

**University of Reading**

**Standard specification for the provision of emergency  
lighting systems within buildings**

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## General Requirements

Emergency lighting systems installed within University of Reading buildings shall:

- i) Be installed so as to be robust, reliable and fully compliant with the current British Standard.
- ii) Be fully compliant with both this general section and also the requirements for the chosen system type detailed later in this document (relating to central battery systems or self-contained- self-test systems).
- iii) Be capable of being maintained and tested fully in accordance with the current British Standard.
- iv) Be capable of being fully tested and maintained during normal working hours without disruption to the building occupants or activities.
- v) Not require the use of key operated switches within teaching/research spaces.
- vi) Be designed with a minimum of 25% additional spare capacity (central battery systems).
- vii) Be fully monitored and self-testing (self-contained systems).
- viii) Be completely independent of the general service lighting within the building.
- ix) Be connected to the Building Management System for the purpose of fault monitoring and alarm signaling.
- x) Operate in the non-maintained mode, except where maintained operation is required for licensed/public areas.
- xi) Be designed to provide full design emergency illumination continuously for a minimum period of 3 hours.
- xii) Continuously monitor all appropriate general service lighting final sub circuits and cause the non-maintained emergency lighting system to operate if a fault is detected.

## Central Battery Systems

The preferred option for emergency lighting systems installed within University of Reading buildings is for the system to be based upon a central battery, operating in a non-maintained mode, supplying slave emergency luminaires.

The central battery based emergency lighting system shall be selected, designed, installed and commissioned to comply fully with the following requirements:

- i) Batteries used in the central battery unit shall be Nickel Cadmium with a design service life of 25 Years. Lead acid or dry fit should not be considered as the life span of the battery is considerably reduced when used in this application. (Typically 5-7 years)
- ii) The batteries and charger shall be specified to have a minimum of 25% spare capacity for future system expansion/alteration.
- iii) The system shall operate at either 50v DC or 110v DC.
- iv) For systems operating at 50v DC it is likely that the charger, control unit and nickel cadmium batteries can be accommodated into one combined steel enclosure; larger systems operating at 110v DC should be specified with a wall mounted or floor standing steel enclosure for the charger and control unit, with a separate floor standing rack for the batteries.
- v) The charger/control unit must be provided with a voltmeter, ammeter and automatic monitoring for earth fault, low voltage, high voltage, low electrolyte, mains fail and charge fail.
- vi) The charger, control unit and batteries must be installed together as a package in one location, kept well ventilated and away from sources of ignition due to the production of hydrogen during charging.
- vii) The system shall operate in the non-maintained mode unless specified otherwise in licensed and or public areas.
- viii) Emergency luminaires are to be slave units, operating at either 50v DC or 110v DC in the non-maintained mode and shall use LED lamps.

- ix) Fixed wiring between the central battery unit and the non-maintained slave luminaires shall be either 2 core MICS cable or an equivalent soft skinned fire resistant cable.
- x) The fixed wiring to each non-maintained slave luminaire shall be directly and permanently terminated into the luminaire, the use of plug-in ceiling roses, wiring centres and flexible cables is not permitted.
- xi) The fixed wiring shall be securely fixed by means of fire resistant metal clips, straps or ties, either directly to the building fabric or on a suitable metal cable tray or basket.
- xii) Final sub-circuit monitoring relays are to be installed on all appropriate general service lighting circuits and connect back to the central battery control panel.
- xiii) The final sub-circuit monitoring relays are to be mounted immediately adjacent to the local lighting distribution board from which the monitored general service lighting is fed.
- xiv) The final sub-circuit monitoring relays are to be mounted in an appropriately sized proprietary steel enclosure with lockable hinged cover and DIN rail mounting.
- xv) The final sub-circuit monitoring relays shall each be clearly marked with the general service lighting circuit reference number that they are monitoring.
- xvi) Each final sub-circuit relay connection shall be fitted with a key operated test switch marked with the lighting circuit reference number that they are controlling.
- xvii) The fixed wiring between the final sub-circuit monitoring relays and the central battery control panel shall be of the same grade and type selected for the wiring between the central battery unit and the slave luminaires.
- xviii) Where maintained luminaires are needed in public/licensed areas a dual output (non-maintained/maintained) central battery charger/control unit will be required.
- xix) All wiring between the central battery unit and any maintained luminaires shall be of the same grade, and installed to the same standard as that previously specified for the non-maintained circuits.
- xx) At the time of hand-over a fully marked up building plan shall be provided which clearly indicates the quantities, types, locations and configuration of each installed luminaire.

