Hea 01 Visual comfort (all buildings)

Number of credits available	Minimum standards
Building type dependent	Yes (Criterion 1 only)

Aim

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

Assessment criteria

This issue is split into five parts:

Prerequisite
Glare control (1 credit)
Daylighting (up to 4 credits - building type dependent) View out (1 credit)
Internal and external lighting (1 credit)

The following is required to demonstrate compliance:

Prerequisite

1 All fluorescent and compact fluorescent lamps are fitted with high frequency ballasts/transformers/drivers. If LEDs are used in the building, drivers shall be fitted with AM (Amplitude Modulation) OR, if PMW (Pulse-Width Modulation) is used, the modular power shall not be lower than 300 Hz. The criteria is applicable for all lighting specified for the building.

One credit – Glare control

2 The potential for glare has been designed out of all relevant building areas using a glare control strategy, either through building form and layout or building design measures (see compliance note CN3.1).

3 The glare control strategy avoids increasing lighting energy use by ensuring that:

3a The glare control system is designed to maximise daylight levels under all conditions while avoiding disabling glare in the workplace or other sensitive areas. The system should not inhibit daylight from entering the space under cloudy conditions, or when sunlight is not on the façade

AND

3b The use or location of shading does not conflict with the operation of lighting control systems.

Up to four credits – Daylighting (building type dependent)

4 Daylighting criteria have been met using either of the following options in accordance with the methods outlined in SS-EN 17037:2018:

4a The relevant building areas meet Target daylight factors (D_T) and minimum target daylight factors (D_{TM}) as outlined in Table 10

OR

4b The relevant building areas meet Target illuminances (E_T) and Minimum target illuminances (E_{TM}) as outlined in Table 12.

Table 10: Values of Target daylight factor (D_T) and minimum target daylight factors (D_{TM}) required

Building or area type	Target daylight factors (D_T) and Minimum target daylight factors (D_{TM})† required by latitude (degrees)				*Minimum area (m^2) to comply*	
	55-60		≤60		1 credit	2 credits
	D_T	D_{TM}	D_T	D_{TM}		
Education buildings (up to 2 credits available)						
Preschools, schools – occupied spaces	2.1%	0.7%	2.5%	0.8%	60%	80%
Universities, colleges and higher education – occupied spaces	2.1%	0.7%	2.5%	0.8%	60%	80%
Residential institutions (1 credit available*)						
Kitchen	2.1%	0.7%	2.5%	0,8%	60%	80%
Living rooms, dining rooms, studies (including workspaces in hotel bedrooms or suites)	1.6%	0,5%	1.6%	0.5%		
Non-residential or communal occupied spaces	2.1%	0.7%	2.5%	0.8%		
Residential dwellings (4 credits available)**						
Kitchen	2.1%	0.7%	2.5%	0.8%	60%	80%
Livingrooms, dining rooms, studies (including home offices)	1.6%	0.5%	1.6%	0.5%	60%	80%
Retail buildings (2 credits available)**						
Sales areas	2.1%	0.7%	2.1%	0.7%	35%	-
Other occupied areas	2.5%	0.8%	2.5%	0.8%†	60%	80%
Industrial, office, and all other building types (1 credit available*)						
Internal association or atrium area	3.1%	1.0%	3.2%	1.1%	60%	80%
Teaching, lecture and seminar spaces	2.1%	0.7%	2.5%	0,8%		
All occupied spaces, unless indicated in Relevant definitions	2.1%	0.7%	2.5%	0.8%		

Notes:
* All spaces must comply to achieve 1 credit.
** Each space can be awarded credits independently.

Table 11: Space type and illuminance requirements – both criteria Target illuminance (E_T) and Minimum target illuminances (E_{TM}) should be met

