

Correctly positioned exit signage is a key element in any emergency lighting scheme



## SHEDDING LIGHT ON FIRE SAFETY

Fire safe assessments can reveal examples of poor practice in the provision of emergency lighting

By Ken Davis

ASK ANY GROUP of building owners for their assessment of the most important fire safety measure and you'll get a variety of answers. Some will identify the fire alarm, while others will maintain that escape routes or the fire exit signs should

take precedence. I have even been assured that fire extinguishers should be top of the list as they can always be relied upon to extinguish a fire, making an evacuation unnecessary.

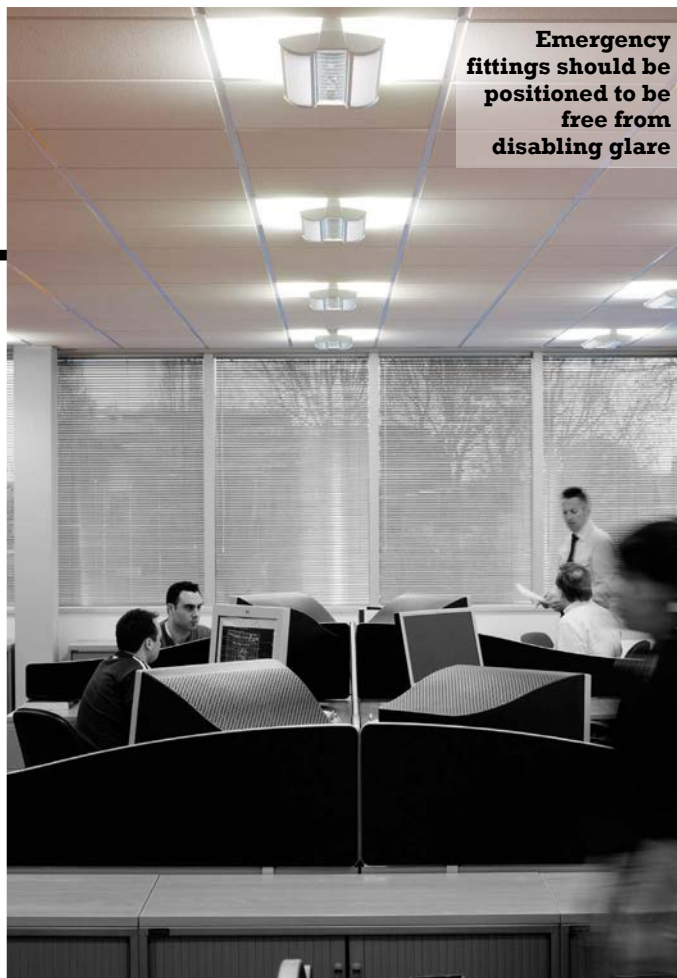
Whilst these different views offer the reassurance

that some thought has been given to fire safety, as a fire safety consultant I would emphasise the need for a fire risk assessment to identify all relevant fire safety measures, and the importance of implementing these measures in priority order to

ensure a balanced response to an outbreak of fire. For the majority of premises the elements of a basic fire safety package can be listed in the following order:

- a means of detecting a fire, often in the form of automatic detectors; ➤

**Emergency fittings should be positioned to be free from disabling glare**



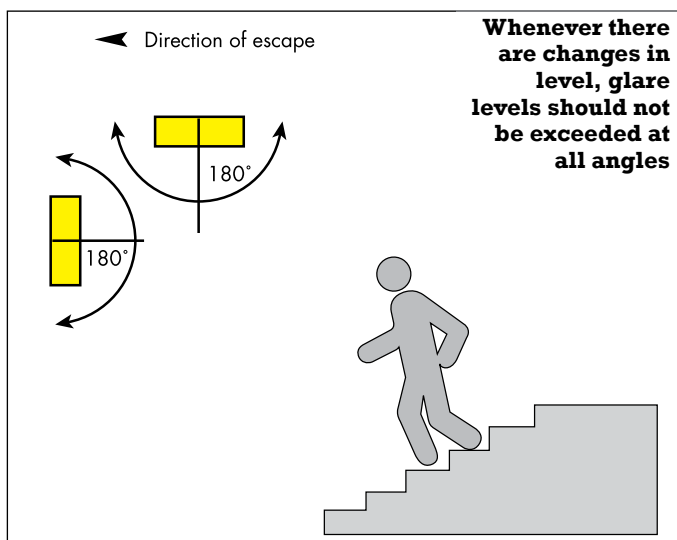
- a fire alarm to warn occupants of the outbreak;
- an emergency fire action plan designed to make sure occupants know what actions to take on hearing the alarm;
- escape routes and exits to permit occupants to evacuate in safety;
- signs to indicate exits;
- doors and partitions capable of preventing escape routes becoming smoke-logged before the premises have been evacuated;
- a procedure for taking a roll-call and summoning the fire and rescue service.

