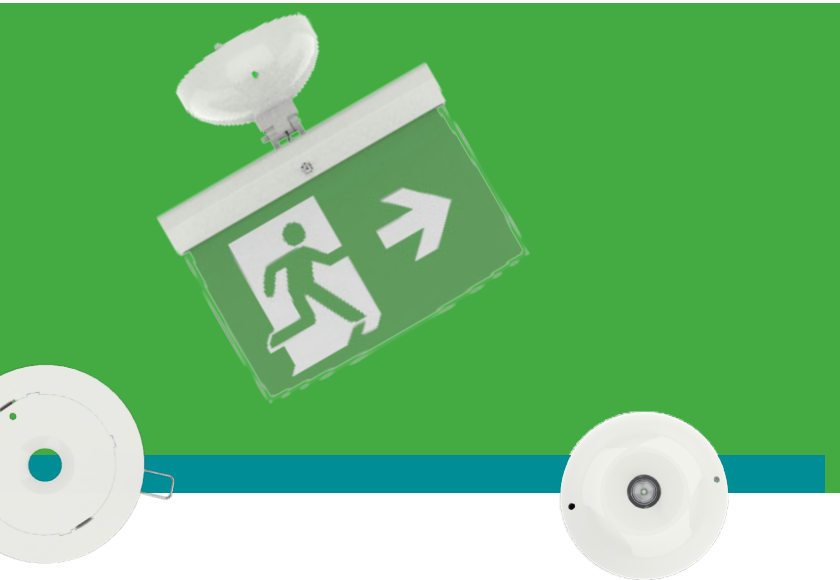




World Class Leaders in Fire Detection Since 1918

In association with



A Guide To

BS5266-1:2016

The design, installation and wiring of emergency lighting systems

FIREscape®



- ✓ **Extra Low Voltage**
- ✓ **LED Technology**
- ✓ **Low Maintenance**
- ✓ **All luminaires are fully approved and certified to BS EN 60598.2.22**
- ✓ **Intelligent**
- ✓ **Simple Installation**
- ✓ **Graphics Software**

Hochiki Europe (UK) Ltd. reserves the right to alter the specification of its products from time to time without notice. Although every effort has been made to ensure the accuracy of the information contained in this document it is not warranted or represented by Hochiki Europe (UK) Limited to be a complete and up-to-date description. © 2017 Hochiki Europe (UK) Limited.

Why Emergency Lighting?

An Emergency Lighting System is essential

- To show clearly the escape routes from a building
- To allow safe movement (to exits) moving at walking pace without stumbling
- To help prevent panic in an emergency and during evacuation
- To show the location of and identify fire equipment, for example fire extinguishers and manual call points
- To permit safety operations such as administering first aid

NOTE: *Way guidance systems, floor mounted equipment and photoluminescent materials are to be considered as supplementary.*

There is no dispute that emergency lighting is required to help people escape safely and quickly from a building. Using signs to show the escape route(s) is an essential part of emergency lighting, because those signs must be visible during a mains failure.

In addition to providing for escape, emergency lighting should illuminate any fire equipment, such as portable extinguishers and manual call points, either on the escape route or elsewhere, and permit safety operations such as first aid and fire fighting.

Remember, the correct positioning of exit signage and emergency lighting is essential in saving lives.

Emergency Lighting Requirements

In the UK, the Fire Safety legislation requires emergency lighting to be provided in the following premises:

- Offices and shops
- Community halls
- Schools
- Hotels and hostels
- Common areas in houses in multiple occupation
- Premises that provide care
- Pubs, clubs and restaurants
- Tents and marquees
- Factories and warehouses

- If artificial lighting is installed, emergency lighting is likely to be required:
 - on escape routes
 - in open areas larger than 60m² (or smaller if risk assessed)
 - to show exit signs
- 1 hour minimum duration (autonomy) for emergency lighting:
 - must fully recharge within 24 hours before reoccupation
 - premises must be evacuated immediately
- 3 hour duration of emergency lighting required for:
 - sleeping risk (hotels)
 - licensed premises and places of entertainment
 - premises requiring early reoccupation (schools, hospitals)

Because of the two types being allowed, in the UK, 3 hour duration emergency lighting is almost exclusively used, to avoid confusion and multiple product types.

An advantage of using 3 hour duration where 1 hour is the minimum requirement is that if the mains fails for just 1 hour, there is still 2 hours duration remaining in the batteries, allowing an immediate reoccupation of the premises. If 1 hour duration had been used, the batteries would have no remaining capacity and would take up to 24 hours to recharge, delaying the reoccupation of the premises.

Other Requirements and Legislation for Emergency Lighting (EL)

Compliance with BS 5266 parts 1, 7 and 8 would be adequate for most premises, but some Local Authorities have Licensing Schemes and Registration Schemes for certain types of premises, where the risks are higher, for example:



Premises licenced for the sale of alcohol.



Very old premises.



Premises where large numbers of people are gathered together.

It is always advisable to check with the Local Authority to see if they have their own special requirements for emergency lighting.