## Self-Contained Self-Test Systems

The alternative to the preferred central battery based emergency lighting system is the self-contained self-test system with Web based monitoring and reporting facility. This type of system would normally only be used on smaller installations requiring up to 100 emergency lighting points and shall have the following feature set as a minimum:

- i) A master control/monitoring panel connected to each self-contained luminaire via a dedicated 2 core fire resistant communications network in a 'T'/ Star or radial configuration. (Loop configurations must be avoided.)
- ii) Each 2 core fire resistant communications network shall be capable of stable operation at a minimum length of 2000 metres.
- iii) The master control panel must allow for modular expansion of up to 63 collector boxes each supporting 125 luminaires. Therefore capable of controlling up to 7500 luminaires.
- iv) The master control panel shall be equipped to provide permanent monitoring of all luminaires and fault signal transmission to the local building BMS outstation, Ethernet connectivity and also email of the fault signal to the university remote Emergency Control Centre (ECC) or duty engineer.
- v) The master control panel shall be equipped with a built in printer for the production of fault reports, system activity reports, system status reports and test result reports. Alternatively this information must be available to be printed via a web based portal.
- vi) The master control panel must be able to allocate an individual 40 character alpha-numeric identification string to each luminaire.
- vii) The master control panel shall be capable of scheduling the exact time of day, frequency and duration of all automatic testing without limitation.
- viii) The master control panel shall be equipped with an internal back- up battery to provide 12 hours of operation in the event of a mains failure to the panel.
- ix) In the event that this system were to be considered for an installation larger than can be accommodated by a single master control panel the installation must allow for additional sub-master

control panels to be installed and networked together, all monitored from a single master panel in a central location or through a web based portal.

- x) The master control panel shall be capable of storing, retrieving and printing out details of the latest 1000 system events. The test data should be held for at least 3 years.
- xi) The master control panel and or collector boxes shall be equipped with a local LCD display to allow user access system parameters, status reports and maintenance functions.
- xii) The master control panel must be equipped with Ethernet web based IP connectivity, a local fault buzzer, RS-485 output for repeaters/collector boxes or hard wired expansion units and volt free connections for BMS signaling of common fault.
- xiii) Luminaires shall be selected from the range offered by the manufacturer of the master control panel and be fully integrated as a part of an approved and warranted system.
- xiv) The luminaires shall be rated for a minimum of 3 hours continuous operation and use only LED lamps with a rated life of 60000 hours.
- xv) The luminaires shall be self-contained with a high output white LED and use specially designed lenses for either corridor, open area or wall mount applications.
- xvi) The luminaires shall be available in either flush or surface mounting varieties.
- xvii) The luminaires shall be designed as a two part assembly allowing for 1<sup>st</sup> and 2<sup>nd</sup> fix activities.
- xviii) Each luminaire shall be automatically monitored for excess temperature and both open circuit and short circuit.
- xix) Each luminaire shall contain its own dedicated intelligent charger circuit and Lithium Ion battery pack.
- xx) Each Lithium Ion battery pack shall be internally fused.
- xxi) Batteries should have at least a 5 year warranty guarantee period.
- xxii) The dedicated charger within each luminaire shall operate on the principle that it will only provide an output to charge the battery when absolutely required, rather than the industry default position of non-intelligent constant trickle charging.
- xxiii) The systems as a whole shall be designed, specified, installed and commissioned in such a way that automatic testing in full compliance with the current British standard is set up from the day of hand-over.

- xxiv) Systems with over 50 installed luminaires shall be equipped with IP connectivity to a web based portal to enable both the relevant building manager and maintenance operative's access to remote system management tools.
- xxv) The self-contained self-test luminaires shall be completely independent from the general service lighting.
- xxvi) At the time of hand-over a fully marked up building plan shall be provided to the University of Reading which clearly indicates the quantities, types, locations and system addresses of each installed luminaire.
- xxvii) At the time of hand-over two copies of the final system configuration must be supplied to the University of Reading, one printed, the other electronic.
- xxviii) Preferred systems that meet this specification would be manufactured by P4 Fastel Limited 1 Wymans Way, Fakenham Industrial Estate, Fakenham, Norfolk NR21 8NT