

# Scottish Health Planning Note 27

**Intensive Care Unit** 

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## About this series

The Scottish Health Planning Note series is intended to give advice on the briefing and design of healthcare premises in Scotland.

These Notes are prepared in consultation with representatives of the National Health Service in Scotland and appropriate professional bodies. Health Planning Notes are aimed at multidisciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

SHPN 27 focuses on Teaching Hospital and District General Hospital accommodation requirements for an intensive care unit with dedicated support facilities.

This Note recommends and assumes that medical, nursing and other specialist staff will be closely involved from the earliest stages of any project.

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## 1. Scope of SHPN 27

#### Introduction

- 1.1 Scottish Health Planning Note (SHPN) 27 provides guidance on the planning and design of intensive care units (ICUs) which form part of Teaching Hospitals or District General Hospitals (DGH). It replaces NHS Estates publication Hospital Building Note 27, 'Intensive Therapy Unit', published in 1970 and revised in 1974.
- 1.2 This Note reflects current thinking on the future role of ICUs. It is intended to facilitate good management and achieve cost effective running costs. Care has been taken to ensure that the guidance and recommendations for this accommodation are as economical as possible without detriment to clinical standards
- 1.3 The recommendations of the Intensive Care Society's publication, "Standards for Intensive Care Units", have been influential in the preparation of this Note.

### Inclusions

- 1.4 This guidance relates to "stand-alone" ICUs for adults and children, with dedicated support facilities. Specific considerations, such as purpose and objectives, are covered in Chapter 2.
- 1.5 Intensive care is appropriate for the following categories of patient\*:
  - patients requiring advanced respiratory support alone;
  - patients requiring support of two or more organ systems;
  - patients with chronic impairment of one or more organ systems sufficient to restrict normal activity and who require support for an acute reversible failure of another organ system.

\* Department of Health 1996.



## Exclusions

1.6 This Note does not contain guidance on the planning and design of High Dependency Units (HDUs) or specialist ICUs such as:

- coronary care units;
- neurosurgical units;
- cardiothoracic units;
- paediatric ICUs;
- neonatal units;
- burns units;
- renal units.

However, the Note may be useful to those providing such services.

- 1.7 High dependency care is appropriate for the following categories of patient\*:
  - patients requiring support for a single failing organ system, but excluding those needing advanced respiratory support;
  - patients requiring a level of observation of monitoring not possible on a general ward;
  - patients no longer needing intensive care, but who are not yet well enough to be returned to a general ward.
  - post-operative patients who need close observation or monitoring for longer than a few hours.
- 1.8 High dependency patients do not require the services and facilities provided in an ICU such as the intensity of nursing input and specialist equipment, and are more appropriately cared for in purpose built High Dependency Units providing the appropriate intermediate care.
- 1.9 Patients requiring high security isolation, (for example, those with Lassa fever, rabies, Marburg disease, viral haemorrhagic fever), are generally admitted to specialised isolation facilities, either in the same hospital or elsewhere.

\* Department of Health 1996.



## 2. Service objectives

### **Purpose and objectives**

- 2.1 An intensive care unit (ICU) provides a service to patients, requiring intensive medical and nursing care, and access to life-support systems.
- 2.2 Once their conditions have stabilised and they no longer require life-support, patients will be transferred to an HDU, an acute ward or to other specialist units for further specialised treatment.

## Service planning

2.6

- 2.3 Teaching Hospitals or District General Hospitals with a range of medical and surgical specialities are the appropriate locations for ICUs, which should be provided as a self-contained unit. ICUs should not be provided in community hospitals.
- 2.4 The conditions for which patients are admitted, and the numbers of patients referred to an ICU from other hospital departments, varies considerably between ICUs. These factors need to be taken into account when estimating scale of provision required. It is vital that a clearly defined operational policy is prepared for each individual unit so that good management practices can be used.
- 2.5 The admissions policy for an ICU will be influenced, to some extent, by the availability locally of other specialist intensive care units. Only patients requiring the specialist services of an intensive care unit should be admitted to an ICU. Patients with burns may be admitted to an ICU if, for example, they require artificial ventilation but may be transferred to the appropriate specialist unit when practicable
  - A variety of factors affect demand on an ICU. These include the range of services offered by the hospital, fluctuations in theatre workload, seasonal variations due to the adverse effects of weather, and locational factors such as proximity to motorways, major roads and airports, and seaside and other locations which attract influxes of seasonal visitors. Account will also need to be taken of regional disaster planning.