Emergency Lighting Classifications

Types

Self Contained

Centrally Supplied

Mode of Operation

Non-maintained (NM)

Maintained (M)

Combined (C-NM, or C-M) Compound

Satellite



All emergency lighting operates when the supply to normal lighting fails



Luminaires can house one or more lamps, one or more of which can be used for emergency operation

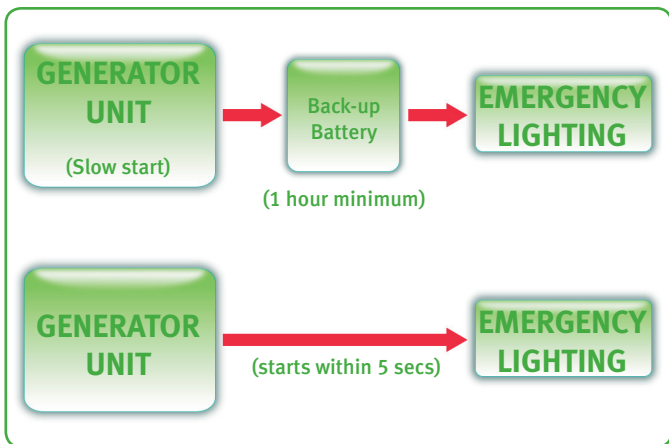


Exit signs can be externally or internally illuminated by emergency lighting

Emergency luminaires shall provide 50% of the rated lumen output claimed by the manufacturer during operation in emergency mode 5 seconds after failure of the normal supply and full-rated lumen output after 60 seconds and continuously to the end of the rated duration of emergency operation.

Temperature limits of battery and control gear are critical and should not be exceeded. Some lamps have special characteristics so it is important to check control gear and lamp compatibility.

Generator Systems



Where generator systems are used for emergency lighting a back up battery will also be required to cover the time taken for the generator to start and run to full power.

However, if the generator starts and runs within 5 seconds, a battery for the emergency lighting would not be required providing the emergency lumen output meets the 50% at 5 seconds and the full rated output by 60 seconds.

Modes of Operation for Emergency Lighting

- *Non-Maintained*
- *Maintained*
- *Combined (was Sustained)*

BS 5266-1 refers mainly to “modes of operation” in this respect, but historically the term used was category.

A **non-maintained** luminaire only operates when the normal supply to the mains lighting fails. It does not operate with healthy mains.

A **maintained** luminaire also operates when the normal supply to the mains lighting fails, but connections can be arranged so it can be switched on and off in the normal way when the mains is healthy.

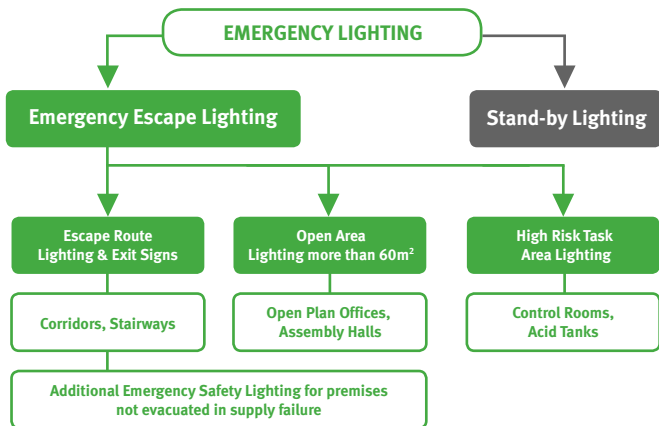
A **combined** luminaire has more than one lamp, but one is dedicated to emergency use and operates when the mains fails. Historically combined luminaires were called sustained.

The non-emergency lamp(s) are mains operated and normally the emergency lamp is non-maintained; this would be called Combined-NM.

However the emergency lamp could be maintained, so that all lamps operate in the mains healthy mode, but only one in the mains failed mode; this would be called Combined-M.

Emergency Lighting Forms

Standby lighting may be used so that commercial or industrial processes can continue during a mains failure, for example using a generator. If the standby lighting complies with aspects of BS 5266, then it can be used for emergency lighting. Within emergency escape lighting the three specific forms apply:



Escape route emergency lighting may be for a corridor, or for delineated routes such as pedestrian routes in a covered car park. Where there is no marked or delineated route open area lighting should be used.

Open areas used as escape routes and open areas larger than 60m², for example, large offices, assembly rooms, large common areas.

High risk task areas, which require a higher level of light whilst the danger exists. This would often be for a lot less than the usual 1h or 3h duration. High risk task area emergency lighting would be to make a dangerous machine, process or area safe, or in a control room to make safe remote processes.

Escape Sign Illumination

Escape signs may be either externally illuminated or internally illuminated to ensure they are conspicuous and legible. Externally illuminated signs should be illuminated to no less than 5 lux on any part.



Both photoluminescent and self adhesive or perspex signs must now be illuminated to 100 lux in the mains healthy condition so as to improve affordance / conspicuity.

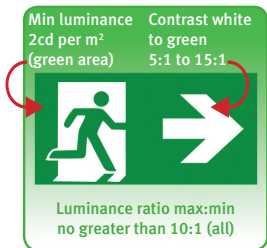
Escape Sign Luminance

Minimum Luminance - the luminance of any area of the [green] safety colour of the sign shall be at least 2 cd/m² in all relevant viewing directions (see annex A in BS 5266-7).

