

Emergency Lighting Modules

TECHNICAL INFORMATION

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EN 1838 Emergency Lighting

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1. Why emergency lighting

Power supply systems may fail at any time, for example as a result of severe weather, fire, construction work or overloads. In serious cases it must be possible for people to leave buildings safely and for rescue services to be deployed.

The following minimum requirements for emergency lighting are defined in European standard EN 1838

- Emergency lighting must be at least twice as bright as the moon in a cloudless sky
- There must be an adequate number of signs to clearly indicate the escape route

Cloudless night sky:	0.01 lux
Full moon:.....	0.25 lux
Anti-panic lighting:	0.5 lux
Safety lighting:	1 lux

2. Definition of emergency lighting

The relevant standards define emergency lighting as lighting that is activated as a result of a malfunction in the general artificial lighting. The following systems may be used as replacement power supplies: single batteries, group batteries, central batteries, generating sets or a specially protected mains power supply.

Emergency lighting covers **safety lighting** and **standby lighting**

Safety lighting covers the following:

- Safety lighting for escape routes
- Anti-panic lighting
- Safety lighting for hazardous workplaces

Standby lighting is the part of emergency lighting that takes over the task of general lighting for a limited period of time on a substitution basis so that normal operation can continue (to continue economically or technically important tasks).

3. Objectives of emergency lighting

- Safe escape from the problem zone on failure of the general power supply (visibility required for evacuation)
- Adequate visibility and orientation along escape routes and in danger zones (illuminated or backlit safety signs along escape routes, direction signs to assist progression towards the emergency exit)
- Easy identification of fire-fighting and safety equipment

4. Requirements for safety lighting

Uniformity

The ratio of the maximum to the minimum illuminance shall not be greater than **40 : 1**.

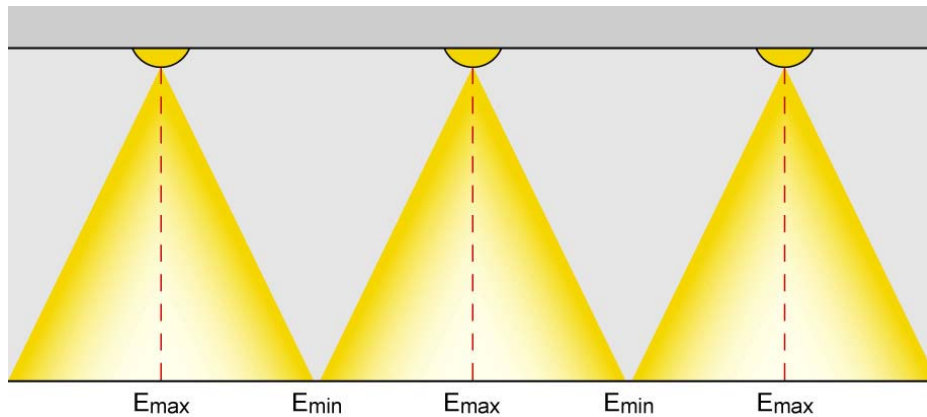


Fig.: Example of lighting for an escape route ($E_{max} : E_{min} \leq 40 : 1$ lx)

Safety lighting for escape routes

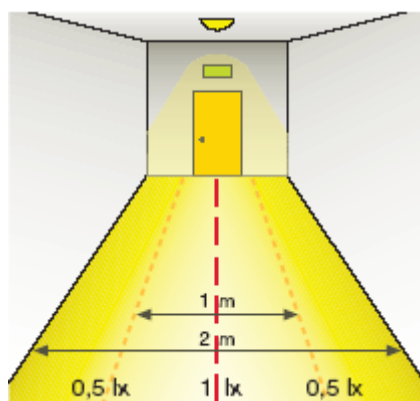
The safety lighting for escape routes is that part of safety lighting that enables escape facilities to be effectively identified and safely used.