Emergency lighting is clearly an essential aspect of fire safety – providing sufficient illumination to assist detection of fire, assist occupants to locate essential equipment, illuminate signs and escape routes and assisting people to find the emergency assembly point. It's omitted from the list because it's a 'facilitator', underpinning all other safety measures, and, as such, can't be listed in order of importance.

#### Assessment

When carrying out a fire risk assessment the assessor will consider all aspects of fire safety at the premises, including the way the premises are used, the methods of building construction, the number of occupants, the presence of vulnerable people, potential sources of ignition and the likelihood of a fire starting.

Where possible, the risk of an outbreak of fire should be reduced so far as reasonably practical, but the assessor will still need to ensure that if a fire does break out it will be quickly detected and the alarm raised. Very importantly, the assessor will need to be satisfied there are suitable escape routes and for these to have adequate illumination that can be relied upon should normal lighting fail.



New buildings will require a fire risk assessment when they are occupied, and fire safety measures, including emergency lighting, should be planned carefully at the building design stage. From the outset there should be a clear understanding between all interested parties about the type of emergency lighting installation required and the extent of coverage. The emergency escape routes should be plotted on a plan, together with the location of fire safety equipment, safety signs and high-risk areas. For this to

be carried out effectively there will first need to be a bringing-together of information to enable the emergency lighting designer to understand the layout of the premises and the location of fire safety equipment and fittings.

A fire-risk assessment on existing premises will often involve a close inspection of any emergency lighting already present and may result in recommendations for improvements. The fire risk assessor might identify a need for one or more additional luminaires

and also specify where they should be installed. Where there are concerns about the general coverage of emergency lighting or the method of installation it is not uncommon for an assessor to simply recommend that a survey of emergency lighting be carried out by a competent person. Such a survey will frequently be accompanied by a recommendation for the system to be upgraded to the latest edition of BS 5266-1 which of course means that the competent person should be familiar with this standard.

Within existing premises, changes in layout or hours of use can often result in a fire risk assessment identifying a need for emergency lighting. For example, a revised layout might result in the loss of natural lighting in parts of a building, or the introduction of a night shift would mean a factory was occupied during the hours of darkness.

#### Requirements and regulations

The provision of emergency lighting for safety purposes is a well-established principle, and it is interesting to note that the 1934 'Manual of Safety Requirements in Theatres and Other Places of Entertainment' makes specific recommendations about safety lighting and the way it should be used in conjunction with the main lighting to ensure continuity of illumination. The manual goes on to specify requirements for the capacity of accumulators and the arrangements for evacuating the building if a lighting failure occurs.

Although this manual was not the first publication to identify the need for safety lighting, it has been hailed as the first comprehensive safety document for places of entertainment and it has more than passing similarities with today's fire safety guides.

