

**Requirements for Emergency Lighting Systems
with Central Power Supply**

A. Definition

1. Luminaire means an apparatus which distributes, filters and transforms the light given by a lamp or lamps and which includes all the items necessary for fixing and protecting these lamps and for connecting them to the central supply circuit. It shall conform to the requirements of BS 5266-1: 2016 and BS EN 1838: 2013 unless otherwise specified below.
2. Centrally supplied emergency lighting luminaire means a luminaire for maintained or non-maintained operation which is energized from a central emergency power supply system that is not contained within the luminaire.

B. Specification

3. The emergency lighting systems shall comply with BS 5266-1: 2016 and BS EN 1838: 2013 and the relevant requirements of the *Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment* unless otherwise specified below.
4. Batteries used shall be of heavy duty and rechargeable (secondary) type; batteries of primary cells of any type whatsoever will not be acceptable.
5. Batteries shall be installed in a room approved for this purpose by the Building Authority, Housing Authority or Director of Architectural Services as appropriate, unless:
 - (a) the battery is an enclosed type and its entire installation shall conform to
 - (i) BS EN IEC 62485-1: 2018 and BS EN IEC 62485-2: 2018 with capacity not exceeding 400 ampere-hours; or
 - (ii) BS EN 50272-1: 2010 and BS EN 50272-2: 2001 with capacity not exceeding 400 ampere-hours; or
 - (b) the battery is of the valve regulated type conforming to BS EN 60896-21: 2004 and BS EN 60896-22: 2004.
6. All batteries for emergency lighting circuits shall be kept fully charged at all times.

7. Power Supply for Cinemas / Theatres / Premises for Entertainment Purposes

(a) For cinemas / theatres / premises for entertainment purposes accommodating 500 persons or less, the emergency lighting system shall be capable of maintaining the stipulated lighting level for a minimum period of 1 hour with power supplied either from a dedicated uninterruptible power supply (UPS) system or from a central battery DC supply system conforming to BS EN 50171: 2001.

(b) For cinemas / theatres / premises for entertainment purposes accommodating more than 500 persons, the emergency lighting system shall be:

(i) maintained for a minimum period of 2 hours with power supplied either from a dedicated UPS system or from a central battery DC supply system conforming to BS EN 50171: 2001; or

(ii) maintained for a minimum period of 1 hour with power supplied either from a dedicated UPS system or from a central battery DC supply system conforming to BS EN 50171: 2001 on the condition that the supply system is backed up by an emergency generator conforming to the standard as stipulated in the *Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment*.

8. An automatic trickle charger with mains input and suitable output, fitted with meters, regulators, pilot lights, testing facilities and warning signals in both visual and audio forms, shall be provided for the UPS system or central battery DC supply system. The visual and audio warning signals shall be terminated in the management office of the cinemas / theatres / premises for entertainment purposes or a place agreed with the Fire Services Department to alert the management of system fault. The charger shall be capable of fully re-charging the batteries in not more than 12 hours, if the emergency lighting system is not additionally backed up by emergency generator. For emergency lighting system backed up by emergency generator, the time required to fully recharge the battery system shall not be more than 24 hours.

9. Wherever applicable, the supply from the batteries shall feed a main distribution fuse board and thence be subdivided to four sub-distribution fuse boards as follows:

- Exit lighting
- Stair lighting
- Auditorium lighting
- Stage lighting

10. Outgoing circuits shall be suitably protected by fuses / protective device conforming to the relevant requirements of the *Code of Practice for the Electricity (Wiring) Regulations* issued by the Electrical and Mechanical Services Department.
11. The emergency lighting system shall be wired with fire resisting cables conforming to:
 - (a) BS EN 50200: 2015 (PH60) and Annex E of BS EN 50200: 2015 (a duration of survival time of 30 minutes) and one of the following standards:
 - (i) BS EN 60702-1: 2002 + A1: 2015 & BS EN 60702-2: 2002 + A1: 2015
 - (ii) BS 7629-1: 2015 (Cat. Standard 60)
 - (iii) BS 7846: 2015 (Cat. F2 for cables of overall diameter not exceeding 20mm); or
 - (b) BS 6387: 2013 Cat. CWZ; or
 - (c) BS 7846: 2015 (Cat. F60 for cables of overall diameter exceeding 20mm).

