ | At 30 min mcd/m$^2$ | At 60 min mcd/m$^2$ | At 150 min mcd/m$^2$ |
|---|---|---|---|---|
| 60 | 11.5 | 2.5 | 1.1 | 0.3 |
| NOTE For convenience, luminance should be measured using a photopic correction function. | | | | |

### 6.6 Width of luminous elements

For wall, stair tread and pitchline marker systems, the width of the luminous elements should be at least 75 mm.

For stair nosing markings, the width of the luminous elements should be at least 15 mm.

For marking of the exit door or exit surround, the width of the luminous elements should be at least 50 mm.

### 6.7 Installed artificial lighting

The installed artificial lighting should provide not less than the minimum excitation illumination necessary for all parts of the photoluminescent system to meet the minimum luminance performance recommended in **6.5** over the service life of the artificial lighting.

### 6.8 Response time

Photoluminescent components emit light instantaneously on removal of other lighting.

The luminous performance recommended in clause **6.5** should be achieved throughout the service life of the photoluminescent system.

The luminous performance recommended in **6.5** should be achieved in emergency mode operation for a duration of up to 2.5 h.

### 6.9 Indicator dimensions

Low mounted indicators should have a minimum symbol height of 75 mm.

## 7 Installation

The system should be installed in accordance with the manufacturer's instructions.

## 8 Commissioning

The performance of the system after installation should be checked in accordance with BS 5266-1:1988, clause **11**. The luminance performance of the photoluminescent system should be measured as specified in annex B.

## 9 Servicing and maintenance

The servicing and maintenance of the system should be carried out in accordance with the relevant parts of BS 5266-1:1988, clause **12** with spot measurements being carried out on the excitation sources and decor in accordance with the commissioning documentation.

## Annex A (informative)

## Application factors

Additional application factors which may need to be considered are the following.

a) In general, for a given size of luminous element, the greater the luminance of the photoluminescent component, the longer the visibility distance will be in low ambient light.

b) Fluorescent lamp light sources excite photoluminescent materials to greater luminances than do tungsten light sources. Fluorescent lamps are likely to be needed to provide sufficient excitation by applying at least the required illuminance values for the particular product for the minimum installed luminance performance to be achieved.

c) Daylight is a highly effective excitation source and daylight which penetrates onto the escape route can excite photoluminescent way guidance components and is therefore a factor during daylight hours.

d) The higher the excitation illuminance on photoluminescent materials, the greater the luminance. However there is a tendency to a saturation luminance performance for a particular light source and excitation illuminance.

e) Duration of the excitation illuminance is a factor. The time period to saturation may depend upon the type of photoluminescent pigment, excitation lighting and excitation illuminance.

## Annex B (normative)

## Measurement of the luminous performance of the photoluminescent system

The luminance properties of the photoluminescent material should be measured after excitation for a period of 15 min by illuminance from the installed lighting at no less than three locations.

Measurements of luminance should be made with a photometer corrected for photopic response with an accuracy of $\leq 3\,\%$ and should have a minimum sensitivity of $10^{-5}$ cd/m$^2$, and have a calibration accuracy of $\pm 5\,\%$. Luminance should be measured normal to the plane of the emitter.

Luminance measurements should be taken at 1, 10, 30, 60 min following the interruption of the excitation lighting which may be achieved with a suitable hood at the point of test. To determine the decay time the time interval between switching off the excitation lighting and reaching the luminance value of 0.3 mcd/m$^2$ should be measured.

Luminance measurements should be taken at points of lowest and highest illuminance and average values may be calculated. Results should be presented as a log luminance versus log time relationship. All results with locations should be noted in the log book.

NOTE If photoluminescent material is in areas receiving excitation as a result of significant and direct illumination by daylight from windows, then testing should be carried out in hours of darkness or with this source of excitation obscured.

## Bibliography

[1] GREAT BRITAIN. Health and Safety (Safety Signs and Signals) Regulations 1996, London, The Stationary Office.

*blank*

# BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

**Revisions**

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

**Buying standards**

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

**Information on standards**

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

**Copyright**



BSI
389 Chiswick High Road
London
W4 4AL