## Future service trends

2.7 It is anticipated that there will be an increasing demand for intensive care services in the future because of improvements in clinical management, case selection and technological advances. The design of new facilities should therefore allow for future expansion during the lifetime of the facility.

## Scale of provision

- 2.8 The total number of in-patients to be treated per year in an ICU should be estimated on the basis of local workload patterns, taking into account the following:
  - admissions policy;
  - availability of other specialist units;
  - number and type of acute beds, numbers of theatres and surgical specialties served and annual workload of the accident and emergency department;
  - locational factors likely to affect demand (seeparagraph2.6);
  - bed occupancy and length of stay assumptions (the assumptions in this guidance are 70% bed occupancy and an average length of stay of 4.3 days (2-8 days across the full range of all ICUs including those in teaching hospitals).

## Location and departmental relationships

- 2.9 Whilst an ICU should be centrally located within an acute hospital development, for the reasons set out below, it does not specifically require a ground floor location. The location of an ICU is subject to local policy decision.
- 2.10 An ICU receives patients primarily from the operating department, accident and emergency department and medical and surgical wards. Rapid transfer of patients from the above departments will necessitate easy access, physical proximity, or short journey times. Locating the ICU adjacent to the operating department allows for emergency evacuation of patients into the operating department's post-anaesthesia recovery area where medical gas and electrical outlets are readily available.
- 2.11 ICUs should also be located adjacent to HDUs to form a critical care department where staff equipment and beds can be shared for optimum efficiency, and to allow progressive patient care.



- 2.12 Although transmission of reported radiology results may be achieved electronically, access to radiology facilities is still desirable in order to facilitate rapid processing of films. Access to the scanner suite is also very important.
- 2.13 Both transport of specimens to the pathology department and receipt of test results may be possible by mechanical and electronic means. Physical proximity of the ICU to the pathology department is therefore not essential.

Figure 1: Departmental relationships within a hospital





## Layout and planning relationships

- 2.14 The layout should achieve a balance between providing privacy for patients, in both single-bed rooms and multi-bed areas, and providing unobstructed observation of patients, particularly by nursing staff. These requirements influence the physical relationship between the staff base and the bed spaces, and the design of the staff base. Requirements for services to bed space and for equipment around the bed will also have an effect on space provision and layout. See the ergonomic drawings in Chapter 7 and the standard demand for equipment per patient per bed, as detailed below, for an average patient in a Teaching Hospital or a District General Hospital (DGH) requiring both artificial ventilation and continuous multi-parameter monitoring (on which the guidance in this Note is based):
  - multi-parameter monitor, for example ECG, B/P, other pressure, temperature;
  - ventilator and humidifier;
  - 4 infusion pumps;
  - 4 syringe pumps;
  - suction apparatus low pressure;
  - suction apparatus high pressure;
  - examination lamp;
  - pulse oximetry and capnography.
- 2.15 In order to provide an efficient working environment for staff, the layout should also take account of key functional relationships between activity spaces, such as bed areas and utilities, and staff areas and bed areas. (See Figures 2a and 2b.)





## Figure 2a: Internal departmental relationships



## Figure 2b: Intensive Therapy Unit



NATURAL LIGHT TO AND VIEWS FROM THE BED AREA



## Functional relationships

2.16 An ICU contains three zones: patient bed areas, associated support facilities and staff areas. Both within and between these zones are key functional relationships which should be taken into account when designing accommodation. Details of these relationships are given below.

#### Staff base/patient bed areas

2.17 Although nursing staff will generally be based in the patient bed areas, visual and aural observation of patients from the staff base is still important, particularly at night. A balance should be struck between providing adequate observation for staff and also privacy for patients.

#### Patient bed areas/utilities and equipment storage

2.18 Utility areas and medical equipment storage should be located to provide ease of access to patient bed areas and also security of supplies and equipment. The multi-bed areas should not be used as a thoroughfare to these support spaces (see Figures 2a and 2b).

#### Patient bed areas/staff areas

2.19 Staff rest rooms and offices should be located far enough away from patient bed areas for staff to withdraw from activity within the unit, but also close enough for staff to return quickly to the patient bed areas if required.

