

Luminaires —

Part 103: Performance requirements —

Section 103.2 Specification for photometric characteristics of luminaires for hospitals and health care buildings

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Foreword

This British Standard has been prepared under the direction of the Electrical Illumination Standards Committee. It supersedes the requirements for photometric performance of BS 3541:1962. The requirements for electrical safety and mechanical construction given in BS 3541, which is withdrawn, are superseded by BS 4533-102.55.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, 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.

1 Scope

This Section of BS 4533-103 specifies requirements for photometric characteristics of luminaires for medical treatment, examination and care in hospitals and health care buildings. The requirements specified are for luminaires in bedded areas¹⁾, for three types of general examination luminaire²⁾, and for operating theatre table luminaires³⁾.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Luminaires for bedded areas

2.1 General

NOTE Special types of fluorescent lamp are required in luminaires used in clinical areas. In general, photometric measurement of luminaires for bedded areas should be in accordance with BS 5225-1. In most cases luminaires are viewed by recumbent patients transversely.

2.1.1 Luminance measurements shall be in accordance with section six of BS 5225-1:1975, and both types of luminance measurement a) and b) described in clause 62 of BS 5225-1:1975 shall be required for the purposes of 2.1.2 to 2.6.

2.1.2 The average luminance L_θ of the luminaire at the critical angle (in cd/m^2) shall be calculated from the following formula.

$$L_\theta = \frac{l_\theta L_0 n}{W l k}$$

where

- l_θ is the intensity (in cd) per 1 000 lm taken from the transverse axis photometric distribution curve of the luminaire at the viewing angle θ ;
- L_0 is the lighting design output of the lamp to be used in the luminaire (in lm using the lumen output of a fluorescent lamp approved for clinical use);
- n is the number of lamps in the luminaire;
- W is the orthogonally projected width (in m) of all parts of the luminaire which contribute direct or reflected intensity at angle θ (see Figure 1 and Figure 2);
- l is the luminous length of the luminaire (in m);
- k is a constant of value 1 000 where the photometric distribution curve of the luminaire is based on a 1 000 lm lamp output;

θ is the angle between the vertical and the supine patient's line of sight to the photometric centre of the luminaire.

NOTE See 2.2 to 2.5 for standard angles.

2.1.3 The patch luminance scan shall include all parts of the luminaire that contribute to direct or reflected intensity at angle θ . The patch area measured shall be not greater than 25 mm^2 .

2.2 Surface ceiling-mounted luminaires

Surface ceiling-mounted luminaires shall have an upper flux fraction of 0.15 to 0.30 with a minimum light output ratio of 55 %. The average luminance of the luminaire at 60° to the downward vertical shall not exceed $1\,800 \text{ cd/m}^2$ and patch luminance shall not exceed $2\,250 \text{ cd/m}^2$ at the same angle.

NOTE This type of luminaire is recommended for bedded areas having ceiling heights up to 3 m from finished floor level.

2.3 Suspended ceiling-mounted luminaires

Suspended ceiling-mounted luminaires shall have an upper flux fraction of 0.40 to 0.70 with a minimum light output ratio of 45 %. The average luminance of the luminaire at 50° to the downward vertical shall not exceed $1\,000 \text{ cd/m}^2$ and patch luminance shall not exceed $1\,250 \text{ cd/m}^2$ at the same angle.

NOTE 1 This lower limit is necessary because such luminaires are usually viewed against a dark background.

NOTE 2 This type of luminaire is recommended for bedded areas having ceiling heights of 3 m and above from finished floor level.

2.4 Recessed and semi-recessed luminaires

Recessed and semi-recessed luminaires shall have an upper flux fraction of 0 to 0.10 with a minimum light output ratio of 50 %. The average luminance of the luminaire at 55° to the downward vertical shall not exceed 700 cd/m^2 and patch luminance shall not exceed 875 cd/m^2 at the same angle.

NOTE This type of luminaire is recommended as an alternative to that specified in 2.2 for bedded areas having ceiling heights between 2.4 m and 3.0 m.