Luminance ratio - the ratio of the maximum minimum luminance within either white or the safety colour shall be not greater than 10:1 (i.e. all areas and colours).

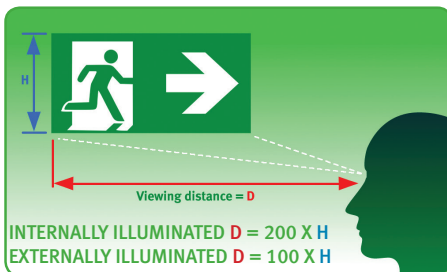
NOTE: High variation of adjacent points should be avoided.

Contrast - the ratio of the luminance L_{white} to the luminance L_{colour} shall be not less than 5:1 and not greater than 15:1.



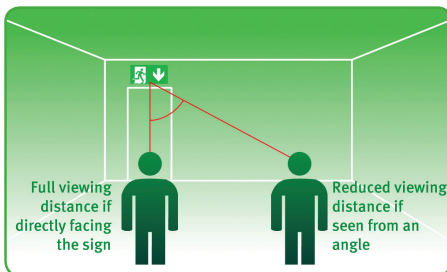
Escape Sign Viewing Distances

The viewing distances (D) specified in BS 5266 part 7 are:



200 x the height (H) of the sign for internally illuminated (self illuminated) signs

100 x the height (H) of the sign for externally illuminated (remotely illuminated) signs



Signs should preferably be clearly visible, face on to where people will be looking, not on the ceiling or at an oblique angle. If the sign is likely to be viewed at an oblique angle, the viewing distance would be reduced, so that, for example, at 60 degrees the viewing distance would be multiplied by 0.5. E.g. For an internally illuminated sign the 200 x viewing distance would become 100 x.

Illuminance Requirements

This table summarises the illuminance requirements for emergency lighting for the three “FORMS” of area. Within emergency escape lighting for BS 5266-7, BS EN 1838, the three specific forms of emergency lighting apply:

FORMS	BS 5266-7 (EN 1838)	Max/Min ratio and uniformity
ESCAPE ROUTE	1.0 Lux min on centre line	Up to 40:1 max:min
OPEN AREA	0.5 Lux minimum	Up to 40:1 max:min
HIGH RISK	10% of normal or 15 Lux min	Up to 10:1 average to min uniformity

Escape Routes (eg corridors, stairways etc) and exit (safety) signs, where illuminance of 1 Lux along the centre line of the escape route should be achieved.

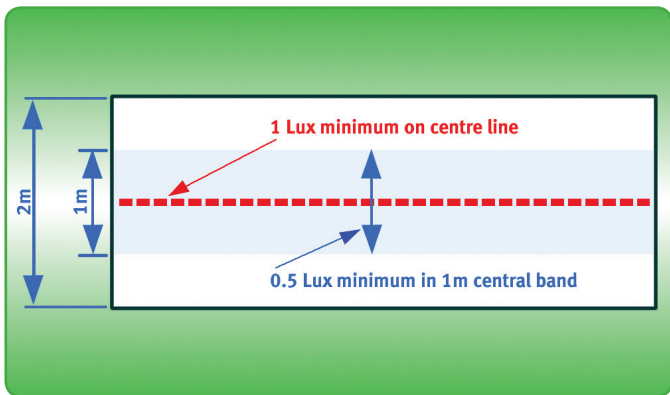
Open Areas greater than 60m², for example, large offices, assembly rooms or common areas require anti-panic lighting with a minimum illuminance of 0.5 Lux (see also page 14).

High Risk Task Areas which require a higher level of light but often for a shorter duration to make a dangerous machine, process or area safe, or in a control room to make safe remote processes.

For high risk task areas the illuminance should generally be 10% of the normal mains illuminance or at least 15 Lux - whichever is the greater and within a minimum response time of 0.5s .

Escape Routes Up To 2m Wide

For escape routes up to 2m wide the illuminance should be a minimum of 1 Lux along the centre line and a minimum of 50% of that (0.5 Lux) in the 1m central band.



If for certain reasons, for example to help the elderly, 5 Lux is required along the centre line, this would correspond to 2.5 Lux in the 1m central band.

To avoid bright and dark areas contrasting and slowing down the evacuation, the maximum to minimum ratio should be no greater than 40 : 1, where the minimum is 1 Lux, the maximum should not exceed 40 Lux. In practice most emergency luminaires, while achieving the stated 1 Lux, the maximum would be nearer to 5 Lux than 40 Lux.

Wider Escape Routes

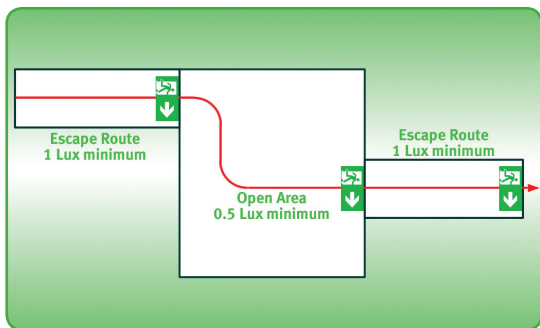
Where the escape route is wider than 2m it can be regarded as a number of 2m wide strips, or more simply as an open area.