#### Bed space/bed space

2.20 The layout of the multi-bed area and relationship to the single-bed rooms should enable nurses to easily call for assistance from one bed space to another.

## Observation

2.21

Factors to be considered include the physical relationship between the staff base, single rooms and multi-bed areas, the design of the staff base, the positioning of glazing panels around single rooms, and the positioning of mobile equipment within bed areas.



## User requirements

#### Patients

- 2.22 All patients require most or all of the following:
  - a bed space for treatment, multi-parameter monitoring and life-support systems;
  - access to medical gases and electrical outlets;
  - access to more specialised equipment;
  - visual privacy, particularly when receiving treatment;
  - awareness of daylight and outside views as an aid to orientation;
  - facilities for relatives and visitors;
  - television, radio and music.

#### Staff

- 2.23 Medical, nursing and paramedical staff require:
  - a design which facilitates observation of patients;
  - a design which facilitates effective deployment of nursing staff;
  - sufficient space around each bed to provide easy all-round access to the patient, equipment, medical gas supplies and clinical hand-washing facilities;
  - a lighting level sufficient for both patient examination and observation;
  - a means of summoning assistance from other staff;
  - storage for supplies and equipment within easy access of bed areas;
  - technical support services for urgent pathology tests and radiology procedures;
  - space and privacy for reporting/handover and other administrative activities;
  - separate male and female facilities for changing and for medical staff's overnight stay;
  - rest room and beverage facilities;
  - provision for teaching activities within the unit;
  - daylight and outside views in patient areas and office accommodation.



#### Visitors

2.24 Visiting times are a matter for local decision. Daytime waiting space, overnight stay and beverage making facilities, as well as access to payphones, will be required. The possibility that visitors may be children, elderly, disabled or emotionally disturbed should be borne in mind. A separate room will be required for counselling by medical and nursing staff.

## **Clinical teaching**

2.25 Seminar facilities, in which clinical instruction and case discussion may take place, are required.

## **Control of infection**

2.26 Prevention of cross-infection is fundamental to patient care in an ICU, with a high standard of hygiene promoted in all areas.

This Note and associated Activity Data Base sheets take account of, for example:

- accommodation requirements for source and protective isolation for at least 33% of ICU beds. A higher proportion may be required in tertiary referral teaching hospital units. The air supplied must be filtered whether the patient requires protective or source isolation. For source isolation the air supplied must be mechanically extracted and discharged directly to outside and not to any area within the unit, i.e. no recirculation of air;
- given increasing problems with multi-resistant organisms within the hospital environment, where possible, allowance should be made for future conversion of open bed spaces to isolation facilities;
- adequate provision of handwashing and drying facilities at each bed space, with easy access for staff;
- provision for staff wearing protective clothing where required. The recommendations of the Expert Advisory Group on Aids, given in 'Guidance for Clinical Health Care Workers' January 1990, may assist in identifying the routine precautions to take;
- the handling of "sharps", and the use of "sharps" containers as recommended in BS 7320;
- the report 'Decontamination of equipment, linen or other surfaces contaminated with Hepatitis B and/or Human Immunodeficiency Viruses' identified by HC(91)33. Account should be taken of the report's recommendations.

All ICUs should comply with the recommendations of the Scottish Infection Manual.



## Health and safety

2.27 The requirements of relevant sections of the document 'The Control of Substances Hazardous to Health – Guidance for the Initial Assessment in Hospitals' 1994 must be adopted.

## Hospital clinical and operational policies

#### Catering

- 2.28 Meals for the few patients in an ICU who may require them will be provided on request, and in accordance with the hospital's catering policy. Separate pantries should be provided for the preparation of beverages and light snacks for patients, staff and visitors. Storage space will be required and facilities provided for washing-up beverage crockery.
- 2.29 Because of working practices and the need to relax within the unit, staff normally take breaks within the ICU. Nevertheless, project teams should seek the advice of the hospital catering manager on all aspects of the provision of catering facilities in the ICU.
- 2.30 Facilities should be provided in accordance with the hospital's catering policy, and should comply with current food hygiene and safety legislation, for example the 'Food Safety Act, 1990' and the 'Food Hygiene Amendment Regulation, 1990'.

#### **Domestic services**

2.31 The accommodation required for storage and cleaning of domestic equipment will be determined by the scope and extent of the service as outlined by the Hospital's operational policies.