Area type	Minimum area to comply		Target illuminance (E_T) and fraction of daylight hours (F_{time}) to be met over 50% of the space (F_{plane}).	Minimum target illuminance (E_{TM}) and fraction of daylight hours (F_{time}) to be met over 95% of the space F_{plane}).
	1 Credit	2 Credits		
Education buildings (up to 2 credits available)				
Preschools, schools - occupied spaces	60%	80%	At least 300 lux over 50% of the fraction of daylight hours	At least 100 lux over 50% of the fraction of daylight hours
Universities, colleges and higher education - occupied spaces	60%	80%		
Residential dwellings (4 credits available) and residential institutions (1 credit available)				
Kitchens	80%	100%	At least 150 lux over 50% of the fraction of daylight hours	At least 25 lux over 50% of the fraction of daylight hours
Living rooms, dining rooms, studies (including home offices)			At least 150 lux over 50% of the fraction of daylight hours	At least 25 lux over 50% of the fraction of daylight hours
Non-residential or communal occupied spaces	60%	80%	At least 225 over 50% of the fraction of daylight hours	At least 50 lux over 50% of the fraction of daylight hours
Retail buildings (2 credits available)				
Sales areas	35%	-	At least 250 lux daylight illuminances over 50% of the fraction of daylight hours over 95% of the area	
Other occupied areas	60%	80%-	At least 250 lux over 50% of the fraction of daylight hours	At least 50 lux over 50% of the fraction of daylight hours
Industrial and Office, and all Other building types (2 credits available)				
Internal association or atrium area	60%	80%	At least 350 lux over 50% of the fraction of daylight hours	At least 200 lux over 50% of the fraction of daylight hours
Teaching, lecture and seminar spaces	60%	80%	At least 300 lux over 50% of the fraction of daylight hours	At least 100 lux over 50% of the fraction of daylight hours
All occupied spaces, unless indicated in Hea 01 Visual comfort	60%	80%	At least 300 lux over 50% of the fraction of daylight hours	At least 100 lux over 50% of the fraction of daylight hours

One credit – View out

5 Where 95% of the floor area space within relevant building areas are within X metres of a window or permanent opening that provides an adequate view out, as outlined in Table 13

6 In addition, the building type criteria in Table 14 are applicable to view out criteria.

Table 13: Window or opening size required as a percentage of surrounding wall area depending on the distance of the desk or workspace to the window or opening

Distance (in m) from window to workspace or desk (X)	Window or opening size (as % of surrounding wall area)
8 m or less	20%
8 m – 11 m	25%
11 m – 14 m	30%
14m or more	35%

Table 14: View out – building specific requirements

Building type	View out requirements
Residential institutions	Sheltered housing - communal lounges, individual bedrooms and bedsits All positions within relevant areas are to be within 5 m of a wall which has a window or permanent opening providing an adequate view out. The window or opening must be ≥ 20% of the surrounding wall area.

One credit – Internal and external lighting levels, zoning and control

Internal lighting

7. 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 CN3.10). For areas where computer screens are regularly used, see CN3.17.
8. The uniformity of illuminance due to electric lighting is as per the recommendation in the approved local standard.
9. For areas where computer screens are regularly used, 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 CN3.10 and CN3.17). These should include:

9a Limits to the luminance of the luminaires to avoid screen reflections. Manufacturers' data for the luminaires should be sought to confirm this

9b 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

9c Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.

External lighting

10. All external lighting located within the assessment zone is designed to provide illuminance levels that enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. To demonstrate this, external lighting provided is specified in accordance with SS-EN 13201 series Road Lighting and SS-EN 12464-2:2014 Light and lighting - Lighting of work places - Part 2: Outdoor work places.

Zoning and occupant control

11. Internal lighting is zoned to allow for occupant control (see Relevant definitions) in accordance with the criteria below for relevant areas present within the building:

11.a In office areas, zones of four workplaces (see CN3.13). For workplaces the requirement of occupant control covers workplace lighting and not general lighting.

11.b Workstations adjacent to windows or atria and other building areas separately zoned and controlled. This applies to workspace lighting and not general lighting.

11.c Seminar and lecture rooms: zoned for presentation and audience areas

11.d Library spaces: separate zoning of stacks, reading and counter areas

11.e Teaching space or demonstration area

11.f Whiteboard and display screen. This criterion is only applicable if there is a need for lighting in the display zone. If there is no such need, the criterion is achieved by default.

11.g Auditoria: zoning of seating areas, circulation space and lectern area

11.h Dining, restaurant, café areas: separate zoning of servery and seating or dining areas

11.i Retail: separate zoning of display and counter areas

11.j Bar areas: separate zoning of bar and seating areas

11.k Day rooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff

11.l Hotel bedrooms: separate zoning of hallway, bathroom, desk and sleeping area (where present in the room).

