EMERGENCY LIGHTING
A Best Practice Guide

This document has been compiled by the Engineering Project Group in association with Marald Engineering Consultants

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INTRODUCTION

Emergency lighting as the term implies is lighting for an emergency situation when the main power supply fails. The loss of mains electricity could be the result of a fire, power cut or local circuit failure and the normal lighting supplies fail. This may lead to sudden darkness and a possible danger to the occupants, either through physical danger or panic.

Emergency lighting is normally required to operate fully automatically and give illumination of a sufficiently high level to enable persons of all ages to evacuate the premises safely.

As most new buildings will have emergency lighting installed during construction, the design and type of equipment is normally specified by the relevant local authority, architect or consultant.

When the designer is faced with a ‘Blank Canvas’ of a new project he should take stock of the type of building, location, usage and compile a ‘story board’ of his aims to achieve a satisfactory design for a reasonable cost which not only meets all the legislation, standards and codes of practice but also is practical in it’s use and in it’s maintainability.
EL.01.0 LEGISLATION AND STANDARDS

EL.01.04 It is necessary that the design shall satisfy all of the conditions determined in the following documents:

The Building Regulations 2000

The Fire Precautions (Workplace) Regulations 1997

The Health and Safety (Safety Signs and Signals) Regulations 1996

Electricity at Work Regulations, Statutory Instrument 1989 No. 635

BS 5266-1: 2005 Emergency Lighting – Code of Practice for emergency lighting premises


BS 5266-3:1981 Emergency lighting. Specification for small power relays (electromagnetic) for emergency lighting applications up to and including 32 A

BS 5266-4:1999 Emergency lighting. Code of practice for design, installation, maintenance and use of optical fibre systems

BS 5266-5:1999 Emergency lighting. Specification for component parts of optical fibre systems


BS 5266-10:2008 Guide to the design and provision of emergency lighting to reduce the risks from hazards in the event of failure of the normal lighting supply

BS EN 1838:1999 (also numbered BS 5266-7:1999) Lighting applications – Emergency Lighting

BS EN 50171 Central power supply systems

BS EN 50172:2004 (also numbered BS 5266-8:2004) Emergency escape lighting systems
EL.02.0 OTHER RELEVANT STANDARDS AND CODES OF PRACTICE

BS 7671 Requirements for electrical installations. 17th Edition
IEE Wiring Regulations.

BS 7629-1 Specification for 300/500 V fire resistant electrical
cables having low emission of smoke and corrosive gases when
affected by fire – Part 1: Multicore cables.

BS 7629-2 Specification for 300/500 V fire resistant electrical
cables having low emission of smoke and corrosive gases when
affected by fire – Part 2: Multi-pair cables.

BS EN 60702-1 Mineral insulated cables and their terminations
with a rated voltage not exceeding 750 V – Part 2: Terminations.

requirements – Section 2-22: Luminaries for emergency lighting.

BS 7846 Electric cables 600/1,000 V armoured fire-resistant
cables having thermosetting insulation and low emission of
smoke and corrosive gases when affected by fire.

CIBSE, LG12 SLL Lighting Guide 12: Emergency Lighting
Design Guide.

Carbon Trust, ILG008 Installers’ Guide to Emergency Lighting.

NHS Estates, Health Alarm and Detection Systems TM82
EL.03 TYPES OF EMERGENCY LIGHTING SYSTEM

EL.03.01 Most emergency lighting schemes fall into one of the following categories:-

a) **Non-maintained** - The emergency light units only illuminate in the event of a mains failure.
b) **Maintained** - The emergency light units are illuminated at all times using the same lamps for both normal and emergency operation.
c) **Sustained** - The emergency light units are fitted with two lamps or two sets of lamps. One of which operates on mains 240V AC supply, the other which operates from the battery supply in the event of mains failure. It is basically a non-maintained system with the addition of mains lamps which should be illuminated whenever the premises are occupied.

EL.03.02 The type of system and emergency duration is often expressed in abbreviated form as per the following examples:-

- M3 - Maintained System, emergency duration 3 hours.
- NM2 - Non-maintained System, emergency duration 2 hours.
- S1 - Sustained System, emergency duration 1 hour.
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EL.04 COVERAGE OF EMERGENCY LIGHTING

As denoted in BS 5266 the requirement under statute is for emergency lighting to be provided in the following instances:

EL.04.01 Escape Route

"Emergency escape routes, intersections of corridors and exits doors requiring illumination must be provided with emergency lighting of adequate intensity in case the lighting fails". Outside each final exit and on external escape routes

EL.04.02 Signage

Adequate provision of signs protected by emergency lighting. Signs should be located at all final exits and also on the escape routes at any location where the route may be in doubt.