Remark: The use of fire resisting cables may be exempted under the relevant conditions stipulated in FSD Circular Letter No. 2/2017 - Minimum Fire Resisting Cable Requirements for Fire Service Installations.

12. All luminaires in the emergency lighting system shall be compliant with the glow wire test as stated in sub-clause 13.3.2 of IEC 60598-1 but at a temperature of 850°C. The luminaires shall be permanently fixed in position.
13. Upon failure of the normal lighting system or in the event of power failure, the emergency lighting system shall automatically light up to at least 90% of the stipulated illumination level within 5 seconds.

C. Other Requirements

14. Batteries in celluloid containers shall not be installed, stored or used.
15. A margin allowance of 12½ % of the total required battery capacity (ampere-hour rating not voltage) shall be provided, i.e. 100% + 12½ %=112½ %.
16. A diagram showing details of the distribution system and the circuit wiring of the emergency lighting system shall be posted adjacent to the electrical wiring diagram(s) of the main distribution board.
17. The minimum illumination provided at floor level by the emergency lighting system shall be:

Staircase/exit route

not less than 2 lux

Nightclub, restaurant, dance hall, or premises where people have freedom of movement and there are loose fixtures and fittings not less than 1 lux

Cinemas and theatres (auditorium) not less than 0.5 lux

The measurements shall be taken at the mid-point between any two emergency lighting luminaires. A discretionary tolerance of minus 10% is permitted and all readings shall be taken by an illuminance meter.

18. All luminaires shall have equal lumen output and distribution characteristics giving equal intensity of light in all material directions. Each luminaire shall be so sited as to avoid impairment of vision from glare. Luminaires, except where so specified and approved, shall be mounted at a height of not less than 2 metres above the finished floor level.
19. The minimum number of lamps required in any luminaires shall not be less than two (Note: If only one luminaire was provided and a lamp failure occurred, a hazardous situation would result). The luminaires shall be permanently fixed in position.
20. Facilities exceeding 8m² gross floor area and facilities of less than 8m² without borrowed light shall be provided with escape lighting complying as if they were part of an escape route. For clarity, escape route means a route forming part of the means of escape from a point in a building to a final exit. Borrowed light means the light obtained from an adjacent reliable source such as emergency lighting luminaires, exit signs and directional signs that is available at all material times. Escape lighting means part of emergency lighting which is provided to ensure the escape route is illuminated at all material times.
21. In the event of failure of the normal lighting, the public shall, unless the capacity of the battery is sufficient to maintain the specified conditions for a minimum period of 4 hours, within 1 hour be required to leave the building / premises and they shall not be re-admitted until the normal lighting has been fully restored and the emergency lighting system recharged.
22. Routine Inspections and Tests
 - (a) In the case of battery systems, the control and safety devices installed shall be regularly tested as follows:
 - (i) Connections between the battery and the source of charging current shall be such that in no circumstances shall the battery discharge other than to the emergency lighting circuits.

- (ii) A rectifier for battery charging shall be provided for the purpose only and shall be so regulated that the battery cannot discharge appreciably under normal conditions.
 - (b) Once every month a functional test in accordance with BS EN 50172: 2004 not longer than 10% of rated duration should be carried out.
 - (c) Once every month a discharge test for 1 minute at the 10-hour discharge rate, shall be carried out and the results shall be entered in a register. The on-load voltage of each cell after this test shall be not less than 2.01 volts for lead acid and 1.25 volts for nickel-cadmium. For other types of battery, advice from the manufacturer of the battery / system shall be sought and that shall also be acceptable to the Director of Fire Services.
 - (d) Once twelve-month a full rated duration test should be carried out and the result should be entered in a register.
 - (e) The luminaire should be functioning properly to maintain the stipulated lighting level and the normal power supply should be restored after the test.
 - (f) If automatic testing devices are used, paragraphs C.22(b) to C.22(e) should be complied with.
23. The luminaires of emergency lighting system conforming to the requirements as stipulated in paragraph B.12 above shall be tested and certified by a testing organization recognized by the Fire Services Department or a local university laboratory competent to carry out the relevant tests and certification.
24. Performance as stipulated in paragraphs B.7, B.8 and B.13 above shall be verified by a Registered Fire Service Installation Contractor / Works Specialist / Works Agent by means of manufacturer's specifications/certificates/calculations and testing & commissioning conducted on site.

Fire Services Department
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