

Hea 02 Artificial light

(all buildings)

Aim

To ensure artificial lighting and occupant controls are considered at the design stage to ensure best practice in visual performance, visual comfort, and overall wellbeing for building occupants.

Overview

Assessment type	Available credits	Applicable assessment criteria
Fully fitted	2 + 1 exemplary	All (see ref 1.0)
Shell and core	1	3 (see ref 1.0)
Shell only	1	3 (see ref 1.0)
Residential: fully fitted	2+1	All (see ref 1.0)
Residential: partially fitted	1	3 (see ref 1.0)
EU Taxonomy	-	None

Minimum standards

Rating level	Criteria
None	-

Assessment type specific notes

Ref	Assessment type specific note
1.0	<p>External lighting</p> <p>Where no external light fittings are specified (either separate from or mounted on the external building façade or roof), the criteria relating to external lighting do not apply.</p> <p>For fully fitted buildings, the credit can be awarded based on compliance with criteria 1–3.</p> <p>For all other assessment types, the credit is not applicable, and the issue is filtered out.</p>

Building type specific notes

Ref	Building type specific note
2.0	<p>Hospitality – lighting levels in hotel bedrooms</p> <p>Internal lighting levels in hotel bedrooms will not usually need to conform to national best practice levels for offices as these spaces are not generally used as a workspace. However, if hotel bedrooms, or rooms within a hotel suite, are intended to be used as workspaces, similar to a small office, the lighting levels should conform to national best practice levels for this type of space.</p>

Assessment criteria

This issue is split into six parts:

- Internal and external lighting - one credit
- Zoning and occupant control - one credit
- Exemplary credit – Lighting control

Internal and external lighting – one credit

Internal lighting

- 1 Internal lighting in all relevant areas of the building is designed to provide an illuminance (lux) level appropriate to the tasks undertaken, accounting for building user concentration and comfort levels. This can be demonstrated through a lighting design strategy that provides illuminance levels in accordance with national best practice lighting guides (see CN1). Compliance criteria should include, as applicable for each type of application:
 - 1.a Illuminance levels and uniformity
 - 1.b Glare limits
 - 1.c Colour appearance (where standard recommendations exist)
 - 1.d Colour rendering
- 2 For areas where computer screens are regularly used, specific confirmation is required that the lighting has been designed to limit the potential for glare in accordance with a numerical glare limit specified within national best practice lighting guides (see CN1 and CN2). These should include:
 - 2.a Limits to the luminance of the luminaires to avoid screen reflections. Manufacturers' data for the luminaires should be sought to confirm this.
 - 2.b For uplighting, the recommendations refer to the luminance of the lit ceiling rather than the luminaire; a design team calculation is usually required to demonstrate this.
 - 2.c Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.

External lighting

- 3 All external lighting located within the construction zone is specified in accordance with EN 13201 series (parts 1 to 5) and EN 12464-2:2024. External lighting should enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. This can be demonstrated through a lighting design strategy that provides lighting parameters in accordance with national best practice lighting guides (see CN1). Compliance criteria should include, as applicable for each type of application:
 - 3.a Illuminance / luminance levels and uniformity
 - 3.b Glare limits
 - 3.c Colour rendering

One credit – Zoning and occupant control

- 4 Internal lighting is zoned to allow for occupant control in accordance with the criteria below for relevant areas present within the building, as applicable:
 - 4.a Workstations adjacent to windows or atria and other building areas are separately zoned and controlled
 - 4.b In office areas where furniture layout is known: zones of no more than four workplaces
 - 4.c Seminar and lecture rooms: zoned for presentation and audience areas
 - 4.d Library spaces: separate zoning of stacks, reading and counter areas
 - 4.e Teaching space or demonstration area
 - 4.f Whiteboard or display screen
 - 4.g Auditoria: zoning of seating areas, circulation space and lectern area.
 - 4.h Dining, restaurant, café areas: separate zoning of servery and seating or dining areas
 - 4.i Retail: separate zoning of display and counter areas
 - 4.j Bar areas: separate zoning of bar and seating areas
 - 4.k Day rooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff
 - 4.l Hotel bedrooms: separate zoning of hallway, bathroom, desk and sleeping area (where present in the room).
- 5 Areas used for teaching, seminar or lecture purposes have lighting controls specified in accordance with the size and use of the space, but a typical auditorium or lecture theatre with stepped seating and a formal lectern / demonstration / performance area would typically be expected to have lighting controls as follows:
 - 5.a Full normal lighting (to allow for entry and exit, cleaning etc.)
 - 5.b Demonstration area lighting off and audience area lighting reduced to a low level (for the purpose of line slide projection, but allowing enough light for the audience to take notes)
 - 5.c All lighting off (for the projection of tone slides, colour slides, and for the purposes of visual demonstrations or performances)
 - 5.d Separate localised lectern lighting.
- 6 Where automatic lighting controls are used for energy efficiency reasons, manual override must be provided.
- 7 In addition, the building type criteria in Table 15 (where relevant).

One exemplary credit – Lighting control

- 8 Lighting in each control zone within an occupied space can be manually dimmed by occupants down to no more than 20% of the maximum light output using lighting control interfaces positioned in accessible locations.
- 9 Lighting in each control zone within an occupied space can be colour tuned over a correlated colour temperature range from 2700K or less to 4000K or more, with automatic controls set to limit the correlated colour temperature in the afternoon and evening to 2700K or less.

