

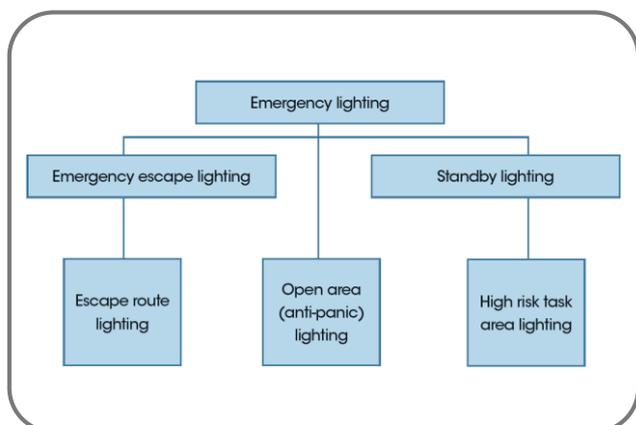
## INTRODUCTION

Emergency lighting is intended to provide sufficient light to enable people to see their way out safely in case of an emergency. Emergency lighting installations must always comply with the appropriate standards. In terms of the Occupational Health and Safety Act (Act 85 of 1993) as amended, it is now mandatory to provide emergency lighting. In addition, it is compulsory that the emergency lighting system installed satisfies strict performance and operational criteria with SANS 1464-22 – Safety of Luminaires Part 22: Luminaires for Emergency Lighting. Further details and explanations can be found in SANS 10114-2 – Interior Lighting Part 2: Emergency Lighting. The installation must also be regularly maintained, tested and full records kept.

## THE NEED FOR EMERGENCY LIGHTING

Emergency lighting is provided for when the main lighting supply fails. This is required to help the occupants evacuate the premises quickly and safely. The emergency lighting is only required to be bright enough for the occupants to find exit doors and to avoid obstacles.

Specific forms of emergency lighting



**Emergency escape lighting** – that part of the emergency lighting provided to enable safe exit from a building in the event of mains failure.

**Standby lighting** – that part of the emergency lighting that enables normal activities to continue in the event of mains failure.

**Escape route lighting** – that part of the emergency lighting that enables the safe exit from a building by providing adequate light and direction on escape routes and ensures that the fire fighting and safety equipment can be easily identified and used.

**Open area (anti-panic) lighting** – that part of emergency lighting that is provided in an open area to avoid panic and to enable the safe movement of occupants to reach an escape route.

**High-risk task area lighting** – that part of emergency lighting that provides light for the safety of the occupants involved in a potentially dangerous process or situation and enables proper shutdown procedures to ensure the safety of the operator and other occupants of the premises.

Under emergency conditions, emergency lighting is usually powered by internal batteries or a standby generator which are automatically triggered as soon as the mains supply fails. The emergency light source will usually be a separate miniature compact fluorescent lamp if “stand alone” emergency luminaires are used. It can also be one of the normal linear fluorescent lamps in a standard luminaire operated at reduced power level when in emergency mode.

All emergency lighting requires a power source which is independent of the main power supply. In general, this will either be powered by batteries or a generator.

## THERE ARE TWO MAIN SYSTEM TYPES:

### Battery system

Battery systems may be one of two distinct types: self-contained and central system.

#### Self-contained emergency system

Each luminaire is equipped with a battery charger/ballast, indicator and changeover device (inverter). These components may be integral within the luminaire or adjacent to it. Self-contained systems are easy to install and require little or no maintenance other than routine testing to ensure correct operation. The luminaires should be connected to the local lighting circuit where there is a danger from circuit failure.

#### Central battery system

The central battery system is a battery room or cubicle in which the charger, batteries and changeover devices are located. In a central system it is also essential that the wiring be of a very high integrity. If it is not of a sufficiently high standard, there is a considerable risk of loss of power due to fire damage. There may also be a poor overall performance because of excessive voltage drop in the cables.

#### Generator system

An emergency lighting system must reach its required illumination level within 5 seconds, although some authorities will extend this to 15 seconds if the building is occupied by staff who are familiar with the surroundings.

It is essential that the generator is run at all times. During its required time or the time that the generator automatically starts and runs up to, its required output is 5 seconds or less. If neither of these conditions can be achieved, then the generator must be supplemented by a battery system capable of operating the emergency lighting for at least one hour. In this case, the generator need not start up automatically but it should take over from the battery system as soon as possible.

## MODES OF OPERATION

There are two types of emergency luminaires:

### Non-maintained mode

In non-maintained mode, the lamp is normally off and only operates during supply power failure. When using a non-maintained luminaire, the lamp only provides emergency escape lighting in the event of a power supply interruption. It has only one main connection that must be left on permanently. This connection is normally used to charge the batteries and to detect a power failure.