Current UK recommendations for

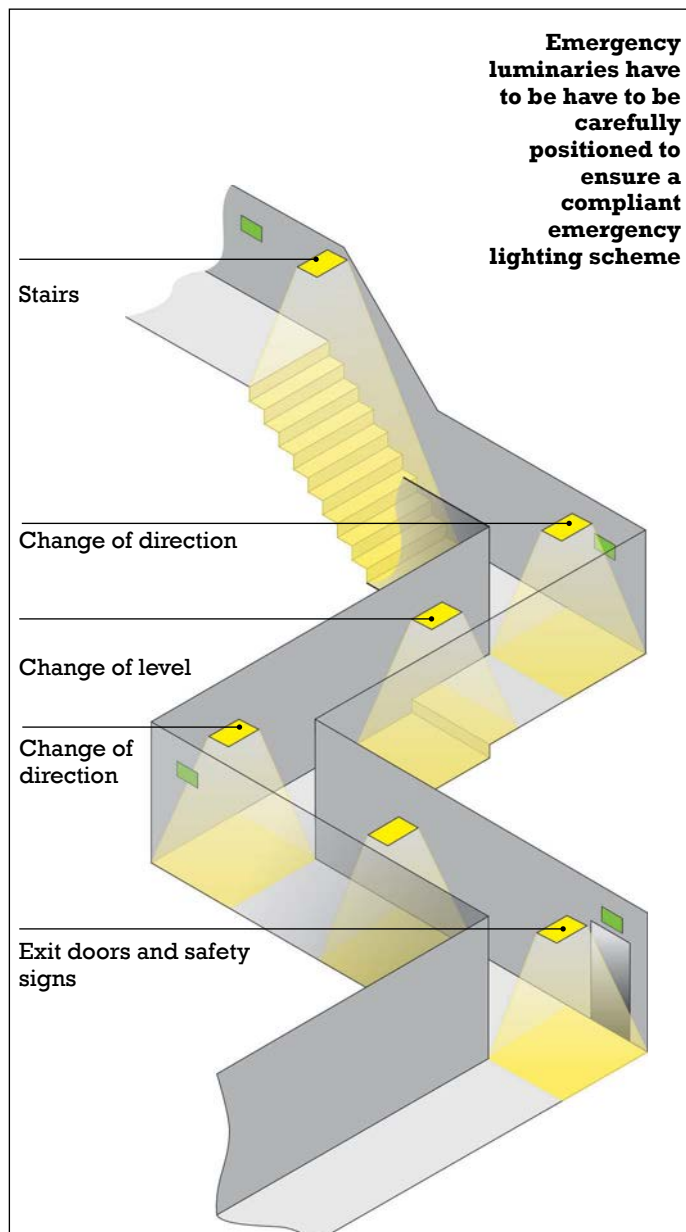
emergency lighting, known as emergency escape lighting where it is provided for fire safety purposes, stem primarily from national Building Regulations and fire safety legislation.

Guidance issued in support of Building Regulations and fire safety legislation direct us to a series of British and European standards dealing with emergency lighting. Whilst all of these documents have their own specific role, it is British Standard 5266-1: 2011 – 'Code of practice for the emergency escape lighting of premises' which applies to probably the majority of emergency lighting systems. This document will usually be quoted as the benchmark standard for emergency escape lighting in both new-build and existing premises.

#### Power supply

Emergency lighting is provided for use when the power supply to normal lighting fails, which means it must have a secondary power supply. This can be a central supply, such as an emergency generator or batteries, but more commonly will be in the form of self-contained units where the battery and charging equipment are contained within the luminaire itself. Emergency lighting is frequently combined with normal lighting in a single fitting.

Luminaires will often be of the non-maintained type, which comes into operation only when the electricity supply to individual units fails. This arrangement is suitable for probably the majority of premises, but where normal lighting may be dimmed or turned off altogether, as for example in cinemas and theatres, then it might be necessary to install maintained luminaires, in which emergency lamps are energised at all material times.



#### Positioning

The positioning of emergency lighting luminaires is very important to ensure occupants are able to locate essential equipment, identify the position of exit routes and to leave the premises in relative safety. In general, the emergency lighting designer should position luminaires to cover the following locations:

- staircases, high risks and extensive open areas such as large factory production floors and sports halls which occupants may have to cross to reach exit points;
- corridors, corridor intersections and changes in the direction of travel in corridors. Infill units may be required between these points to provide an adequate level of illuminance throughout the route;
- changes in footway level, such as ramps or one or more steps up or down within a corridor;
- doors intended to be used as escape routes, including storey exits and final exits;
- access rooms serving inner rooms;
- the area outside of final

exits leading to a place of safety, which may include emergency assembly points. Reliance upon external borrowed light such as street lighting, is no longer recommended;

- signs that identify exit routes and also those signs providing other mandatory information;
- toilet facilities exceeding 8m<sup>2</sup> although closeted facilities having a smaller area may also require emergency lighting;
- facilities for use by disabled people which include accessible toilets and refuge points on escape routes. It is common for refuge points to be provided with communications facilities and it is important that emergency lighting is sufficient to enable call buttons to be easily used and instruction notices to be read;
- lift cars;
- plant rooms and switch rooms;
- fire extinguishers, fire alarm call points and emergency shut-off control locations;
- first aid equipment.

The above list is not exhaustive and a fire risk assessment may identify a need to vary the appropriate coverage.

