



STANDARDS AND CONSIDERATIONS
FOR COMPLIANT EMERGENCY LIGHTING

IF YOU CAN'T SEE IT. **HOW DO YOU EXPECT OTHERS TO?**

Selecting an emergency lighting solution that has adequate luminescence and that isn't going to fail in an emergency is essential.

Look for these approvals to ensure product quality.





BS 5266 BS EN Compliant

TYPE PERC

60598-2-22 62034

KM 653255 BS EN 60598-1:2015 BS EN 60598-2-22:2014 **Emergency Luiminaires**

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

This guide has been compiled to include recommendations within BS5266, it should be noted that this British standard is closely aligned with EN 1838.

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

- Factories and warehouses
- Common areas in houses in multiple occupation
- Pubs, clubs and restaurants
- Premises that provide care
- Tents and marquees.

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

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.



Premises where large numbers of people are gathered together.



Very old premises.



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

Classifications

TYPES OF CLASSIFICATIONS

Self Contained

Centrally Supplied

MODES OF OPERATION

Non-maintained (NM)

Maintained (M)

Combined (C-NM)

Compound (C-M)
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.

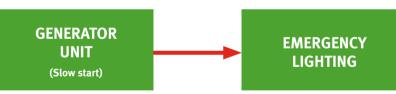
Temperature limits of battery and control gear are critical and should not be exceeded. Some lamps have special characteristics so it is important to check control gear and lamp compatibility.

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.



(starts within 5 seconds)

Modes of Operation

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

- ► NON-MAINTAINED
- MAINTAINED
- ► COMBINED (was sustained)
- ► COMPOUND
- ► SATELLITE

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 then normal supply to the mains lighting fails, but conections can be arranged so it can be switched on and off in the normal way when thre 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

A compound luminaire able to implement either the maintained or non-maintained emergency lighting, in conjunction with the emergency power supply for a satellite lighting.

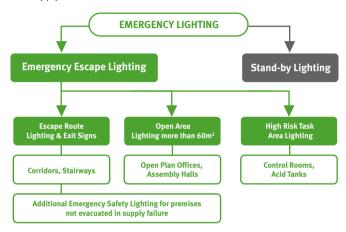
A satellite luminaire for maintained or non-maintained operations which derives its supply from a self-contained associated compound.

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 to the 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 white to the luminance colour shall be not less than 5:1 and not greater than 15:1.

Min. Luminance -2cd per m² (Green)

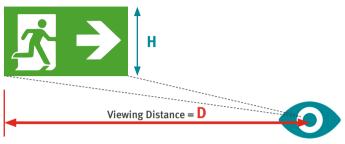
Contrast - 5:1 to 15:1 (White)



Luminance ratio max:min no greater than 10:1 (all)

Escape Sign Viewing Distance

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

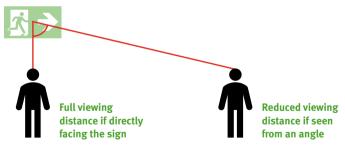


SELF ILLUMINATED

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

REMOTELY ILLUMINATED

D = 100 x the height (H) of the sign for externally 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	1.0 Lux	Up to 40:1
ROUTE	min. on centre line	max:min
OPEN	0.5 Lux	Up to 40:1
AREA	minimum	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

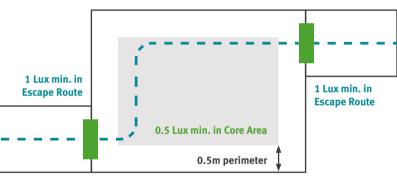
For open areas of 60m² or greater the area should be illuminated to a minimum of 0.5 Lux with a maximum to minimum ratio of 40:1.

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 $60\mbox{m}^2$ 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.



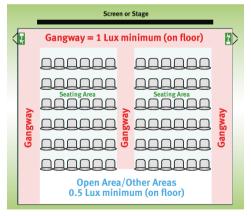
Non-residential - Recreation

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 hour 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.

Minimum Levels of Illuminace

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 E - Table E:1

See also BS5266 Part 1 Annex E: Table E1, 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. Please see page 25 for more information

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.

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 gatheringtogether 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.

Luminaires

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 $20 \sim 23$ for a full list and further details.