### Non-maintained emergency luminaires are usually used:

- in areas where it is not possible to merge the emergency lighting gear into the existing luminaires;
- for high risk task area lighting where bright, direct lighting is required during an emergency;
- for existing lighting installations where it is not feasible to change the building wiring and the lighting is on permanently;
- for area flood lighting where the existing lamp (HID) is not suitable for use in an emergency lighting application.

### Maintained mode

A maintained luminaire provides light for both normal and emergency lighting. It has two main connections: permanent life and switched life. The permanent life connection is used to charge the batteries and detect the power failure. The switched life is used to switch the luminaire on and off to provide normal lighting.

### Maintained emergency luminaires are ideally suited for emergency lighting in:

- stair wells;
- general offices;
- escape route lighting;
- areas where it is preferable to merge emergency lighting into existing luminaires;
- new installations where the additional wiring requirements can be readily accommodated.

## Batteries

There are two types of batteries used for emergency lighting luminaires:

### Nickel cadmium batteries

Nickel cadmium (NiCad) batteries are the most commonly used for emergency lighting. These batteries are rechargeable and the batteries are normally connected in series into a battery pack – 4 batteries will give a 4.8V output for an hour duration and 5 batteries will give 6V output for a two to three hour duration. Nickel cadmium batteries have a long life, up to 10 years. They can be kept on the shelf for one or two years before being used without any detrimental effect.

### Lead-acid batteries

A sealed lead-acid battery is cheaper but requires more maintenance and its rated life is about 5 years. It is used for halogen lights and other 12V DC devices. When this battery is stored, it must be recharged every three months. It is seldom used in fluorescent emergency luminaires.

## SERVICING / MAINTENANCE

To protect the integrity of an emergency lighting system, recommended maintenance and routine servicing is essential. This routine should be detailed and checks recorded in a logbook which is available for examination by any duly authorized personnel. These personnel must have at their disposal a general building or floor plan and electrical system assembly diagram of the safety lighting system.

**Monthly** – test for a short period not exceeding one quarter of the rated duration of operation of the luminaire.

**Annually** – test each luminaire to its full rated duration of operation.

**Note: these tests should be carried out more regularly if there are many power failures of short duration in a short space of time.**

In terms of the Occupational Health and Safety Act 1993 (Act 85 Of 1993) as amended, periodic inspection and test reports should be supplied to the person responsible for the premises.

## DESIGN CONSIDERATIONS

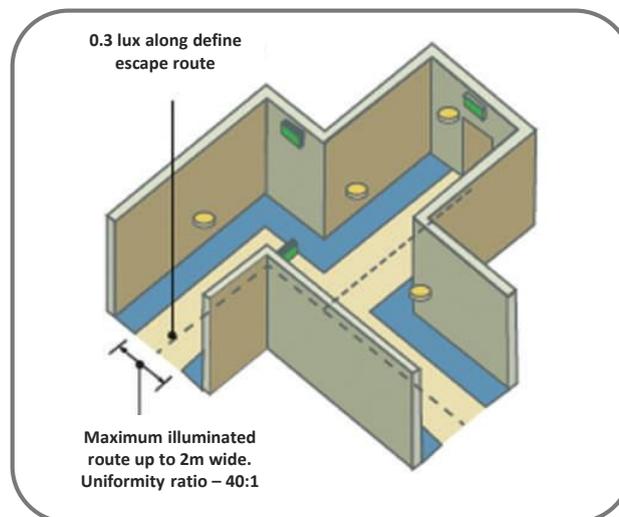
### Design objective

It is an increasing requirement that commercial, industrial and public buildings are provided with some form of emergency lighting.

Requirements vary for different types of buildings. General guidance is given in **SANS 10114-2 – Interior Lighting Part 2: code of practices for emergency lighting**:

Clearly define the escape routes.

Provide illumination along the escape routes to allow safe movement towards and through the exits by luminaires spaced at appropriate intervals. Corridors and stairways or gangways in open areas are all classified as clearly defined escape routes.



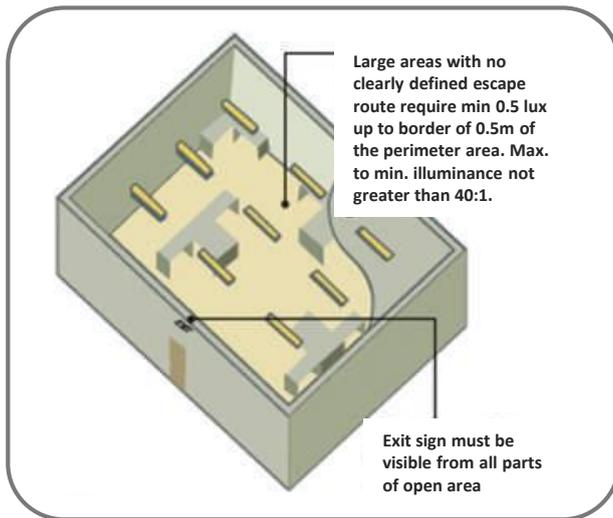
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## The minimum lighting parameters are as follows:

- Horizontal illumination at the floor on the centreline of permanently unobstructed routes should not be less than 0.2 lux. For stairways, the illumination should be measured horizontally at the edge of each tread.
- Where escape routes are greater than 2 metres, the escape route is to be treated as multiples of 2 metre wide bands.
- In retirement centres, an illumination of 0.3 lux is recommended.

