

Road lighting —

Part 9: Code of practice for lighting for urban centres and public amenity areas

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Foreword

This Part of BS 5489 has been prepared by Subcommittee CPL/34/8. It supersedes BS 5489-9:1992 which is withdrawn.

The 1990 edition of this Part of BS 5489 extended the code of practice on road lighting to those areas within villages, towns and cities which have an importance for social or other reasons, and for which lighting conditions different from those described in other Parts of BS 5489 were considered desirable or appropriate.

The 1992 edition introduced a revised definition of maintenance factor and incorporated editorial improvements. However it was not a full review or revision.

This revision introduces new recommendations for car park lighting and makes some editorial corrections to the previous edition.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

The general principles of road lighting are given in Part 1 of this British Standard. In urban and amenity areas, people should be attracted by a pleasant visual scene. During the hours of darkness, the surrounding environment and people need to be easily recognized. During the hours that business and commercial concerns are open, a relatively high level of lighting is needed which can usually be achieved by a combination of public and private lighting.

In view of the diverse nature of each particular site being considered no uniform method of lighting provision is suggested and it is most important to recognize that an individualized approach has to be taken. For this reason this Part of this British Standard makes basic recommendations only with regard to the overall lighting provisions, related to each area.

In most of these areas, lighting is needed on surfaces other than the horizontal. Light in many instances is particularly needed on the faces of pedestrians to ease identification.

During the day it is important to ensure that all lighting equipment complements rather than detracts from the appearance of the area. All the physical and psychological criteria such as height of columns and size, design and light distribution of luminaires should be in accord. The general lighting should define the area rather than the traffic route. During the early evening when all shop window lights and signs are illuminated this should all be considered as a part of the lit environment. However it is important to remember that during the late evening and during the night when shops are closed and the commercial light is reduced or extinguished, the public lighting should aid the security of shops and pedestrians' safety as well as the safe passage of any vehicular traffic.

The addition of an attractive and dynamic side to the general lighting installation can in many cases be left to the supplementary commercial lighting referred to above which, if carefully controlled, can introduce useful variations in overall lighting effects.

1 Scope

This Part of BS 5489 gives recommendations for the lighting of urban centres and public amenity areas for all road users. Vehicular and pedestrian traffic is involved and, therefore, all exterior public areas alongside, under or over roads are included. As visual orientation and location are important to both drivers and pedestrians within urban centres, recommendations for the highlighting of landmarks at night are also given.

2 References

2.1 Normative references

This Part of BS 5489 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Part of BS 5489 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This Part of BS 5489 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this Part of BS 5489 the definitions given in BS 5225-1:1975, BS 5489-1:1992, BS 5489-7:1992 and BS 6100-2.4.1:1992 apply, together with the following.

3.1

background luminance

the average luminance of the immediate surround of the object being viewed

3.2

conservation area

a statutory, designated area of architectural merit needing special attention to preserve its character

3.3

cycle path

a means of passage designed for cyclists

3.4

footpath

a means of passage for pedestrians

NOTE Footpaths may be across open spaces or between buildings.

3.5

horizontal illuminance

the illuminance on a horizontal surface of the area being considered (measured in lux)

NOTE In the text horizontal illuminance is denoted by the symbol E_H .

3.6**luminaire**

apparatus which controls the distribution of light given by a lamp or lamps and which includes all the components necessary for fixing and protecting the lamps and for connecting them to the supply circuit

3.7**maintained illuminance**

the average or minimum illuminance on the reference surfaces ensured by appropriate lamp renewals and maintenance

3.8**reflectance**

the ratio of the light flux reflected from a surface to the light flux incident on it

3.9**sparkle**

a subjective contribution to the enhancement of the visual scene made without causing visual discomfort or disabling glare

3.10**floodlighting**

lighting, by projection, of a scene or object in order to increase considerably the illuminance relative to the surroundings

3.11**isolux curve**

locus of points on a surface where the illuminance has the same value

3.12**candela**

the luminous intensity in a given direction of a source which emits monochromatic radiation of frequency 540×10^{12} Hz and of which the radiant intensity in that direction is 1/683 W/sr

NOTE This definition is repeated from BS 5775-6:1993.