12. 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 or demonstration or performance area would typically be expected to have lighting controls as follows:

12.a Full normal lighting (to allow for entry and exit, cleaning etc.)

12.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)

12.c All lighting off (for the projection of tone slides, color slides, and for the purposes of visual demonstrations or performances)

12.d Separate localised lectern lighting.

13. In addition, the building type criteria in Table 15 (where relevant).

Table 15: Internal and external lighting – building specific

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.

Checklists and tables

Table 10 - 16.

Compliance notes

Ref	Terms	Description
Shell and core (non-residential and residential institutions only)		
CN1	Applicable assessment criteria	Prerequisite: criterion 1 Both options: This criterion is not applicable. Glare control: criteria 2 and 3 Both options: These criteria are not applicable. Daylighting: criterion 4 Both options: All criteria relevant to the building type and function apply. View out: criteria 5 and 6 Both options: All criteria relevant to the building type and function apply. Internal lighting, zoning and occupant control: criteria 7 to 9 , 11 to 13 Both options: These criteria are not applicable. External lighting: criterion 10 Both options: All criteria relevant to the building type and function apply.
CN1.1	View out	Both options Where it is not possible to confirm which areas of the building will contain workstations or benches or desks, then all areas of the building designed for or likely to be occupied by workstations or benches or desks must comply with the relevant criteria.
Residential - Partially fitted and fully fitted		
CN2	Applicable assessment criteria - Single and multiple dwellings	Prerequisite: criterion 1 Both options: This criterion is not applicable. Glare control: criteria 2 and 3 Both options: These criteria are not applicable. Daylighting: criterion 4 Both options: All criteria relevant to the building type and function apply. View out: criteria 5 and 6 Both options: These criteria are not applicable. Internal lighting, zoning and occupant control: criteria 7 to 9 , 11 to 13 Partially fitted: These criteria are not applicable. Fully fitted: All criteria relevant to the building type and function apply External lighting: criterion 10 Partially fitted: These criteria are not applicable. Fully fitted: All criteria relevant to the building type and function apply.

Ref	Terms	Description
Ombyggnader		
CN	Tillämpliga bedömnings-kriterier – ombyggnader och kulturhistoriskt värdefulla byggnader	*Här tillkommer information om hur ombyggnader och kulturhistoriskt värdefulla byggnader ska hanteras i indikatorn.*
General		
Glare control		
CN3.1	Compliant forms of glare control	Compliant shading measures for meeting glare control criteria include: Building integrated measures (e.g. low eaves) Occupant controlled devices such as blinds (where transmittance value is equal to or less than 0.05 (5%) Bioclimatic design External shading or brise soleil. Glare control must provide shading from both high level summer and low level winter sun. Glare control does not have to be installed where design studies have demonstrated that sunlight is prevented from reaching building occupants during occupied hours. In such cases, the client must provide a written commitment ensuring that measures to prevent potential glare will be installed if the problem should arise (for example, where unforeseen reflections cause glare issues for building occupants). Curtains (where used without other forms of shading) do not meet the criteria for the glare control criteria, as they do not provide sufficient control to optimise daylight into the space. Furthermore, the use of curtains to control glare is likely to cause occupants to rely more on artificial lighting.
Daylighting		
CN3.2	Percentage of assessed area. See criterion 4.	Where the criteria specify that a percentage of floor area must be adequately illuminated by daylight, this refers to the percentage of the total floor area of all the rooms that must be assessed, i.e. the compliant area. If for example, a development has six rooms that must be assessed, each 150m² (total area 900m²) and 80% of this floor area must meet the criterion, then 720m²must comply with the criterion; this is equal to 4.8 rooms. The number of rooms that must comply must always be rounded up; therefore, in this example, five rooms must have Daylight factor or Daylight provision as per table 10 and 11 to achieve the credit.
CN3.3	External obstructions	In calculating minimum and average daylight factors and daylight illuminances, external obstructions should be taken into account. For illuminance calculations, the reflectance of external obstructions should be taken as 0.2 unless on site measurements of external reflectance have been made.
CN3.4	Dirt factors when calculating daylight	Daylight calculations should include a reduction of glazing transmittance due to dirt deposition on the windows as per the SS-EN 17037:2018.
CN3.5	Borrowed light	For areas where borrowed light is used to demonstrate compliance with daylighting criteria, calculations or results from appropriate lighting design software must be provided to demonstrate that such areas meet the BREEAM-SE criteria (if the light from these sources is required in order for the room to comply). Examples of borrowed light include: light shelves, clerestory glazing, sun pipes or internal translucent or transparent partitions (such as those using frosted glass).