#### Illuminance level

The selection of individual emergency lighting luminaires will be largely determined by the level of illuminance required, and this will vary with their location within the premises. As little as 0.5lx may be sufficient at floor level in a room exceeding 60m<sup>2</sup>, whereas an escape corridor up to 2m in width should be provided with not less than 1.0lx. Panic bar devices, refuges and signs indicating exit routes should have a minimum illuminance level of 5.0lx. Higher levels of illuminance are recommended in kitchens, ▶



first-aid rooms, plant rooms and for fire alarm control and indicating equipment, where it is suggested that 15lx is appropriate. Care is required to avoid disabling glare when siting high-output luminaires, and it is recommended that such units are mounted at least 30° out of the direct line of sight when viewing escape routes.

### Duration

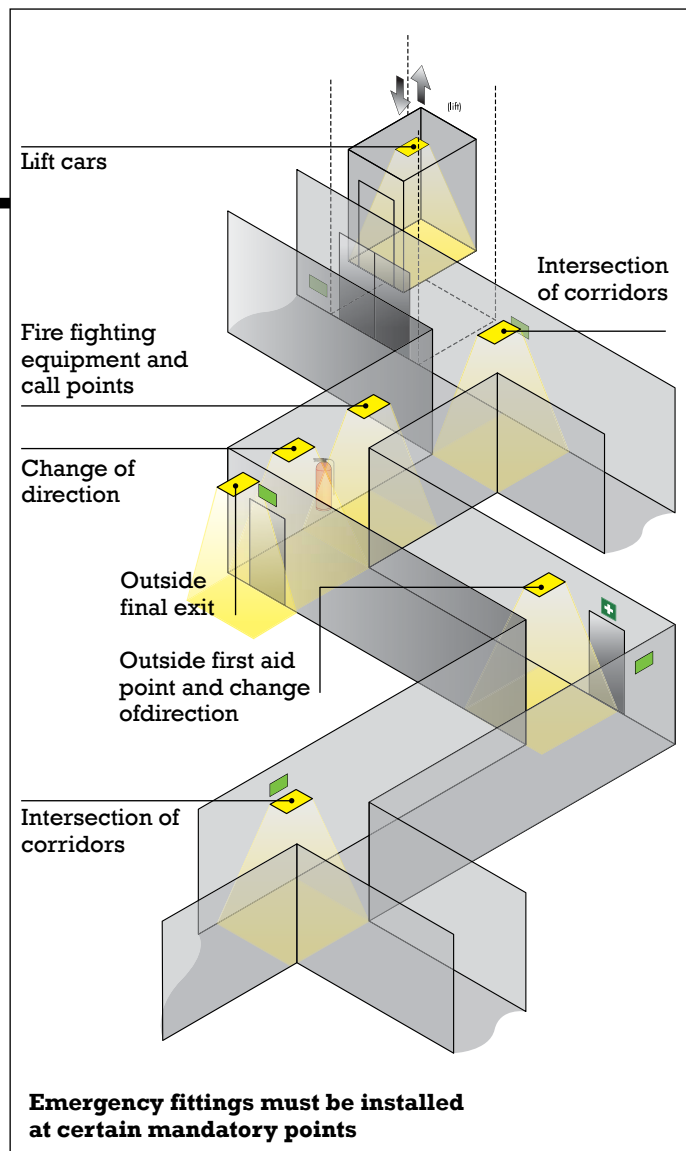
The operational duration of power supplies is an important factor when planning an emergency lighting system. Generally, a minimum duration of one hour will be adequate where the premises will be evacuated immediately on supply failure, and not reoccupied until full capacity has been restored to the batteries. A duration of one hour may also be suitable where people using the premises can be expected to be familiar with their layout, for example in the case of factories. Where sleeping accommodation is provided, or where occupants may be unfamiliar with the premises, then three hours' duration will normally be required.

The risk of lamp failure in individual luminaires presents the possibility that occupants will be in total darkness, but this threat can be minimised by ensuring that at least two individual luminaires, or internally illuminated exit signs, are visible from any location, although a single luminaire may be adequate in WC facilities.

Test facilities should be provided to enable failure of the normal supply to be simulated without interruption of the normal supply.

### Concerns

Although the regulations and principles governing emergency lighting are well established, it is clear from my work as a fire safety consultant that emergency lighting



is the fire safety system that presents the greatest concern in the course of a typical fire risk assessment.

