2 ELECTRICAL SYSTEMS

Minimum Standards

2 .1.00 The minimum requirements for the provision of electrical installations in Health Care Facilities shall be those listed in Enclosure E1.

In addition to the minimum requirements and depending upon the type of the facility and installed services the following Australian Standards shall apply:

- Energy Efficient Government Buildings: Sustainable Energy Authority Victoria
- AS 3011 - Electrical Installations - Secondary batteries installed in buildings
- AS 2676 - Guide to the installation, maintenance and testing of secondary batteries in or on buildings
- AS 2430 - Classification of hazardous areas
- AS 2243.7 - Safety in laboratories - electrical aspects
- AS/ NZS 1680.4 - Maintenance of electric lighting systems
- AS 1768 - Lightning protection
- AS 1169 - Minimising of combustion hazards arising from the medical use of flammable anaesthetic agents.

All clauses outlined in the following section shall be in addition to statutory requirements.

Submains for Critical Care Services

2 .2.00 Standby lighting and power systems to AS 3009 shall be provided in critical care areas.

Light and general purpose power outlets in critical care areas shall have dedicated submains originating from the main switchboard. The switchboard and submains shall be configured to ensure continuous availability of electrical supply by means of an essential section on the switchboard.

Two dedicated submains circuits shall be provided for each critical care area. At least one of the circuits shall be connected to the emergency generator supply where installed. Critical care submains cables are not required to be fire rated. Protection against mechanical damage shall be provided.

Emergency power shall be connected to all critical patient equipment involved in invasive subcutaneous procedures and diagnostic procedures. High load diagnostic equipment shall be fitted with low power modes where possible to enable connection to a UPS. This will allow clinical personnel time to complete or finalise an invasive procedure without risk to the patient.

Standby Power

2 .3.00 The following factors shall be considered when dual high voltage electrical supplies are to be used without providing emergency generators:

- Do high voltage supply feeders originate from two independent network circuits?
- Are high voltage supply feeders reticulated through two separate geographical routes?
- Does the standby feeder have full capacity available all the time?
- Are the high voltage supply feeders reticulated overhead or underground?
- Is an automatic bus tie permitted by the Supply Authority?
- Are either HV feeders likely to be interrupted due to weather conditions, vehicle crashes or vandalism?
- Total life cost (initial capacity cost, authority charges and recurrent standby charges).

Emergency generators are recommended to be installed to ensure continuity of essential electrical supply in critical areas, when suitable dual supply high voltage feeders are generally not available.

Where the facility has a post disaster function or requires chilled water / cooling services for sustaining human life or critical service, this shall be achieved by providing sufficient electrical generation capacity to start and run chillers, chilled water pumps, critical air-conditioning necessary for the continued operation of all critical areas and services.

Connection of Mobile Generator

2 .4.00 For hospitals where life-sustaining procedures are undertaken and no emergency generator is installed, a quick connection facility is recommended to be provided to enable connection of a mobile generator to the essential (emergency) section of the main switchboard.
Designers shall analyse and document the risks associated with this system.

Earthquake Protection for Generator

2 .5.00 The main electrical switchboards and emergency generators including remote cooling plant design and installation shall comply with AS 1170.4 Earthquake loads for seismic constraint requirements.

Standby Power Electrical Outlets

2 .6.00 Power outlets and light switches connected to a UPS or automatic diesel generator shall have either toggles or plates distinctively colour coded. Engraving of outlets will be acceptable in lieu of coloured flush plates or rockers.

Emergency Light and Power (UPS)

2 .7.00 Fixed surgical luminaries in Operating Rooms shall be connected to an Uninterruptible Power Supply (UPS) System. Examination lights in Procedure Rooms, Birthing Rooms and the like shall be connected to 'Vital (1sec)' cental battery systems. Other 'Vital (1 sec)' lighting circuits may be connected to the central battery power system or may consist of self contained single point systems.

All battery supported equipment such as PABX, radio paging and fire alarm systems, together with medical gas warning, nurse call and similar systems shall be connected to 'Vital (1 sec)' circuits, (maximum delay 1 second).

Any room or enclosure containing secondary batteries with a stored capacity exceeding 1 kWh or a floating voltage which exceeds 115 volts, that installation shall comply with the installation requirements of AS 2676 ' Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings' and AS 3011 'Secondary batteries installed in buildings'. Note that vented batteries require specific emergency wash down and washing facilities to be provided.

Emergency lighting shall be provided in corridors, stairways, toilets, ensuites, utility rooms, patient treatment areas and other critical use areas for the safe management of patient care.

Planned Spare Electrical Capacity

2 .8.00 An allowance of additional floor space to accommodate future electrical capacity shall be considered in the design phase.

Planned spare electrical capacity shall be based on predicted future building loads and future equipment loads or the following table:

BUILDING CATEGORIES		VA per m2	kVA per m2
AIR-CONDITIONING WITH NON-ELECTRIC HEATING		100	0.10
AIR-CONDITIONING WITH ELECTRIC HEATING		120	0.12
AIR-CONDITIONING REVERSE CYCLE		110	0.11
ELECTRIC HEATING NO COOLING		100	0.10
NON-ELECTRIC HEATING NO COOLING		60	0.06

Patient Electrical Protection Systems

2 .9.00 Patient treatment areas where electrico-medical equipment may be used for procedures classified as either body-type or cardiac-type as defined by AS 3003, shall have electrical installations installed to comply with AS 3003 'Electrical installations - patient treatment areas of hospitals and medical and dental practices'.

Labelling and Identification of Outlets & Switches

2 .10.00 All RCD protected outlets shall be labelled 'RCD Protected'. All outlets and switches shall be labelled. Circuits and phase number shall be suitably identified at each light and outlet switch position.

Outlets in Nursery and Clinical Patient Rooms shall be RCD protected and shall be fitted with safety shutters.

General Lighting

2 .11.00 General lighting levels shall comply with the BCA and shall not be less than the recommended illuminance stated in AS 1680.1 'Interior lighting - General principles and recommendations'.

Night lights shall be installed in all Patient Care Areas and exit passages where normal lighting levels will decrease at night. Night lights shall be mounted at a low level and shall be low intensity and diffused. Night light levels shall not interfere with patient sleep.

Clinical Lighting

2 .12.00 Light fittings with a colour rendering index complying with AS/NZS 1680.2.5 - 'Interior lighting - Hospital and medical tasks', shall be provided based on clinical need as determined by the facility.

Triphosphor lamps with a colour rendering index of 85 shall be fitted only after consultation with clinical staff.

A clinical observation light shall be provided where clinical observation is required. A patient reading light shall be mounted at each bed head. If the clinical observation light is not required to be colour corrected, clinical observation lighting and patient reading lighting can be incorporated into one fitting.

Energy Efficiency

2 .13.00 The following energy efficiency measures are not mandatory but are recommended; a cost benefit study will often confirm these systems as cost effective:

- High efficiency motors over 1.5 kW
- Variable speed drives installed in all pumps and fans over 4 kW to enable turn down during out of hours operations
- Fluorescent light fittings to be fitted with power corrected, low loss ballasts; consider the installation of triphosphor light tubes
- Power factor correction capacitors on the main switchboard to achieve a power factor of greater than or equal to 0.95
- Automatic lighting controls.