4 Objectives of lighting

This Part of BS 5489 differs from most other Parts of the standard in that the efficient lighting of the road surface for traffic movement is not the only or main consideration. A balance with many other aspects has to be achieved.

Urban centres serve many users, each with differing and sometimes conflicting lighting needs. A master plan should be drawn up which contains the various elements in order of their importance and emphasis. These may include many of the following which should, therefore, all be considered:

- a) lighting design and choice of equipment in relation to the architectural scene and urban landscape;

- b) lighting to provide safety for pedestrians from moving vehicles and to deter antisocial behaviour;

- c) lighting commensurate with the character and volume of vehicular traffic (including cyclists);

- d) control of illuminated advertisements in the interests of amenity;

- e) control and integration of permanent floodlighting installations into the visual master plan;

- f) control of temporary special lighting effects, such as floodlighting and festive decorations;

- g) control of road and direction signs and their relationship with other illuminated material;

- h) control and blending of lighting from both public and private sources e.g. bus shelters and telephone kiosks;

- i) protection of residential developments from light pollution;

- j) protection of installations from accidental or deliberate damage;

- k) maintenance of installations.

5 Traffic**5.1 Categories of traffic**

The relative balance of the needs listed in clause 4 depends on the type of traffic, which can be divided into the following categories:

- a) primarily vehicular;
- b) mixed vehicular and pedestrian;
- c) wholly pedestrian.

The lighting levels for the general traffic situations within urban centres are given in Table 1.

5.2 Primarily vehicular traffic

The minimum lighting level should be that given in the appropriate category in BS 5489-2. However, there is a need for the lighting to accentuate the change in area use from that where the motorist is the prime road user to where a growing number of pedestrian activities are occurring. One way to mark this change of use is to alter the appearance of the lighting equipment to a more decorative type and/or change the colour of the light source. Whilst there is still a need to define a traffic route, normally achieved by direction signs, the lighting should define the area and general street scene. This last point is of special relevance when considering the daytime appearance of the installation.

Table 1 — Lighting levels for general traffic situations

Category and type		$\bar{L}$ cd/m ²	U_O	U_L	E_H (average) lx	E_H (minimum) lx
9/1 City or town centre						
9/1/1	Primarily vehicular	1.5	0.4	0.7	n/a	n/a
9/1/2	Mixed vehicular and pedestrian areas, including service areas	n/a	n/a	n/a	30	15
9/1/3	Wholly pedestrian	n/a	n/a	n/a	25	10
9/2 Suburban shopping street						
9/2/1	Primary vehicular	1.5	0.4	0.7	n/a	n/a
9/2/2	Mixed vehicular and pedestrian areas, including service areas	n/a	n/a	n/a	25	10
9/2/3	Wholly pedestrian	n/a	n/a	n/a	15	5
9/3 Village centre						
9/3/1	Primary vehicular	1.0	0.4	0.5	n/a	n/a
9/3/2	Mixed vehicular and pedestrian areas, including service areas	n/a	n/a	n/a	15	5
9/3/3	Wholly pedestrian	n/a	n/a	n/a	10	5
Key $\bar{L}$ is the maintained average road surface luminance (in cd/m ²); U_O is the overall uniformity ratio; U_L is the longitudinal uniformity ratio; E_H (average) is the maintained average horizontal illuminance (in lx); E_H (minimum) is the maintained minimum horizontal illuminance at any point (in lx); n/a not applicable. NOTE For primarily vehicular circumstances the lighting and criteria set out in BS 5489-2 apply.						