Open Areas

For open areas of 60m^2 or greater the area should be illuminated to a minimum of 0.5 Lux with a maximum to minimum ratio of 40:1.

A 0.5m strip around the perimeter of the area can be ignored. Therefore, the maximum illumination should not exceed 20 Lux.

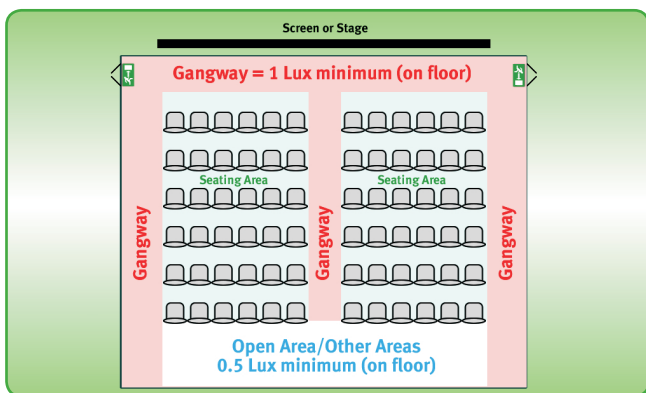
Some areas smaller than 60m^2 would also need to be illuminated as shown, if a risk assessment requires. For example, if a 40m^2 room has a number of trip hazards, then open area illumination may be required.



Non-residential - Recreation

This class includes such premises as theatres, cinemas, concert halls, exhibition halls, sports halls, public houses and restaurants. The people using such premises can be expected to be unfamiliar with the layout. Also it may be desirable to reoccupy the premises once the normal lighting has been restored, or to delay evacuation after the initial failure of the normal supply, should this be permitted. Based on these considerations, it is recommended that 3 h duration emergency lighting should be installed.

Where the normal lighting may be dimmed or turned off, in a cinema or theatre for example, a maintained emergency lighting system (luminaires and exit signs) should be installed. However, it is not necessary for the full emergency lighting level to be provided when the normal lighting system is functioning.



NOTE: Provided cinema and theatre seating is fixed to the floor, the seating rows will direct people to the aisles, so these do not need to be treated as open areas. Cinema and theatre auditoria are closely monitored by the local authority and designers should consult with the authorities to establish the exact requirements.

Basic Requirements

Luminaires should comply with the requirements of their product functionality safety standard BS EN 60598-2-22.

Special Requirements

In the Risk Assessment any special requirements will be identified. For example where the elderly, or those with impaired eyesight or mobility are likely to be present, increased illuminance may be required.

High risk task areas require higher illuminance but only in the relevant area, at the task, and while the hazard exists. The normal lighting level will need to be established because the high risk task area emergency lighting will need to be 10% of that or 15 Lux, whichever is the greater.

Annex D

See also BS5266 part 1 Annex D, for items and areas identified as Special Requirements, needing higher light levels than for escape routes and open areas, but the associated tasks are less arduous than any high risk task areas.

Maintained or Non-Maintained?

There may be local regulations applying to the type of premises. The relevant authorities should be consulted. This is of particular importance for licensed premises, places of entertainment, where the public have access, hospital or residential care or sleeping risk. So, in general:

- 1 Research any local regulations
- 2 Establish use of premises

- 3 Premises used as sleeping accommodation includes hospitals, nursing homes, hotels, guest houses, clubs, colleges and with boarding schools. Persons using premises of this kind may be unfamiliar* with their overall layout and/or may be infirm therefore maintained exit signs would be good practise.
- 4 Non-residential premises used for recreation such as theatres, cinemas, concert halls, exhibition halls, sports halls, public houses and restaurants. The people using such premises can be expected to be unfamiliar* with the layout and maintained exit signs should be installed. However, if the normal lighting for the premises may be dimmed or turned off (e.g. cinema or theatre), a maintained emergency lighting system should be installed. The recommendations in this point 4 are firmly stated in BS 5266-1:2011, clause 9.3.4.
- 5 Non-residential premises such as town halls, libraries, shops, shopping malls, art galleries and museums. The majority of persons present in this class of premises will be unfamiliar* with the layout, and evacuation may involve discharging large numbers of persons (from large shops) or gathering together smaller numbers of persons from large dispersed areas. Therefore maintained exit signs would be good practise.

** Where occupants would be unfamiliar with the premises, then it would be good practise to install maintained exits signs. This would apply where most of the occupants were unfamiliar, but probably not where there would be only a few visitors; they would be guided by or follow the majority.*

Locating Luminaires

Generally luminaires (emergency lights) should be installed in the following locations:

Points of Emphasis

At all points of emphasis on escape routes or in open areas, such as changes in floor level (steps), changes of direction (corners), first aid points, manual call points etc. See pages 20 ~ 23 for a full list and further details.

Areas of Particular Risk

Although they cannot form part of the defined escape routes from premises the following types of areas are considered to need emergency lighting because of the particular risks :

(a) Passenger Lift Cars - At least one emergency luminaire should be installed for the comfort of people trapped in the lift car in the event of a supply failure.