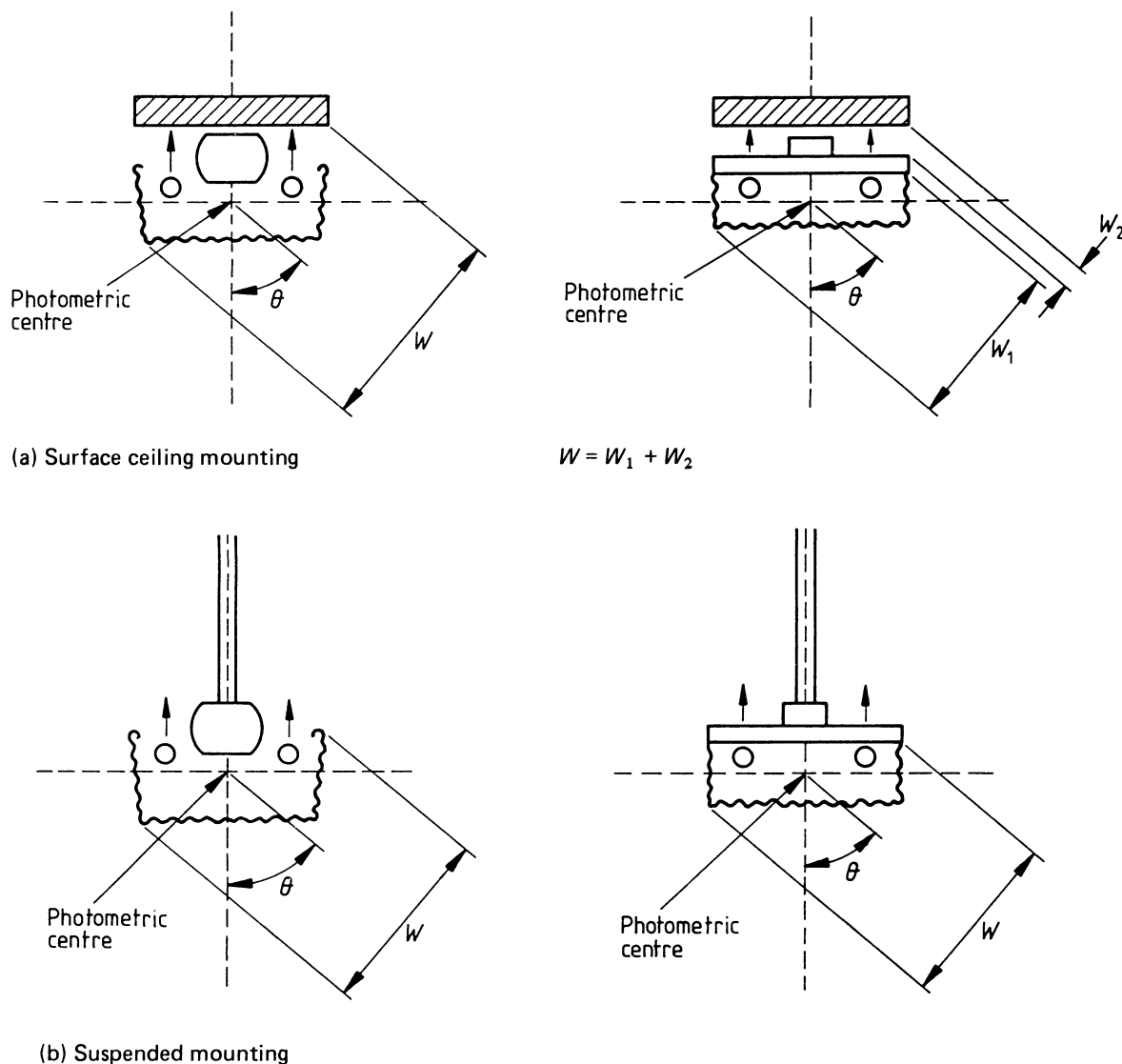
2.5 Wall-mounted luminaires

Wall-mounted luminaires shall have an average luminance at 70° to the downward vertical not exceeding 700 cd/m^2 and patch luminance at the same angle shall not exceed 875 cd/m^2 . The luminaire shall have a minimum light out-put ratio of 50 % with at least 70 % of the output directed forward into the zone 145° to 175° from the downward vertical, and not more than 10 % of the output shall fall on the wall above the luminaire.

¹⁾ For definition see 55.3.3 of BS 4533-102.55:1986.

²⁾ For definition see 55.3.7 of BS 4533-102.55:1986.

³⁾ For definition see 55.3.11 of BS 4533-102.55:1986.



NOTE W is the orthogonally projected width at angle θ elevation for linear luminaires viewed transversely.

Figure 1 — Examples of orthogonally projected width and photometric centres

NOTE See Figure 3. This type of luminaire is recommended for single-bed areas but can be used in multi-bed areas. However, when it is used in multi-bed areas it will generally be necessary to install additional central luminaires as described in 2.2 to 2.4.

2.6 Night light luminaires

The luminance of night light luminaires at 55° to the downward vertical shall not exceed 30 cd/m^2 .

NOTE This type of luminaire is recommended for bedded areas and ward corridors.

2.7 Wall-mounted bed-head luminaires (fixed arm)

For wall-mounted bed-head luminaires with fixed arm, a stop shall be fitted to limit the angle of tilt such that there is no direct view of the lamp from the opposite bed.

The luminance of the visible lower edge of the shade from the opposite or adjacent bed shall not exceed 500 cd/m^2 .

NOTE See Figure 4.