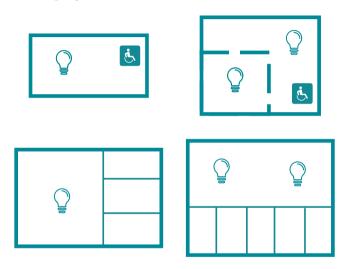
Areas of Particular Risk

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

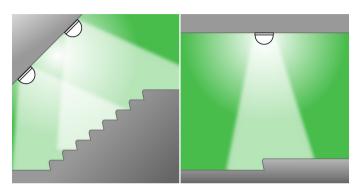
Facilities exceeding 8m² gross area, including any cubicle(s) should be provided with emergency lighting as if they were open areas. Toilets for disabled use, and any multiple closet facilities without borrowed light, should have emergency illumination from at least one luminaire.



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.

Emergency lighting should be positioned at or near points of emphasis as detailed in BS5266.



Changes of level: -

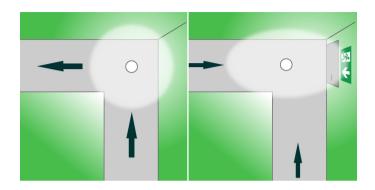
These are generally the most difficult area of the escape route to negotiate, particularly at low light levels, it is important that these areas are adequately protected.

Luminaires must be located so each tread receives direct light; generally, at least two luminaires will be needed to provide the 1 lux minimum level on the centre of each tread.

It is difficult to determine light levels on stairs using spacing tables, the use of design software is more reliable.

Other changes of level, such as stages and ramps that can cause tripping hazards in low light levels, must also be illuminated.

The term near is defined in BS 5266 as being within 2 metres horizontally.



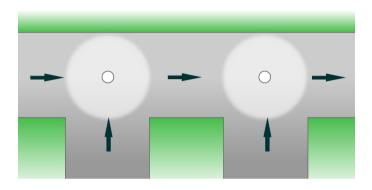
Exit doors and Safety signs: -

The exit signs should be located in the occupant's line of sight so, where possible, the signs should be sited between 2 and 2.5 metres above the floor.

For low ceilings it is acceptable to position the exit sign on the handle side of the door, between 1.75m and 2m.

Luminaires should be sited at changes of direction and, if there is any ambiguity as to the direction of the escape route, this should be adequately 'signed'.

Note: That luminaires or signs should be sited at, not near the change of direction.



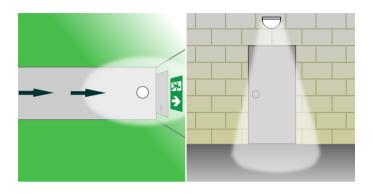
At each Change of Direction and at Intersection of Corridors: -

Luminaires should also be sited at each change of direction and at the intersection of corridors, as these are locations which can cause constrictions of the escape route and should be highlighted so that people can anticipate the problem area.

They will also provide the maximum illuminance where two or more streams of escaping occupants may combine together.

Interpretation:

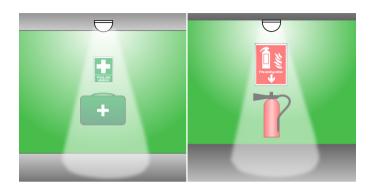
Where a point of emphasis requires a luminaire to be "at" (e.g. for a change of direction) rather than "near", the intention is that the luminaire would illuminate in both directions. Had "near" or 2m been specified for a 2m wide escape route, the luminaire might not have achieved this. As good practice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



Outside of each Final Exit: -

The outside of each final exit shall be illuminated, this would usually be achieved by positioning a dedicated emergency luminaire over the door or using a combined mains and emergency luminaire.

The route to a place of safety shall also be lit as specified in the risk assessment, although the final exit may be deemed to be safe if there are no potential hazards en-route.



First Aid or Firefighting Equipment: -

Near to first aid posts or firefighting equipment, this requirement was introduced in BS 5266-1 1999, it is recognised that if the normal lighting supply fails, but there is no fire requiring immediate evacuation, then access to and use of other safety equipment must be facilitated.

An emergency illumination level of 5 lux to first aid points and firefighting equipment is required in the vertical plane.

Evacuation Equipment for Disabled People: -

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

Specific Location Illumination

BS 5266-1 informative annex E (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 E 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. Horizontal on working plane, switches and cutouts readily visible

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.

Plant Rooms/Switch Rooms/Emergency Winding facilities for Lifts - To enable maintenance and duty engineers to operate equipment.