(b) Motor generator, control and plant rooms - require emergency lighting, for example to illuminate any manual lift winding facilities to rescue anyone trapped in the lift car.

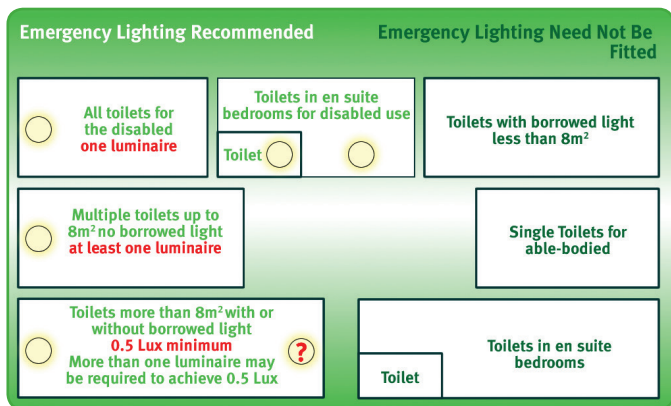
(c) Moving stairways (escalators) and moving walkways - to allow users to safely leave them in case of a failure of the normal supply.

(d) Pedestrian escape routes in covered and multi-storey car parks. (not the whole carpark, just the escape route gangways).

Toilets, Lobbies and Closets

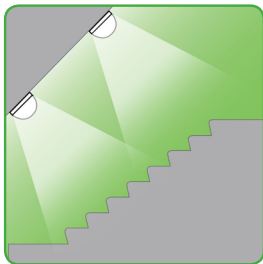
Facilities exceeding 8m² gross area, including any cubicle(s) should be provided with emergency lighting as if they were open areas. Toilets for disabled use, and any multiple closet facilities without borrowed light, should have emergency illumination from at least one luminaire.

NOTE: Provision of emergency lighting in accordance with this sub-clause does not necessitate the provision of emergency lighting in toilets designed to accommodate only a single able bodied person or en suite toilets or bathrooms in hotel bedrooms.



For Hotel rooms designated for disabled use, emergency lighting would be required in the associated toilet, and it would be good practice to provide EL in the room itself.

Locating Luminaires - Points of Emphasis



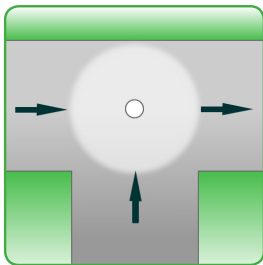
Near Stairs

Each tread should receive direct light from the installed emergency lighting luminaire(s), so that the minimum luminance on each stair tread is 1 Lux.



Near Changes of Level

Steps or other changes of level should receive direct light from an emergency lighting luminaire.



At Each Change of Direction

Emergency lighting luminaires shall be installed at each change of direction as well as near each intersection of corridors on the designated escape route.

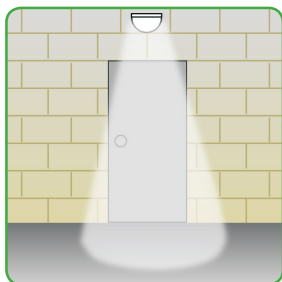
Note: Where a point of emphasis requires a luminaire to be “near”, this is stated as within 2m horizontally, as seen on a plan.

Locating Luminaires - Points of Emphasis



Near Fire Fighting Equipment and Manual Call Points

Near to all fire equipment and fire alarm manual call point, such that 5 Lux in the vertical plane* would be provided on the equipment. This would also include the fire alarm control panel whether on the escape route or elsewhere.



Outside and Near to Each Final Exit

The escape route outside of the final exit(s) to a place of safety shall be illuminated. (This would include an extended outdoor pathway with hazards such as an adjacent fence with solid obstructive posts, until at a place of safety).

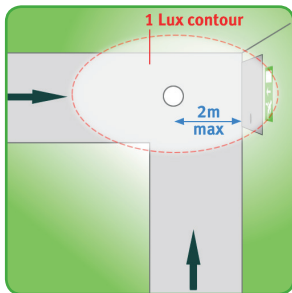


Near Each First Aid Point

This is a requirement included in BS 5266 part 7, clause 4. All types of first aid post should be illuminated to 5 Lux in the vertical plane*.

Vertical Plane* - For more details, see page 23.

Locating Luminaires - Points of Emphasis



Exit Doors

Emergency lighting luminaires should be installed (near) each exit door to provide appropriate illuminance near the door and at the threshold.

However, to provide the 1 Lux on the centre line, the luminaire may need to be closer than the 2m suggested in the diagram.



To Illuminate Safety Signs

Emergency lighting luminaires should be installed to illuminate each escape sign and safety sign. For externally illuminated sign boards, a luminaire should be within 2m of the sign. Any further than 2m away would be unlikely to illuminate the sign sufficiently. See Hochiki data for details on the illumination of exit doors and signs.

Interpretation:

Where a point of emphasis requires a luminaire to be “at” (e.g. for a change of direction) rather than “near”, the intention is that the luminaire would illuminate in both directions. Had “near” or 2m been specified for a 2m wide escape route, the luminaire might not have achieved this. As good practice it would seem reasonable to position the luminaire within 0.5m of the change of direction.

