

## **Part E – Engineering**



# **International Health Facility Guidelines**

Version 3 December 2012

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# 1 Introduction

Part A of the International Health Facility Guidelines has already covered the Engineering guidelines which must be followed. This section provides further clarify in relation to the Engineering requirements.

The key issue in relation to Engineering is to understand the role of detailed briefing. Once the Functional Planning Units of the Health Facility are known, the nature of the service they provide will dictate certain engineering requirements from the environmental conditions to infection control.

In an administrative area, a certain type of simple air conditioning may be adequate and acceptable; however the same will be totally unacceptable in an Operating Suite, where a complex air pressurisation regime must be implemented for infection control.

Therefore, the operator and/or designer's self-declaration of the intended services and FPU's is the starting point of determining the engineering services.

## 1 Engineering Briefing

There are two aspects to the briefing requirements of Engineering.

### *Engineering Service Outlets*

This refers to the type and quantity of service outlets in each part of the facility, defined room by room. These include but are not limited to:

- Air Conditioning (including pressurisation type)
- Ventilation
- Power Outlets (General, Essential, UPS etc)
- Lighting
- Sanitary and other Fixtures
- Data and Voice Points
- Medical Gas Outlets
- CCTV and MATV outlets
- Nurse Call
- Security
- Transportation (lifts, escalators)

The type and quantity of the above outlets is not regarded as an Engineering decision, proposal or brief. These are regarded as part of Health Facility Briefing and covered in Part B. They represent the needs of patients, staff and visitors as determined by Health Facility Planners in consultation with the facility operators with consideration of the minimum Local Health Authority requirements.

These minimum requirements are shown in Room Layout Sheets provided under Part B.

### *Engineering Systems*

The engineers take the above briefing requirements as a starting point and determine the Engineering Systems which respond to those requirements.

Engineering Systems may have numerous options for the provision of the same outcome. For example, there are many ways of providing Air conditioning to a space.

In addition to the items which are defined by the Health Facility Planners, Systems Engineering will have to consider aspects of design which are not fully definable as part of the Health Facility Briefing. These include, but are not limited to:

- Fire Detection
- Fire Fighting
- Steam Generation
- ESD solutions
- Electrical Generators
- Medical Gas storage
- Central Energy Facilities
- Water Treatment
- Hot water generation and storage

These are example of Engineering Systems which are determined during the design development although certain preferences may be apparent even before design.

## 2 Engineering Services in Health Facilities

Engineering services in health care facilities shall satisfy general comfort demands, health procedure and patient care relevant requirements.

An important role of engineering services is controlling specific risks characteristics within a particular Health Facility. Engineering services become part of the complex risk management environment which includes many other factors such as maintenance and management. The optimal solution is the structuring of risk management to suit the potential risks specifically for the facility and financial circumstances (that will vary among projects).

These guidelines cannot cover all engineering options or define the requirements of a risk management system for engineering services. These systems should be developed during the design phase of the project by specialist engineers experiences in health facilities.

As energy efficient solutions are becoming increasingly important further requirements are proposed for inclusion in the design of health facilities. Some energy efficient solutions based on good engineering and general project development approach do not necessarily increase capital costs.

The provision of most energy recovery equipment does increase capital costs of the project, therefore life cycle cost analysis is recommended to justify additional expenditure and application of this equipment will depend on budget constraints.

It is not the intention of the Guideline to cover every aspect of public and private health facilities. Project specific issues that are expected to be covered in the project brief include:

- Involvement of affected stakeholders
- Nomination, listing of critical and sterile areas, including unacceptable risks
- Application of energy recovery systems, life cycle cost analysis and other financial requirements
- Provisions for foreseeable modifications
- Emergency power distribution
- Facility specific requirements
- Specific risks and risk management policy
- Trade wastes
- Service requirements for health care equipment
- Specific Management and Maintenance requirements

- Critical safety and performance parameters required being included into the maintenance regime.

Note: Healthcare procedure-specific equipment is excluded from the engineering services as the service contractors usually do not provide them. Engineering services shall be provided as necessary to suit equipment.