Illuminance
$E_{min} = 1$ lx (minimum horizontal illuminance at floor level)
Uniformity
$E_{max} : E_{min} \leq 40 : 1$ lx
Colour rendering
$R_a \geq 40$
Rated service time for escape routes
1 hour
Switch-on delay
50% of the required illuminance level within 5 seconds, 100 % within 60 seconds

Escape routes up to 2 m in width:

- at least 1 lx along the central axis
- 0,5 lx over at least half the width

The measurement is taken 2 cm above the floor; only the direct light from the safety or combination luminaire is taken into consideration.



Anti-panic lighting

Anti-panic lighting is that part of safety lighting that serves to avoid panic and provide illumination to allow people to reach a place where an escape route can be reliably identified.

Illuminance
E (horizontal at floor level) ≥ 0.5 lx (Marginal areas with a width of 0.5 m are not taken into consideration)
Uniformity
$E_{\max} : E_{\min} \leq 40 : 1$ lx
Colour rendering
$R_a \geq 40$
Rated service time for escape routes
1 hour
Switch-on delay
50% of the required illuminance level within 5 seconds, 100 % within 60 seconds

Hazardous workplaces

There are special requirements that relate to potentially hazardous work processes and situations. Proper shut-down procedures are needed for the safety of operators and all other occupants of the premises, for example in places where machines are running, in laboratories handling hazardous and in control rooms.

Illuminance
$E_{\min} = 10\%$ of the level needed for the task or at least > 15 lx
Uniformity
$E_{\max} : E_{\min} \leq 10 : 1$ lx
Colour rendering
$R_a \geq 40$
Rated service time for escape routes
For as long as the hazard persists
Switch-on delay
0.5 seconds

5. Country-specific requirements for emergency lighting (deviations from EN 1838)

France

Products must be certified and have defined quality features. Luminance and illuminance levels are not taken into consideration in planning.

Safety lighting for escape routes:

- Certified emergency luminaires
- Maximum distance between the luminaires 15 m (30 m in schools)
- Positioned at each door used as an emergency exit
- near stairways for directly illuminating each stair
- near every change in level
- at every change of direction
- at every junction in passageways and corridors

Anti-panic lighting:

- Certified emergency luminaires must provide 5 lm/m² of floor area
- At least two luminaires per room
- Distance between the luminaires less than four times the installed height (distance from floor to luminaire)

Safety lighting for hazardous workplaces:

- EN 1838 does not correspond to French regulations
- The basis is a risk assessment

Safety signs:

- French standard NF 08-003
- or compatible standards of other European countries

In public buildings and workplaces, illuminance is not used as a photometric parameter.

Italy

Public places such as cinemas and theatres:

- An illuminance of at least 5 lx near stairways and exits (measured 1 m above floor level)
- At least 2 lx along escape routes

Illuminance values are not to be taken as planning values if they are based on specifications. They must be capable of being measured on site including reflections.

Germany

Safety lighting for escape routes and anti-panic lighting in workplaces:

- Maximum time of 15 seconds between failure of the general lighting system and achievement of the necessary illuminance levels (Workplace Directive § 7 Section. 4, Workplace Guidelines ASR 7/4)

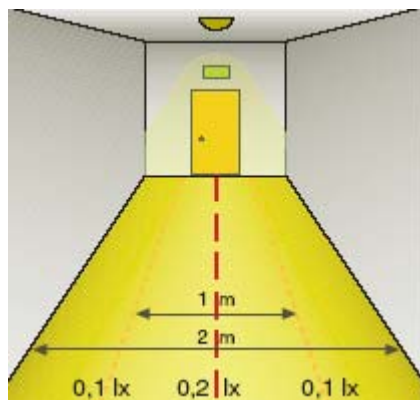
United Kingdom

The following requirements apply to start-up of the emergency lighting system:

- Within 5 seconds of failure of the general lighting system
- In buildings that are used mainly by people who know the escape routes: the authorities are at liberty to extend this period to a maximum of 15 seconds (1988 "Emergency Lighting", BS 5266 Part 1)

Horizontal illumination of escape routes (which are unobstructed):