Locating Luminaires - Points of Emphasis



Fire Safety Equipment

Emergency lighting luminaires shall be installed near each first aid post, fire alarm manual call point, fire fighting equipment and fire alarm panel, such that 5 Lux vertical illuminance shall be provided on the equipment.



Note: the illuminance in the vertical plane would be measured with the Lux meter photocell held vertically on the equipment.



Evacuation Equipment for Disabled People

Emergency lighting luminaires shall be installed near escape equipment, refuges and communication call points for disabled people.



Illuminance for Specific Locations

BS 5266-1 informative annex D (previously in BS 5266 part 10 and now updated) describes a number of locations that may require emergency lighting to enable normal activities to be terminated safely. These activities would be less arduous than those requiring high risk task illumination, but would need more illumination than escape routes. Annex D is intended to be “Informative”, but some specifiers are using the guidance as if it were in the body of BS 5266-1.



Kitchens - To enable equipment such as electric and gas appliances to be left in a safe condition.
Response time 0.5 seconds, 15 Lux, 30 minute minimum duration.



First Aid Rooms - To enable simple medical procedures to be completed (e.g applying a bandage).
Response time 5 seconds, 15 Lux, 30 minute minimum duration.



Examination/Treatment Rooms - To enable complex medical procedures to be completed (e.g minor operations).
Response time 0.5 seconds, 50 Lux, 30 minute minimum duration



Refuge Areas - For people with mobility impairments to enable the use of communication equipment and for helpers to collect and rescue.
Response time 5 seconds, 5 Lux, full rated duration.

Other Areas of Hazard (contd)



Plant Rooms/Switch Rooms and emergency winding facilities for lifts - To enable maintenance and duty engineers to operate equipment.
Response time 5 seconds, 15 Lux, full rated duration.



Fire alarm control and indication equipment - To enable inspection of the panels, repeaters, zone plans and instructions, to enable staff and firefighters to locate the source of the fire and operate controls.
Response time 5 seconds, 15 Lux, full rated duration.



Reception Area - To enable operators to correctly contact the emergency services.
Response time 5 seconds, 15 Lux, full rated duration.



Panic bars and pads (push-bar to open) or security devices at exit doors - To enable people to easily operate and open the door. The downward light required might be achieved from a suitably designed exit sign.
Response time 5 seconds, 5 Lux, full rated duration.



Swimming pools and diving platforms and flumes - To enable these areas to be safely cleared and allowing for the slipping hazard.
Response time 0.5 seconds, 5 Lux, full rated duration.

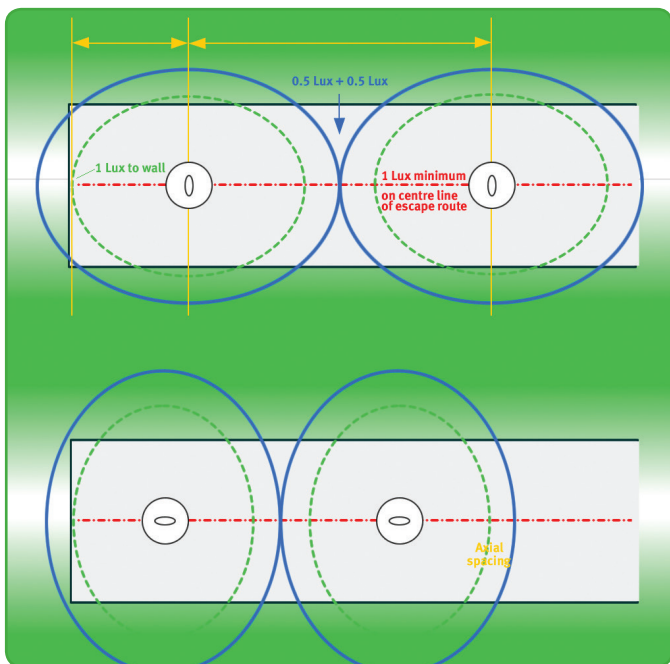
The plane of the illumination would be determined by the plane of the task, e.g. vertical plane on the equipment for fire alarm control panels, but horizontal on the floor for swimming pool surrounds.

Spacing of Luminaires - Escape Routes

Emergency luminaires should be sited in addition to the points of emphasis:

(a) on escape routes up to 2m wide, to 1 Lux minimum on the centre line.

(b) on escape routes that may be used by the young, elderly, impaired or partially sighted, to 1 Lux minimum (consider higher levels than 1 Lux depending on impairment)



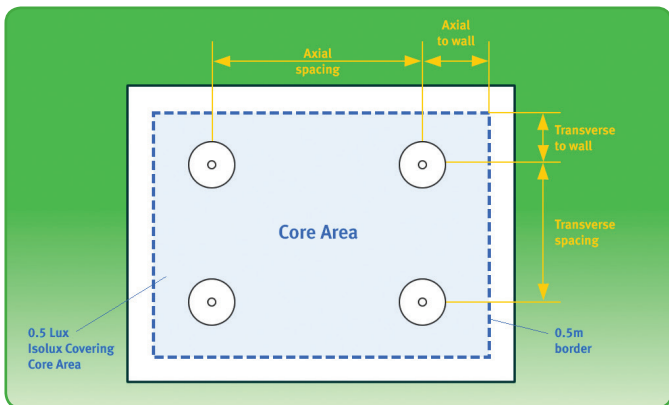
Spacing of Luminaires - Open Areas

Emergency luminaires should be sited in open areas used as escape routes and in open areas larger than 60sq metres, to 0.5 Lux minimum.