EL.04.03 Staircases and Changes in Floor Level

Stairways should be so illuminated so that each flight and change of level receives adequate light

EL.04.04 Open Area

Area > 60m²

EL.04.05 Small spaces

Windowless rooms and toilet accommodation exceeding 8m².

EL.04.06 Fire Fighting Equipment

Fire fighting equipment

EL.04.07 Fire Fighting Equipment

Fire alarm manual call points

EL.04.08 High Risk

Area where hazardous activity occurs that is to be made safe or terminated or where people may pass by

EL.04.09 Equipment

Equipment that would need to be shut down in an emergency

Cont’d
EL.04.0  COVERAGE OF EMERGENCY LIGHTING (Cont’d)

EL.04.10  Lifts

Lifts should be provided with emergency lighting.

It is not necessary to provide individual lights (luminaire) for each item above, but there should be a sufficient overall level of light to allow them to be visible and usable.

EL.04.11  Standby

In areas or places where a continuous operation is required, during the failure of the supply to the normal lighting, then standby lighting should be installed.

EL.04.12  Additional areas to be considered (not in BS)

- It is recommended that standby lighting should be installed in the following areas:
  - Adjacent to all distribution boards ensuring sufficient illumination to carry out any likely repairs to the boards.
  - Adjacent to all Vent Panels ensuring sufficient illumination to carry out any likely repairs to the panels.
  - In all Plant rooms ensuring sufficient illumination to maintain the running of and the carrying out of any likely repairs to all items of plant and equipment.
  - In all Boiler rooms, ensuring sufficient illumination to maintain the running of and the carrying out of any likely repairs to all items of plant and equipment.
  - Adjacent to all Sprinkler Panels, ensuring sufficient illumination to carry out any likely repairs to the panels.
  - In all lift motor rooms ensuring sufficient illumination to maintain the running of and the carrying out of any likely repairs to all items of plant and equipment.
  - In all accessible Pipe Ducts, Cable Ducts and Walkways ensuring sufficient illumination to inspect, repair and maintain all items of plant and equipment.
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EL.04.0 COVERAGE OF EMERGENCY LIGHTING (Cont’d)

EL.04.12 Additional areas to be considered (not in BS) (Cont’d)

- In all Tank Rooms to ensuring sufficient illumination to inspect, repair and maintain the tanks and all associated items of plant and equipment.
- Positioned adjacent to all access ladders, to ensure operative safety in the event of lighting failure.

EL.05.0 FORMS OF EMERGENCY LIGHTING

EL.05.01 Light Sources

- Self Contained luminaires
- Luminaires with integral battery pack
- LED luminaires

EL.05.02 Power Sources

- Self-Contained Mains fed with Integral Battery Pack
- Luminaire with Conversion Battery Pack
- Central Battery System

EL.05.03 Self Contained - Single Point

Advantages:

- Speedy and low cost installation;
- Standard wiring material may be used (failure of mains supply due to cable burning through will automatically satisfy the requirement for a luminaire to be lit);
- Low maintenance costs - periodic test and general cleaning only required;
- Low hardware equipment costs – no requirement for extended wiring, special ventilation etc.
- Greater system integrity with each luminaire independent of the other;
- System can easily be extended with additional luminaire’s;
- No special sub-circuit monitoring requirements.

Cont’d
EL.05.0 FORMS OF EMERGENCY LIGHTING (Cont’d)

EL.05.03 Self Contained - Single Point (Cont’d)

Disadvantages:

- Limited environmental operating range (batteries may be adversely affected by a relatively high ambient temperature);
- Battery life is limited to between 2 and 4 years dependant upon application;
- Testing requires isolation and observation of luminaire's on an individual basis.

EL.05.04 Luminaire with Conversion Battery Pack

Advantages:

- Speedy and low cost installation;
- Standard wiring material may be used (failure of mains supply due to cable burning through will automatically satisfy the requirement for a luminaire to be lit);
- Low maintenance costs - periodic test and general cleaning only required;
- Greater system integrity with each luminaire independent of the other;
- System can easily be extended with additional luminaire's;

Disadvantages:

- Limited environmental operating range (batteries may be adversely affected by a relatively high ambient temperature);
- Battery life is limited to between 2 and 4 years dependant upon application;
- Testing requires isolation and observation of luminaire's on an individual basis.
- Higher equipment costs – requirement for extended wiring, etc.

Cont’d
EL.05.05 Central Battery Source

Advantages

- Maintenance and routine testing is easier with only one location to consider;
- Superior battery life, between 5 and 25 years dependant upon type;
- Environmentally stable in a protected environment, luminaire able to operate at relatively high or low ambient temperatures;
- Large batteries are cheaper per unit of power and luminaire are usually less expensive.