5.3 Mixed vehicular and pedestrian traffic

The lighting levels given in BS 5489-2 and BS 5489-3 should be regarded as minimum levels. It is important that pedestrians should be able to recognize any potential danger as well as appreciate their surrounding environment.

Where pavements are narrow or subject to very considerable pedestrian traffic then consideration should be given to the removal of the lighting columns and the use of wall brackets as referred to in BS 5489-1. To the motorist, road surface luminance is still important, but of equal importance is the need to see and clearly define pedestrian movements on the adjacent pavements. For this, illuminance on other planes is of importance. For pedestrians there are more needs: to see the vehicles and to see each other. Luminaire brightness needs to be carefully controlled in order to avoid glare. It should be noted that this does not only apply just to the public lighting installation but to the whole urban landscape of commercial signs, shop windows and the like.

At night, modest scale decorative floodlighting can assist traffic movement. A local landmark, known and used during the day as a means of orientation by both motorists and pedestrians, can be totally lost during the hours of darkness. This may be overcome by a purpose-designed floodlighting scheme, a single spotlight attached to an adjacent road lighting column or even by “spill light” from strategically positioned road lighting luminaires (see clause 15).

5.4 Wholly pedestrian traffic

The objective is that the lighting should promote easy movement of pedestrians and create a feeling of general security and well being. To achieve the latter, recognition of the behaviour and intentions of other pedestrians is important, and for this good colour rendering and good illuminance are very desirable. In commercial and leisure areas the provision of good lighting can add to the general amenity and so encourage people to visit and make use of the facilities.

6 Security and safety

The general lighting needs of traffic referred to in clause 5 in most cases serve the needs of security and safety. Additionally it is beneficial to utilize any public lighting installation throughout the hours of darkness rather than simply during times of major traffic movements. If normal lighting levels are very high, such as in some town and city centres, some form of “multiple lighting” (see clause 21) could be considered to reduce overall running costs. Special care should be taken to ensure that there are no dark corners. In such areas, where necessary, more than one lighting unit should be employed so that a single lamp failure does not leave an area in total darkness. To aid in crime detection, differentiation of colours is useful and this should be taken into account.

To provide a sense of security it should be possible to recognize whether another person is likely to be friendly, indifferent or aggressive, in time to make an appropriate response. The lighting level should give sufficient illuminance on a person's face to enable such recognition. In those situations within the scope of this standard, this can generally be achieved by using the lighting levels for horizontal illuminance given in Table 1 to Table 5, with luminaire mounting heights of between 4 m and 12 m.

NOTE The quantification of light on vertical planes presents a difficulty because of the multiplicity of planes at each measurement point which has to be taken into account. To some extent, this can be overcome by using the value for the average illuminance on an infinitesimally small vertical half cylinder situated at average head height (1.5 m). However with this measure, the semi-cylindrical illuminance, it is necessary to take into account at least three orientations of the half cylinder (the curved surface facing up, down and across the street). In addition, no simple method has yet been evolved for calculating semi-cylindrical illumination from a complete installation other than by using a computer (see annex A).

7 Trade and commerce

A function of public lighting in urban centres, in addition to that of general safety and security, is to enhance the night-time environment. The provision of good and attractive lighting is likely to assist in stimulating trade and commerce. Many instances can be cited where the specific attraction of this public lighting is known to attract large numbers of people, to the direct advantage of the local trade and commerce.

8 Visual appreciation

Added interest can be given to areas which people may wish to see by the use of imaginative lighting. These will include conservation areas and other areas of local importance containing buildings and monuments of historical interest.

Imaginative lighting design can also do much to subdue the less visually attractive features within an urban environment by highlighting the more attractive and worthwhile features.

9 Arcades and canopied areas

The lighting of arcades and canopied areas should be to a relatively high level to match that of the adjacent shop windows etc. Good colour rendering light sources should be used.

The lighting levels for arcades and canopied areas are given in Table 2.