Only the core area is considered because people do often not move through the outer 0.5m perimeter border.

The transverse and axial orientation also applies in open areas and for rectangular areas one orientation may be more efficient in utilising luminaires.

Some open area luminaires have a circular light distribution, so the transverse and axial would be identical.

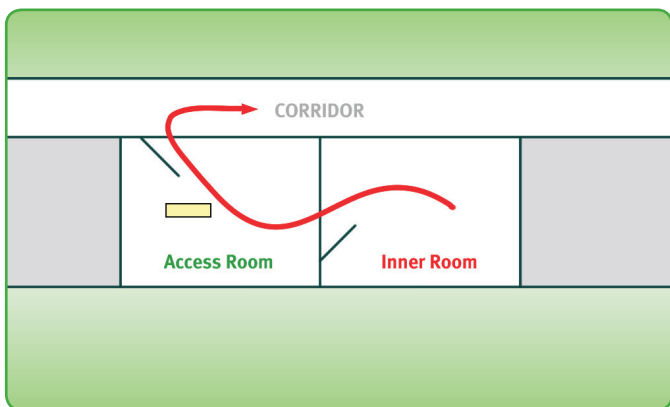


In open areas, moveable desks, chairs and other furniture can be ignored for emergency lighting, but where a partition is fixed, the 0.5m border follows the shape of the partition, and the emergency lighting has to be designed around it.

Inner Rooms

An inner room is a room from which escape is possible only by passing through another room (the access room). The definition of an Inner Room is taken from the Guide to the Building Regulations, Approved Document B (2000). The interpretation would therefore be that the access room would be the escape route from the inner room and should have emergency lighting.

An exception might be if the access room was quite small and the wall and/or door to the escape corridor outside had sufficient clear or translucent panels to allow “borrowed” light (this would be subject to a risk assessment, for example would notices be adhered to the clear/translucent panels obscuring the light?).



High Risk Task Areas

Examples of dangerous processes:

- An acid tank
- Any large rotating machine

A fast response is required so that the worker is not dangerously distracted when the mains fails.

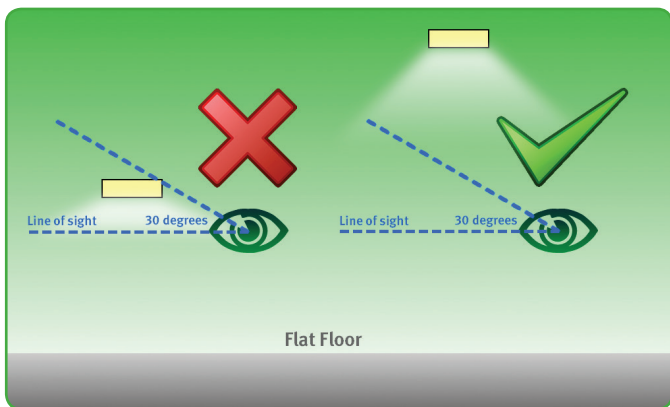


The high risk task area emergency lighting is only required “while the risk remains”. Once the machine or hazard has been safely shut down the emergency lighting can revert to the normal level (for example, 0.5 Lux for an open area). The duration required may be up to 30 minutes.

Disability Glare

High contrasts between a luminaire and its background can produce disability glare which prevents observation of the escape route and obstructions.

If the floor is level, glare must be limited in the direct line of sight by ensuring the luminaires are within the glare limits in the line of sight and 30 degrees around line of sight.



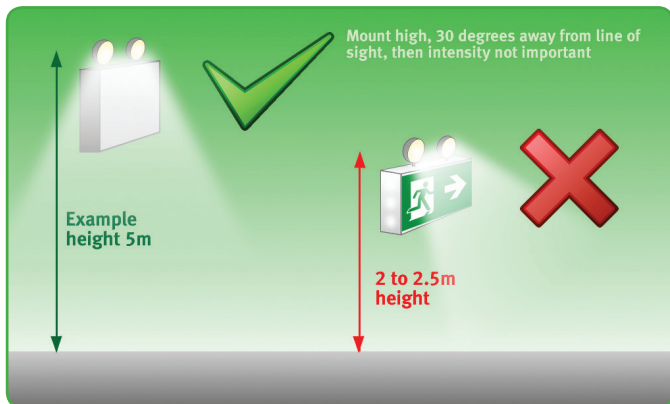
Discomfort glare = mains lighting

Disability glare = emergency lighting

The glare limits become more critical for emergency lighting near steps and changes of level and care should be taken not to exceed the limits.

Disability Glare (contd)

Care is needed with projector and high output luminaires. Spot lamps have intense narrow beams and can easily cause disability glare. However if they are mounted sufficiently high and directed below the glare zone they are acceptable.