Response time 5 seconds, 15 Lux, full rated duration.

Specific Location Illumination

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.

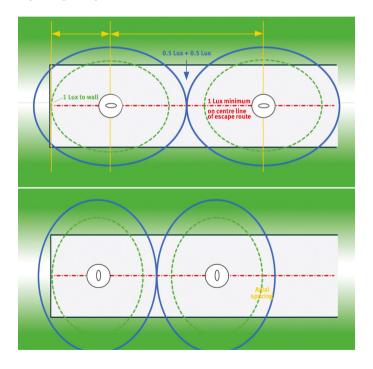
Response time 0.5 seconds, 5 Lux, full rated duration.

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).



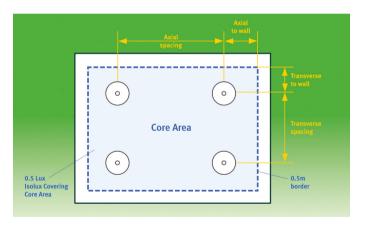
Spacing of Luminaires - Open Areas

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.

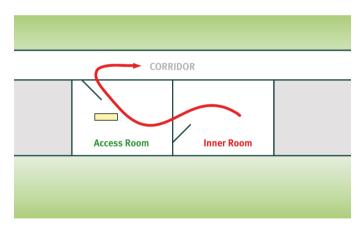
Inner Rooms

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".

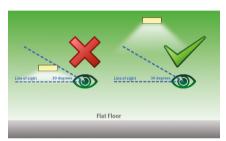
Once the machine or hazard has been safely shut down the emergency lighting can revert to the normal level (for example, 0.5 Lux for an open area).

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.

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.

DIALux - Lighting Design Software

Often when we are asked to provide lighting schemes, very little information is available to produce a compliant design.

This is where High risk task areas can easily be misinterpreted. Points of emphasis such as fire call points, fire fighting equipment, first aid points etc. should be lit to correct standards.

DIALux, is a parametric tool for modeling and luminotechnical calculation, aimed at obtaining measurable technical results from light, which allows us to create 3D environments, to calculate and to visualize data and results through an intuitive graphical interface.

Firescape luminaires are among the best performing in the industry, with their tightly controlled distributions are ideally placed to achieve the right light levels for the majority of high risk and emphasis point applications.

The positioning of emergency luminaires is critical to ensure correct illuminance for compliance with the standards. The use of lighting design software such as Dialux by well-trained personnel is highly recommended for a professional and correct design solution.

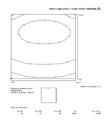
For more information on how we can help on projects requiring DIALux please contact:

info@hochikieurope.com

DIALux - Lighting Design Software

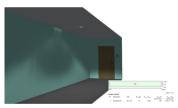
These examples show the how we use DIALux for photo realistic visualizations of your own light planning.

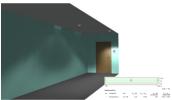




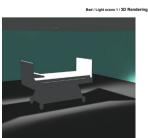
A control panel lit with a dedicated NFW89-C.

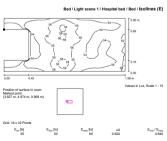
Using escape route luminaires the light level on the floor exceeds the the standards but the call point is not lit. The addition of a dedicated luminaire lights the call point in excess of the 5 lux minimum requirement.





Strategically placed high output corridor luminaires prove the perfect distribution for a treatment room.







- Feature Rich
- Cost Effective
- Compliant

Discover the benefits



Next
Generation
Emergency Lighting
from



www.hochikieurope.com/firescapenepto

10 Year Cost Comparison

Based on the four critical components of the annual costs of an emergency lighting system:

- Power Consumption
- . Statutory Annual and Monthly Inspections and Maintenance
- Luminaire/Battery Replacement (Materials)
- Luminaire/Battery Replacement (Labour)

and an existing system model comprising 100 conventional self-contained units of which 70 are non-maintained (on in emergency) escape route luminaires (70%) and 30 are maintained (always on) exit signs (30%) we have calculated the following:

Existing System will cost £4,416 per year (£48,805 over 10 years)

FIREscape Nepto System will cost £495 per year (£5,518 over 10 years)

Saving £3,921 per year (89%) (£43,288 over 10 years)

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Your Safety Our Technology



Quality Certificate No.164QMS Assessed to ISO 9001

Environmental Certificate No.164EMS Assessed to ISO 14001