## OPEN AREAS ANTI-PANIC LIGHTING

For areas that are frequently reconfigured and therefore do not have within them clearly defined escape routes, for example open plan offices or conference facilities, the minimum lighting parameters are as follows:



- The horizontal illumination shall not be less than 0.5 lux at the floor level of the empty core area which excludes the border of 0.5 metre of the perimeter area.
- The ratio of the maximum to the minimum open area lighting illumination shall not be greater than 40:1.
- Exit signs should be visible from any part of the space.

## High risk task lighting

High risk areas are those in which dangerous machines must be shut down prior to evacuation.

## General requirements

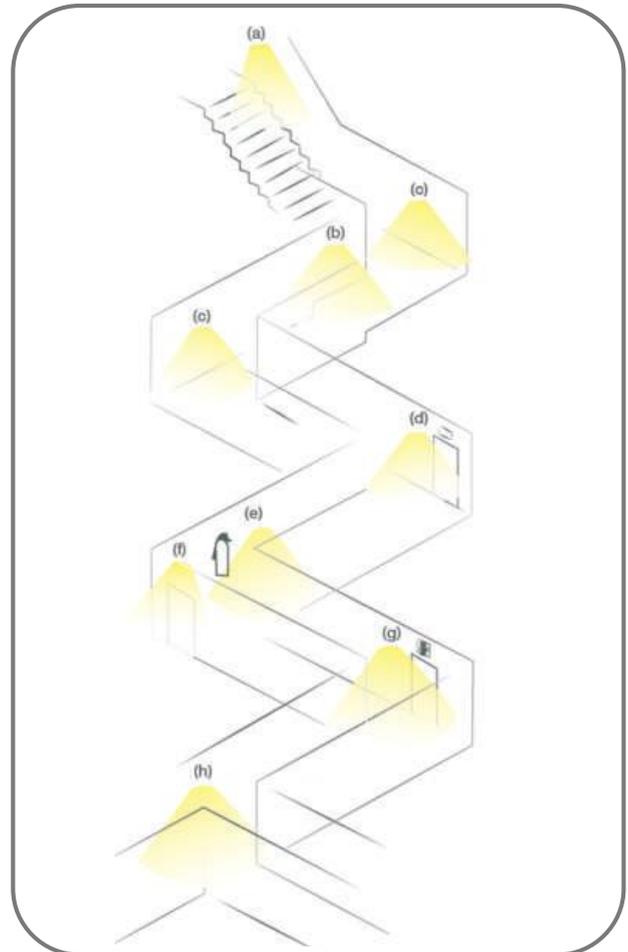
- The task must be illuminated to 10% of the normal lighting for as long as the risk exists or 20 lux, whichever is greater.
- Maximum uniformity ratio of 10:1 within 5 metres of task.
- Duration of at least 30 minutes.
- Response time of at least 0.5 seconds.

## Position of emergency lighting luminaires

The most important part of the design procedure is to determine the location and position of luminaires to account for specific points of emphasis. This is to be performed regardless of whether the luminaires are placed on the emergency escape route or in an open anti-panic area. These points of emphasis should be illuminated by a luminaire and a directional sign (exit sign).

## AREAS REQUIRING SPECIAL EMPHASIS LIGHTING:

- All staircases – long flights of stairs may need more than one luminaire.
- At or near changes in floor levels.
- At or near each change of direction.
- To illuminate exit doors and safety signs.
- Within 2 metres of each fire call point and each item of fire equipment such as extinguishers or hose reels.
- Outside and near to each final exit.
- Near any First Aid points.
- At each intersection of the escape route corridor.



"Near" is described as being within 2 metres measured in a horizontal direction. Exit signs are to be mounted at a height of 2 to 2.5 metres above floor level.

## Additional emergency lighting

Although not part of the escape route, certain additional areas require the use of emergency lighting:

- Lift cars – although they may be part of the escape route in exceptional circumstances, they may present a problem if the public are trapped in them in the event of a mains supply failure.
- Toilet facilities exceeding 8m<sup>2</sup> floor area and all toilets for the disabled.
- Motor generator, control or plant rooms.
- Covered car parks along normal pedestrian routes.

Most of Lascon's standard fluorescent luminaires can be supplied as self-contained emergency units. All luminaires can be maintained or non-maintained for an hour duration with 20% light output.