A spot lamp unit mounted near to an EXIT sign would almost certainly cause sufficient glare to make the EXIT sign illegible.



www.hochikieurope.com/firescape

Hochiki Europe, world leaders in fire detection manufacturing introduces a brand new concept to the UK market - an innovative new Emergency Lighting system, **FIREscape**.

FIREscape is a unique, highly cost effective and environmentally friendly emergency lighting system based on LED technology and is the UK's first to be fully intelligent.

FIREscape is based around an addressable, emergency lighting control panel with battery back-up and features addressable, self-contained luminaires and signage connected via traditional low-voltage (40V) cabling.

With lighting units fitting directly onto the standard Hochiki Europe sensor base (YBN-R/3) **FIREscape** offers the installer a brand new and easy solution to the installation of emergency lighting and signage.

Extra Low Voltage

Less than 5% energy consumption compared to traditional lighting*¹

LED Technology

Low carbon emissions – less than 5% CO₂e compared to traditional lighting*²

Low Maintenance

Less than 5% lamp changes when compared to traditional lighting*³.



Intelligent

Unique intelligent addressable technology allows control and testing of individual luminaires

Simple Installation

Luminaires fit onto the standard Hochiki Europe sensor mounting base (YBN-R/3)

Graphics Software

Allows instant overview of complete system and assists in maintenance tasks

*1 Figure based on tests of 100 luminaires over 10 years

*2 Figure based on comparison of traditional fluorescent tubing with FIREscape, installation of 100 luminaires

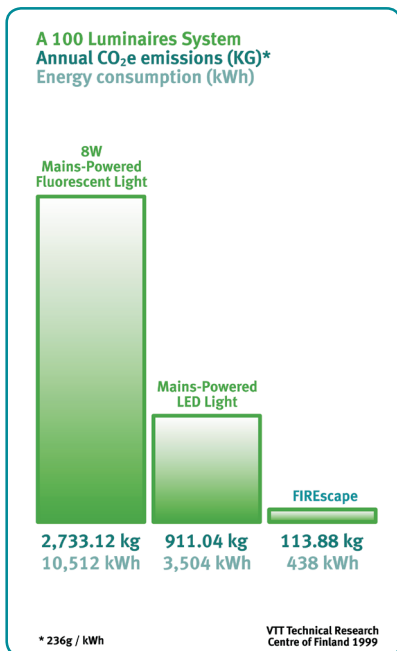
*3 Figure based on lamp changes over a ten year period for a system of 100 luminaires

A Greener Solution to Emergency Lighting

The **FIREscape** emergency lighting system features luminaires that contain their own battery backup power source. This means the system can be cabled with regular cabling, instead of Fire Resistant cables.

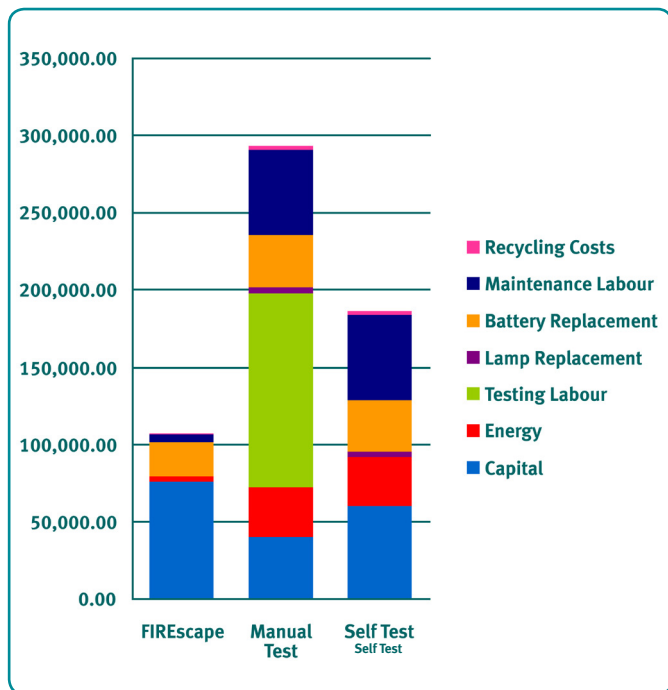
The **FIREscape** emergency lighting system uses less energy and therefore produces less CO₂e associated with a traditional maintained and mains voltage system.

The graph (right) compares the energy consumption and CO₂e emissions of emergency light systems using traditional mains-powered fluorescent technology, a mains-powered LED equivalent and the low-voltage **FIREscape** system, on an annual basis in a 100- luminaries installation.



A Greener Solution to Emergency Lighting

The graph below shows a total cost of ownership comparison based on a 1000 luminaires, 80% non-maintained 20% maintained, emergency lighting system for manual-test, self-test and Hochiki's **FIREscape** system, over a 10 year period. Savings of £186,534 and over 26 tonnes of CO₂e can be achieved.



Learn more at www.hochikieurope.com/firescape

Your Safety, Our Technology

ROSSE SYSTEMS

4 Peel House
Taunton St
Shipley
BD18 3NA
United Kingdom

Tel: 01274 595015

Fax: 01274 580804

Email: sales@rosse-systems.co.uk

www.rosse-systems.co.uk

V9 | NOV17



HOCHIKI

In association with