- at least 0.2 lx along the central axis
- at least 0.1 lx over half the width (for widths up to 2 m)
- wider escape routes: division into 2 m wide zones, illumination as above (1988 "Emergency Lighting", BS 5266 Part 1)



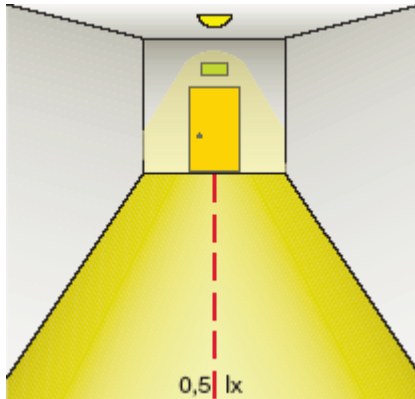
Ireland

The following requirements apply to start-up of the emergency lighting system:

- within 5 seconds after failure (1989 “Code of Practice for Emergency Lighting”, I.S. 3217)

Horizontal illumination of a clearly identified escape route:

- at least 0.5 lx along the central axis at floor level (1989 “Code of Practice for Emergency Lighting”, I.S. 3217)



6. Safety power sources

Single battery system:

- Consists of a maintenance-free battery, charging and monitoring equipment
- Supplies backlit safety signs, standard luminaires or other safety equipment

TridonicAtco emergency lighting units for single battery systems:

EM BASIC, EM BASIC LP, PC COMBO, PC CFL COMBO, PC CFL COMBO-CONNECT,
EM SELFTTEST, EM PRO

Group battery system:

- Limited output
- Consists of a battery, charging and monitoring equipment

Central battery system:

- Battery system without output restrictions
- Consists of a battery, charging and monitoring equipment
- Supplies the necessary safety equipment

Safety power unit:

- Supplies the safety equipment with electrical energy no later than 15 seconds after failure of the general lighting system
- Additional measures may be needed to achieve the minimum illuminance within the prescribed period, such as further safety power sources

High-speed standby generating set:

- Supplies the safety equipment with electrical energy no later than 0.5 seconds after failure of the general lighting system
- Built-in energy buffer (battery) for short-term supplies to loads and if necessary for quickly starting up the generating set

Instant standby generating set:

- Supplies the safety equipment with electrical energy immediately on failure of the general lighting system with no interruption
- Built-in energy buffer (battery) for short-term supplies to loads and if necessary for quickly starting up the generating set
- There may be a temporary frequency deviation on transition from the electric motor to the power engine

TridonicAtco control gear for central power supply sources:

- Non-dimmable electronic control gear (BLF in dc mode 100%):
PC T5 PRO LP, PC INDUSTRY T8/T5, PC T8 PRO, PC TCL PRO, PC TCD/T PRO, PC BASIC, PC DD PRO
- Dimmable electronic control gear:
PCA ECO
(BLF in dc mode: 70%)

PCA EXCEL one4all, PCA T5 EXCEL one4all lp, PCA T5 ECO lp
(BLF in dc mode adjustable from 1 to 70%)

Two independent systems:

- If one system fails the other ensures that power supply is continuous
- Energy suppliers must prevent the simultaneous failure of both supply systems
- Two systems are deemed to be independent if they are decoupled from each other up to a voltage level of 110 kV.

7. European Directives

There are two European directives that govern the need for Emergency lighting

The construction products directive (89/106/EEC)

“to ensure that lighting is provided promptly, automatically and for a suitable time when normal power supply to the lighting fails”

The workplace directive (89/654/EEC)

“specific emergency routes and exits must be indicated by signs”

“emergency routes and exits must be provided with emergency lighting of adequate intensity in case the lighting fails”

8. European standards

Application standards and guidance

EN 50172 Emergency escape lighting systems

EN 1838 Lighting applications – emergency lighting

Product safety and performance standards

EN 60 598-2-22 Emergency luminaires

EN 61 347-2-7 Safety requirements for DC supplied ballasts for emergency lighting

EN 60 925 Performance requirements for DC supplied ballasts for emergency lighting

Applications Engineering
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