10 Subways, footbridges, stairways and ramps

10.1 General

Subways, footbridges, stairways and ramps should all be lit to a higher level than their surroundings (see Table 3). In subways it is important that vertical surfaces are well illuminated and the lighting engineer should request that all surfaces are as light coloured as is practicable.

The lighting engineer should be consulted at the design stage to determine the location of the chosen luminaires relative to their performance so that the electrical intake cabinets and wiring conduits can be moulded into the construction.

In the event of an already constructed subway the design of the lighting and the type of luminaires and cable conduits should be such as to minimize the scope for abuse. Recessed ceiling fittings do not light the ceiling adequately, giving the impression of a reduction in height.

Surface-mounted luminaires are vulnerable to vandalism. Unless used in sufficient numbers, bulkhead fittings produce poor lighting due to the inadequate space to height ratio. Good lighting can be produced using cornice-mounted luminaires in continuous runs with panel infills, behind which all circuit wiring conduits can be fixed. This system gives a high degree of protection to the lighting installation except against abuse to the diffuser.

Lamp colour and colour rendering are both important factors to be considered. In general, tubular fluorescent lamps give suitable lamp colour and good colour rendering.

On long and complex subways the lighting should be operational over a 24 h period. It is recommended that the installation be designed to give higher levels during daylight hours which can be switched to lower levels of illuminance during the hours of darkness. Switching can be carried out by either time switch or photocell.

During the daytime the brighter surroundings of a subway entrance area, relative to a low level of subway interior lighting, can create a “black hole” effect. At night a reversal of this effect can be experienced when emerging from the subway into lower levels of exterior lighting. In order to overcome this undesirable situation during the daytime the entry area of the subway should be provided with extra threshold zone lighting (see note 3 to Table 3). At night the threshold zone values should be reduced, with exterior approaches to the subway provided with good levels of light. For footbridges and stairways it is important that the risers are illuminated differently to the treads so as to accentuate the steps even if the difference is already highlighted by the use of different materials.

On footbridges care should be taken to install the lighting units in such a manner as to complement the structure but with due consideration given to future maintenance.

10.2 Emergency lighting

On longer complex subways, emergency lighting, in accordance with BS 5266 should be considered, lasting for a minimum duration of 1 h. Self-maintained units are recommended.

If the area forms part of an escape route from a shopping centre, car park or transport interchange it is essential that emergency lighting is installed.

Table 2 — Lighting levels for arcades and canopied areas

Type	Day		Night	
	E_H (average) lx	E_H (minimum) lx	E_H (average) lx	E_H (minimum) lx
Open arcade	n/a	n/a	75	50
Totally enclosed arcade or canopied areas	250	150	150	75
Key E_H (average) is the maintained average horizontal illuminance (in lx); E_H (minimum) is the maintained minimum horizontal illuminance at any point (in lx); n/a not applicable. NOTE Illuminance uniformity ratio (E_H (minimum) to E_H (average)) should be as high as possible but no lower than 0.4.				

Table 3 — Lighting levels for subways, footbridges, stairways and ramps

Type		Day		Night	
		E_H (average) lx	E_H (minimum) lx	E_H (average) lx	E_H (minimum) lx
Subways:	open	n/a	n/a	50	25
	enclosed	350	150	100	50
Footbridges:	open	n/a	n/a	30	15
	enclosed	350	150	100	50
Stairway/ramp:	open	n/a	n/a	30	15
	enclosed	350	150	100	50
NOTE 1 “Open” equates to major daylight penetration. NOTE 2 For “enclosed” areas emergency lighting needs to be considered. It is essential that it is installed if the area forms part of an escape route from a shopping centre, car park or transport interchange. NOTE 3 Where longer subways have poor daylight penetration, or where subway user confidence needs to be ensured, it may be necessary for the threshold illuminance value to be up to twice the value of the general daytime service level. Key E_H (average) is the maintained average horizontal illuminance (in lx); E_H (minimum) is the maintained minimum horizontal illuminance at any point (in lx); n/a not applicable.					