Ref	Terms	Description
Internal and external lighting levels or zoning and control		
CN3.10	National best practice lighting guides	National best practice lighting guides include the relevant regulations (Arbetsmiljöverkets föreskrifter) from "Arbetsmiljöverket"; Arbetsplatsens utformning (AFS 2009:02) and Arbete vid bildskärm (AFS 1998:05) as well as the following Swedish standards and practice: SS-EN 12464-1:2011 and SS-EN 12464-2:2014" (for internal lighting Ljus & Rum can be used as guidance)
CN3.11	Occupancy and workstation layout unknown	Where occupancy or workstation layout is not known, lighting control can be zoned on the basis of 40m²grids, i.e. an assumption of 1 person or workspace per 10m².
CN3.12	Small spaces	Buildings consisting entirely of small rooms or spaces (less than 40m²) which do not require any subdivision of lighting zones or control will meet the zoning criteria by default.
CN3.13	Zones of four workspaces	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 personable work area. The relevant design team member, e.g. a lighting consultant, should set out how this is to be achieved in such an instance.
CN3.14	Internal areas excluded from the requirements	The following internal areas are excluded from the lighting zone requirements: 1. Media and arts production spaces 2. Sports facilities (exercise spaces only, including hydrotherapy and physiotherapy areas).
CN3.15	No external lighting	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.
CN3.16	Zoning rooms not listed	For zoning rooms or spaces not listed within criteria 11 and 12, 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-SE issue.
CN3.17	Lighting levels for areas where computer screens are regularly used	Projects can specify 300 lux instead of what is prescribed in EN 12464:2011. This is as per CIBSE Lighting Guide 7, but can only be accepted if there is a possibility for the building user to increase the lighting level to 500 lux if needed, in accordance with standard EN 12464:2011. Workplace lighting (e.g. desk lamps) that enables building users to increase the lighting to 500 lux can be used to demonstrate compliance. A lease agreement obliging the tenants to provide such workplace lighting can be used to demonstrate compliance if workplace lighting is not within the scope of the project.

Building type specific

CN4	Education (preschools) and acute special educational needs controls for children	Where child care or acute special educational needs spaces are included within the scope of the assessment, controls should be provided for the teacher or member of staff, i.e. it is not a necessity for the controls to be accessible to the children. Where nursery spaces are included within the scope of the assessment, controls should be provided for the member of staff, not the nursery school children.
CN4.1	Hotels - lighting levels in hotel bedrooms	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.
Tolkningar och förtydliganden publicerade för BREEAM-SE17 kommer att arbetas in som CN:s så långt som de fortfarande är relevanta. *Hänvisningar till standarder, riktlinjer och publikationer ses över och uppdateras till slutgiltig manualversion.*		

Methodology

None

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite		
1	A copy of the specification clause or room data sheets confirming a compliant lighting strategy.	BREEAM-SE Assessor's site inspection report and photographic evidence confirming the installation of the specified light fittings with high frequency ballast/ transformers/divers. (All luminaires do not need to be checked. The Assessor controls a representative sample within the building.) OR Purchase orders to verify installed luminaries in line with designs stage specification. Where changes have occurred: As-built drawings/ specification conforming a compliant lighting strategy is installed.
Daylighting		
All	Design drawings and daylight calculations OR Relevant section or clauses of the building specification or contract confirming compliance with BREEAM-SE requirements.	BREEAM-SE Assessor's site inspection report and photographic evidence (if daylight calculations were submitted in Design Stage). OR Confirmation from the design team that daylighting is in accordance with BREEAM- SE requirements (if daylight calculations were submitted in Design Stage). OR As-built drawings and daylight calculations.