Disadvantages:

- High capital equipment costs;
- High installation and wiring costs with essential MICC or Pirelli FP200 type cable to each slave luminaire;
- Poor system integrity - failure of battery or wiring circuit can disable a large part of the system;
- Requirement for 'battery room' to house cells and charger circuits etc, may also require ventilation of acid gases;
- Localised mains failure may not trigger operation of emergency lighting in that area.
- Voltage drop on luminaire wired furthest from the central battery could become a problem.

In general then, the decision to use either a central battery or a self-contained system is likely to be cost dominated. If an installation has longevity and low maintenance as priorities, then the higher cost of central battery may be acceptable on a very large project. Usually, luminaire and installation costs will be a major consideration, particularly on smaller jobs, and it is this criterion which makes the self-contained luminaire the most popular choice.
EL.06.0 FORMS OF TESTING

EL.06.01 Legislation demands that emergency lights are regularly tested and maintained in full working order, if not then they cannot be expected to function effectively in an emergency.

- Local Test Switch
- Passive Infra Red
- Self Testing Luminaires
- Computer operated Bus-wire

EL.06.02 **Local Test Switch**

The base type of testing is by local test switch for single emergency luminaire or series of emergency luminaires, usually key operated.

The main advantage of the use of this system is its relatively cheap cost.

However the use of local test switches can have a detrimental outcome when used under maintenance test conditions when full discharge as called for often the operative forgets to restore, or is prevented from restoring the luminaire to its charge condition resulting in the luminaire (or conversion pack) being rendered ineffective with detrimental consequences.

To avoid testing all emergency fittings at the same time, then leaving an area with no emergency cover whilst the batteries recharge, testing should be staggered over different days, thus ensuring continuity of emergency lighting cover.

Lately a unit has come onto the market which is a programmable local test switch but this has a significant cost and therefore careful financial evaluation must be undertaken.

EL.06.03 **Passive Infra Red**

Another manual means of testing is afforded by the use of a hand held passive infra red device.

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EL.06.0 FORMS OF TESTING (cont’d)

EL.06.04 Self Testing Luminaires

There are now many emergency lighting luminaires marketed by various manufacturers which incorporate intelligent technology to constantly monitor parameters such as mains supply status and charger operation.

Many of these units carry out monthly function tests of the emergency operation and an annual full rated duration discharge test.

Dependant on manufacturer and cost the self test features can be extend to include self diagnostic and alarm capabilities and inbuilt intelligence features to allow for staggered delay testing to ensure that the luminaires in any given area are not all tested at the same time.

EL.06.05 Computer operated Bus-wire

Where lighting management systems form part of the building management system, consideration should be given to the introduction of an addressable type emergency lighting system.

As the operation of the mains based luminaires are controlled by a ‘bus-wire’ system in follows that the addition to the system of control of emergency luminaires be added enabling the programming of automatic testing schedules.

EL.07.0 INSTALLATION STANDARDS

EL.07.01 All emergency luminaires must be installed in strict accordance with the manufacturer’s requirements and recommendations.

EL.07.02 All emergency luminaires shall be clearly labelled in accordance with the CLAW Specification for Electrical Services to indicate the reference number which shall also be clearly marked on the record drawings.

EL.07.03 All wiring methods and containment shall be installed in accordance with the CLAW Specification for Electrical Services section EC.

EL.07.04 The emergency luminaires shall take their power reference from local lighting circuits in order that failure of the circuit, for whatever reason, will result in the energisation of the emergency luminaires.
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**EL.08.0 INFORMATION FOR LOG BOOKS**

**EL.08.01** The designer should ensure that the information is prepared for inclusion in the Log Book to include the following information for every emergency luminaire forming the scheme:

- Luminaire Number
- Luminaire Location
- Luminaire Category/Rating
- Manufacturer
- Model
- Installation Date
- Lamp Type
- Battery Installation Date
- Supply Isolated From

**EL.08.02** All such information should also be available in spatial drawing format to enable the tester to easily locate each emergency luminaire in order to fulfil the testing and monitoring procedure.

**EL.09.0 OPERATION & MAINTENANCE MANUALS**

**EL.09.01** The compilation and presentation of the comprehensive Operation & Maintenance Manuals shall be carried out strictly in accordance with Clause EB.15.0 of the CLAW Specification for Electrical Services.

**EL.10.0 MAINTENANCE**

**EL.10.01** All maintenance shall be carried out strictly in accordance with the CLAW maintenance module MM36 Emergency Lighting.