Checklists and tables

Table 15 Building-specific zoning and control requirements

Building type	Internal and external lighting requirements
Education buildings	Manual lighting controls are easily accessible for the teacher while teaching and on entering or leaving the teaching space. Manual lighting controls need only be provided for staff, not the children.
Law court buildings	Separate zoning is also provided for the following areas (as a minimum): <ul style="list-style-type: none"> • Judge's or magistrate's bench • Dock • Jury area • Public seating area. Lighting control of the zones in the above spaces, and the court as a whole, cater for the following settings: <ul style="list-style-type: none"> • Full lighting (to allow cleaning etc.) • Normal lighting (for court sessions) • Dimmed (for the purpose of showing audio-visual evidence but allowing enough light for note taking).
Internal areas excluded from the lighting zone requirements	The following internal areas are excluded from the lighting zone requirements: <ul style="list-style-type: none"> • Media and arts production spaces • Sports facilities (exercise spaces only, including hydrotherapy and physiotherapy areas).

Methodology

M1: Internal and external lighting

M1.1: Occupancy or workstation layout

The limit of four workspaces is indicative of the required standard but is not a fixed requirement. Where there is justification for this to be increased to fit with the adopted lighting strategy, this may be accepted provided that the assessor is satisfied that the aim of this criterion is upheld, i.e. that there is suitable zoning or control of lighting to enable a reasonable degree of occupant control over lighting in their personal work area. The relevant design team member, e.g. lighting consultant, should set out how this is to be achieved in such an instance.

Where occupancy or workstation layout is not known, lighting control can be zoned on the basis of 40 m² grids, i.e. an assumption of 1 person or workspace per 10 m².

Compliance notes

Ref	Terms	Description
Internal and external lighting		
CN1	National best practice lighting guides	National best practice lighting guides include the relevant regulations (Arbetsmiljöverkets föreskrifter) from "Arbetsmiljöverket"; Arbetsplatsens utformning (AFS 2020) and Arbete vid bildskärm (AFS 1998:05) as well as the following Swedish standards and practice: SS-EN 12464-1:2021 and SS-EN 12464-2:2024" (for internal lighting Ljus & Rum can be used as guidance)
CN2	Lighting levels for areas where computer screens are regularly used	Projects can specify 300 lux instead of what is prescribed in EN 12464-1. This is as per CIBSE Lighting Guide 7.
CN3	External lighting – architectural façade/decorative lighting	Architectural façade or other decorative lighting, which does not provide users with lighting to perform tasks outdoors, does not need to be included in the assessment of external lighting.
Zoning and control		
CN4	Small spaces	Buildings consisting entirely of small rooms or spaces (less than 40 m ²) which do not require any subdivision of lighting zones or control will meet the zoning criteria by default.
CN5	Zoning rooms not listed	For zoning rooms or spaces not listed within criteria 5 and 6, the assessor can exercise an element of judgment when determining whether what is specified is appropriate for the space, given its end use and the aim and criteria of this BREEAM issue.
CN6	Task lighting	Lighting zoning criteria are applicable to both general lighting and task lighting (where present). Task lighting is only considered in fully fitted projects, where they are integrated into the workstations, are able to be controlled individually by occupants, and can be centrally controlled by building management, enabling automatic switch off. Portable task lights are not accepted. Task lighting must connect to the building systems in a way that prevents removal by general users.
CN7	Dimming control	Localised dimming controls installed in line with the criteria, along with a master on/off switch, can be considered as meeting the aim of the requirement for 'controls' in open plan offices.
CN8	Hand held remote controls	Remote control light switches can be considered as compliant, on the basis that these are provided in sufficient numbers/locations to meet the aim of the criteria.
CN9	Exemplary zoning and control	The exemplary level criteria apply only to lighting zones in the asset where: <ul style="list-style-type: none"> • Zones will benefit from dimming control. • Dimming does not interfere with the function of the space. Where lighting zones do not have dimming controls fitted, these must be clearly evidenced and justified.

Evidence

Criteria	Interim design stage	Final post-construction stage
Internal and external lighting, Zoning and occupant control, Lighting control		
1–9	Design drawings, lighting schedules and lighting control strategy. OR Relevant section or clauses of the building specification or contract. OR A letter of formal confirmation of compliance from the building services engineer or lighting designer.	Assessor site inspection report and photographic evidence. Documentary evidence to confirm compliance such as final construction or equivalent lighting schedules, lighting layout plans, lighting control strategy, lighting calculations or light testing results. A letter of formal confirmation of compliance from the building services engineer or lighting designer.

Definitions

Computer simulation

Software tools that can be used to model more complex room geometries for daylighting.

Construction zone

For the purpose of this BREEAM issue, the construction zone is defined as the site which is being developed for the BREEAM-assessed building, and the external site areas that fall within the scope of the new works.

Illuminance

The amount of light falling on a surface per unit area, measured in lux.

Occupied space

A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user.

Reflectance

The ratio of the luminous flux reflected from a surface to the luminous flux incident on it.

Relevant building area – Internal and external lighting

Relevant areas for internal lighting should cover all the relevant areas listed within the standard used, i.e. EN 12464-1:2021 (Table 9 – 61).

Where no external light fittings are specified (either separate from or mounted on the external building façade or roof), the criteria relating to external lighting do not apply and the credit can be awarded on the basis of compliance with the internal lighting criteria.

Separate zoning – Occupant control

Light switches or controls for a particular area or zone of the building that can be accessed and operated by the individuals occupying that area or zone. Such controls will be located within, or within the vicinity of, the zone or area they control.

The relevant areas for the criteria apply only to areas where users are expected to have control. For instance, this means that areas intended for the general public, or a shop floor would not be expected to have lighting controls.

Uniformity

The uniformity is the ratio between the minimum illuminance on the working plane within a room and the average illuminance on the same working plane.

Working plane

CIBSE SLL Lighting Handbook and the CIBSE SLL Code for Lighting define the working plane or the reference plane as the plane at which work is normally done.

Additional information

None