Criteria	Interim design stage	Final post-construction stage
View out and glare requirements		
All	Design drawings. Relevant section or clauses of the building specification or contract. Window schedule. Where glare control is not installed: Design study demonstrating that sunlight is prevented from reaching building occupants during occupied hours. Written commitment from client ensuring that measures to prevent potential glare will be installed if glare issues should arise.	BREEAM-SE Assessor's site inspection report and photographic evidence. As-built drawings. Formal confirmation of compliance from the contractor or design team.
Internal and external lighting		
All	Design drawings or room data sheets or schedules. Relevant section or clauses of the building specification or contract OR A letter of formal confirmation of compliance from the relevant design team member.	BREEAM-SE Assessor's site inspection report and photographic evidence. As-built drawings. Formal confirmation of compliance from the contractor or design team.

Additional information

Relevant definitions

Adequate view out

BREEAM-SE defines an adequate view out as a view of a landscape or buildings (rather than just the sky) at seated eye level (1.2–1.3m) within the relevant building areas and should ideally be through an external window. A view into an internal courtyard or atrium will comply provided the distance from the opening to the back wall of the courtyard or atrium is at least 10m (therefore allowing enough distance for the eyes to refocus). The view cannot be an internal view across the room, as this is likely to become obstructed by partitions, filing cabinets etc.

Amplitude Modulation (AM)

Power Reduction / Amplitude Modulation (AM) is another technology used in LED-drivers, and means that the power to the LEDs are reduced to dim down the light. This technique has no flicker at all.

Assessment zone

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

Daylight factor

The daylight factor is the indoor illuminance (from daylight) on the reference plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE Standard Overcast Sky.

Daylight hours

Daylight hours (DT) is the target daylight factor relative to a given illuminance to be exceeded for more than half of daylight hours, over 50 % of the reference plane as per the SS-EN 17037:2018.

Daylight provision
Daylight provision is the Level of illuminance achieved across a fraction of a reference plane for a fraction of daylight hours within a space as per the SS-EN 17037:2018.

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

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. Please note there is a specific, unrelated, definition of 'unoccupied' with reference to acoustic testing and measurement and this should not be confused with the definition used here.

Pulse-Width Modulation (PWM)
Pulse width modulation (PWM) involves driving LEDs with a modulated voltageLEDs with PWM should be more than 300 Hz at dimming.

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

Relevant building areas – Daylighting
For the purpose of BREEAM-SE this is defined as areas within the building where good daylighting is considered to be of benefit to the building users (typically those areas occupied continuously for 30 minutes or more). This includes the following (where occupied continuously for 30 minutes or more) specifically stated because they are often omitted:

1 Sports hall exercise spaces
2 Laboratory areas unless the type of research that will be carried out requires strictly controlled environmental conditions, such as the exclusion of natural light at all times
3 Self-contained flats
4 Kitchen and catering areas
5 General communal areas
6 Small offices (including those within residential buildings and residential institutions)
7 Meeting rooms (including those within residential buildings and residential institutions)
8 Leisure areas
9 Any area that may involve close up work.

However, this excludes the following (where present):
1 Media, arts production, SEN sensory spaces, x-ray rooms and other areas requiring strictly controlled acoustic or lighting conditions.

Relevant building areas – Glare control
For glare control include areas of the building where lighting and resultant glare could be problematic for users, e.g. those areas that have been designed to

contain or use workstations, projector screens etc. and sports halls. Spaces in the categories described above, for which daylight and view out are excluded, should not be assessed against the glare control criteria.

Separate zoning 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.

Surrounding wall area
Surrounding wall area refers to the area (in m²) of the internal wall on which the window or opening is located, including the area of the window or opening itself.

View out
BREEAM-SE defines relevant building areas requiring a view out to include areas of the building where:

1. There are or will be workstations or benches or desks for building users
2. Close work will be undertaken or visual aids will be used
3. A view out is deemed to be of benefit to the building occupants, e.g. in spaces where occupants are likely to spend a significant amount of time.

Excluded areas for each of these might include:

- Conference rooms, lecture theatres, sports halls, acute SEN and also any spaces where the exclusion or limitation of natural light is a functional requirement, e.g. laboratories, media spaces, etc.

Reference plane
Plane in a space on which illuminances and/or daylight factors are calculated, specified or measured The reference plane is to be located 0,85 m above the floor as for the SS-EN 17037:2018.

Other information

None.