### 3 General Requirements

Engineering services shall comply with relevant, applicable legislations, municipality requirements and these guidelines. For a list of relevant guidelines acceptable to Local Health Authority, refer to Part A and the list at the end of this part.

Services, or their loss, shall not cause any unacceptable hazard. The particular risks involved with patients and healthcare procedures shall be considered. Where loss of service could cause unacceptable risk (including post disaster function), services shall be continuously available and provide reliable operation.

All services shall satisfy the facility specific healthcare procedure requirements, patients' and other occupants' needs. All services shall be designed and installed in a manner that will minimise the opportunities for patient self-harm.

All services shall satisfy comfort requirements as determined in the acceptable international guidelines.

All services shall be designed for safe usage and maintenance. Maintenance shall only cause acceptable minimal disruption to healthcare procedures and minimal disturbance to patients.

Access points are recommended to be located outside patient areas and thoroughfares to avoid patient disturbance and frequent traffic.

No services shall create a hazard to or damage the environment.  
Services shall be designed for minimal dust collection and easy cleaning.

All services shall be energy and cost efficient within the budgetary limits of the project.

Operation, monitoring and control of services shall suit the specific patient and healthcare procedures needs of the area serviced. Controls generally shall be tamperproof.

As-built drawings and detailed Operation and Maintenance Manuals shall be supplied at the end of a project. The drawings shall be clearly marked "AS BUILT" in large lettering and submitted to the Local Health Authority as part of the final inspection.

At the completion of the works, or section of the works, testing shall be carried out to prove the suitability and operation of the works or section of the works and that the installation complies in full with the requirements specified.

All equipment shall be suitable for the environment where they are located and operate (including temperature and pressure) and for the material they handle.

## 2 Engineering Guidelines

The Local Health Authority will review the engineering design in accordance with the following list of acceptable guidelines

Standards and Guidelines for the MEP Engineering Discipline	
1	AIA2006 – Design Guidelines for Design and Construction of Health Care Facilities
2	ASHRAE (American Society of Heating, refrigerating and Air-conditioning Engineers) - Inc. HVAC Design Handbook
3	SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) - Design Handbook
4	DW 144 - Specification for Sheet Metal Ductwork
5	DW 171 - Standard for Kitchen Ventilation Systems
6	ARI (Air-Conditioning & Refrigeration Institute)
7	CIBSE (Chartered Institution of Building Services Engineers)
8	IOP (Institute of Plumbing) - Plumbing Engineering Services Design Guide
9	ASPE (American Society of Plumbing Engineers) Design handbook
10	IPC (International Plumbing Code)
11	AWWA (American Water Works Association)
12	ASTM (American Society for Testing and Materials)
13	NFPA (National Fire Protection Association)
14	UL (Underwriters' Laboratories, Inc.)
15	HTM 02 (Health Technical Memorandum 02) Medical Gas Design Guide – Part 1 and 2
16	RSB (Regulation and Supervision Bureau)
17	Local Plumbing Code
18	Local Fire Code
19	Water & Electricity Authority Guidelines
20	Sewerage Services Authority Guidelines
21	Wiring Regulations for Electrical Installations (IEE 17 <sup>th</sup> Edition), published by the Institution of Engineering & Technology (BS 7671)
22	CIBSE Design Guides A, D, E, F, H, K & L
23	BS 5266 & NFPA 70 - Emergency Lighting
24	BS 5839(p8)- Voice Alarm System in Buildings
25	BSEN 60849 - Sound Systems For emergency purposes
26	BS EN62305:2006 - Protection of structures Against Lightning

**Standards and Guidelines for the MEP Engineering Discipline**

27	BS 7430 and BS7671 – Earthing
28	NFPA 72 – National fire alarm code
29	NFPA 101 – Life safety code
30	Australasian Health Facility Guidelines Part E- Engineering including TS11> <a href="http://www.healthfacilityguidelines.com.au">www.healthfacilityguidelines.com.au</a>

In situations where compliance with the Standards and Guidelines has not been achieved or is impractical, the non-compliance is to be highlighted to the local Health Authority. Reasons for such non-compliance and an alternative solution are to be put forward for consideration. The local Health Authority (at its sole discretion), may accept alternative solutions or compliance with other internationally recognised Standards and Guidelines offered by the applicant.