There are a number of typical situations that might arise, and there follows a summary of the most common.

Firstly, emergency lighting is frequently installed before the fire alarm has been fitted and before fire extinguishers requirements have been assessed, often leading to inadequate illumination of equipment.

Luminaires often appear to have been installed on escape routes in a haphazard manner and without regard for changes in direction of travel, changes in floor level or adequate illumination of landings, staircases and refuge points.

External escape routes are often not provided with emergency lighting or, where it has been installed, it does not afford continuity

of illumination. This is often critical in the case of residential care homes where the nature of the residents necessitates temporarily keeping them secure at an external assembly point, perhaps at the side or rear of the premises. In these cases the fire risk assessment will usually identify a need for normal and emergency lighting on external exit routes leading to the assembly point, together with illumination of the assembly point itself.

Large rooms such as sports halls and school assembly halls are often provided with internally illuminated exit signs above exit doors but without any general emergency lighting coverage in the main body of the hall which brings into doubt whether the minimum illumination levels have been met. Low-output luminaires fitted on high ceilings may be ineffective at floor level

Twin-spotlight luminaires are often not adjusted to give the most benefit on escape routes.

High-output luminaires such as twin-spotlight units are mounted too low and result in disabling glare. A recent fire risk assessment found a twin-spotlight unit mounted at shoulder height at the base of an escape staircase with both lights directed up the staircase, directly at people descending.

An absence of test-switches leaving the user to switch off circuit breakers, or occasionally to pull fuses, in order to carry out monthly tests of emergency lighting.

Annual servicing and battery discharging being carried out too late in the day meaning that darkness may have fallen before adequate battery recharge has been achieved. This is critical in premises that are occupied 24 hours a day.

Non-maintained emergency luminaires are found to be installed entirely independently of normal lighting. This is probably the most common problem encountered with emergency lighting. Unless the power supply to the emergency lighting is taken from the circuit supplying the normal lighting, then a failure of the normal supply won't be detected by the emergency lighting and the emergency lighting won't operate when the normal supply fails. In one instance, 40 consecutive tests conducted on new emergency lighting systems revealed 38 that would not operate if the supply to the main lighting failed. In a separate incident involving a hotel fire, panic arose when the corridor lighting had failed and emergency lighting failed to operate because it had been installed on a dedicated circuit. These examples certainly suggest that the recommended standards for installation are not always fully understood.

Completion certificates and validation certificates

**Exit routes must be clearly identified and always kept clear**



receiving a service that will stand them in good stead should they be unfortunate enough to experience an outbreak of fire.

Where designers and installers have queries about emergency lighting recommendations arising from fire risk assessments, they are encouraged to discuss them with the person who carried out the assessment. However, it is important to stress that the designer is seen as the competent person in this field and technical decisions about the system are the designer's responsibility. It is worth emphasising that, under fire safety legislation, anybody involved in the supply of fire safety services can be held accountable in law for the quality of the products and services they provide, which includes the design and installation of emergency lighting.

The importance of emergency lighting for fire safety purposes should not be underestimated and it is only by careful planning and skilled installation that the potential dangers from lighting failure can be reduced to a satisfactory level. ❧

**Ken Davis (ken.davis@churchesfire.com) is fire safety engineer, Churches Fire Security Ltd, and sits on the Fire Industry Association's Fire Risk Assessment Council and the Fire Risk Assessment Council's Professional Standards Working Group.**

are sometimes not supplied by the installer. The approach taken by fire risk assessors often varies with the requirements of the customer and may or may not include tests of fire safety systems such as emergency lighting. If the assessment is being carried out on an entirely new system the assessor may request to see a completion certificate as

evidence that it has been designed and installed to a satisfactory standard. Where an existing system has been examined and judged to be suitable for ongoing use a validation certificate may be necessary. It is worrying to be told by an installer that he is reluctant to issue a certificate because he has never seen the applicable British and European

standards for emergency lighting.

#### **A need to refocus**

Emergency lighting is a broad and complicated subject that requires specialist knowledge, but there are evidently grounds for believing that a refocus on standards of installation is warranted to ensure customers are

**The images used in this article have been taken from the 'Emergency Lighting Design Guide', published by Thorn Lighting ([www.thornlighting.co.uk/download/Em\\_Lighting\\_Design\\_Guide.pdf](http://www.thornlighting.co.uk/download/Em_Lighting_Design_Guide.pdf))**