#### Supply, storage and disposal

- 2.32 Supply and disposal methods merit careful consideration by the project team, for in few other areas are building and operational policy so inseparable and interdependent.
- 2.33 The quantity and distribution of storage space required in an ICU can only be specified in terms of a known policy. A disposal hold, for example, however large, must be of finite size, and that size must be related to a given frequency of collection.
- 2.34 Supply and disposal must be thought of as an entity supplies must enter the department, be consumed or used and thereafter disposed of, in some instances for processing.



- 2.35 Project teams must consider:
  - Hospital clinical and operational policies on supply, storage and disposal;
  - the several kinds of items supplied for example sterile supplies, office supplies, clean laundry, food;
  - the collection and delivery points;
  - the volume and location of storage spaces;
  - specialised storage requirements for example, pharmaceutical supplies, especially Controlled Drugs;
  - equipment held.
- 2.36 Efficient control of stock, which usually requires computer support, can effect appreciable, or even substantial, reductions in costs. The value of such a departmental stores management system will be enhanced if it can be linked to an existing hospital supplies management system.

Figure 3 illustrates the siting and purpose of departmental stores.



## Figure 3

Purpose and siting of departmental stores										
Storage / holding										
A otivity	Categories of items to be stored									
Space	Medical and surgical inc. IV fluids	Pharmacy/ lab. reagents	Controlled drugs	Clean linen	Catering supplies	Stationery	House- keeping/ cleaning supplies	Mobile medical equipment	Furniture – bulk items	
Staff base						•				
Bed areas	•							•		
Bulk supplies store	•						•			
Furniture store									•	
Clean utility	•	•	•							
Linen store							•			
Dirty utility										
Clinical equip- ment store								•		
Laboratory		•								
Workshop										
Staff changing				•						
Staff rest room/pantry					•					
Patient pantry					•					
Relatives' pantry					•					
Offices						•				
Seminar room						•		•		
Cleaner's room							•			

#### Activity spaces not used for storage

- Entrance/waiting area
- Disposal room
- On-call room
- Equipment service room

#### Key

- store
- policy option could be linen trolley



#### Organisation

- 2.37 Organising an efficient and economical system for supply and disposal in an ICU is demanding and complex. In this section the problems are discussed in general terms.
- 2.38 Systems and timetables for ordering, delivery and disposal should be devised and agreed with the managers of hospital stores, sterile services department (SSD), pharmacy, linen, catering and portering services.
- 2.39 Knowledge of Hospital materials handling policy is essential. For example, the frequency of delivery of supplies and the amount of storage that must be reserved in the central store will be determined by the storage and delivery policies of a particular department, for example SSD, pharmacy, linen. The lower the frequency of delivery, the greater the capital outlay on the working stock of consumables and non-consumables.
- 2.40 It is usual for the senior nurse and their nursing colleagues in an ICU to determine their average daily requirements, and create a stock list. Once a stock list has been prepared for each different group of supplies these lists can then be collated and a delivery and ordering policy for the department established to maintain stock levels.
- 2.41 There are several options available for storage management. For example, an exchange system where all supplies are held on exchange trolleys, the contents having been agreed with the nursing staff. These trolleys are then exchanged daily. Another similar method is the topping-up system where again stock levels are agreed by nursing staff and maintained daily by topping-up.
- 2.42 Linen may be stored in either a linen store or on a linen exchange trolley depending on the Hospital's operational policy. A parking space for the trolley must be provided.

#### Disposal

- 2.43 Items for recycling or disposal will be held in the dirty utility prior to being taken to the disposal hold where they will be collected by portering staff. These items will be separated into relevant groupings colour coded bags for linen, infected waste and general waste for incineration in line with Hospital operational policies.
- 2.44 Contaminated medical equipment will be sent to the SSD for decontamination in line with Hospital operational policies - see SHPN 13, 'Sterile services department'. Used sterile supplies for reprocessing will be held in an SSD container in the dirty utility.



- 2.45 Disposal of pressurised containers requires special attention: see SAB(88)79
   'LPG Aerosol containers: risks arising from storage, use and disposal'. In order to avoid abuse and misuse "sharps" containers should be held in the dirty utility to await collection.
- 2.46 The size of the disposal hold will be dependent on the amount of waste generated and the number and frequency of collections daily.

*Figure 4* illustrates in schematic form the point of origin, routing and destination of items for disposal.

							Destination	
Disposal cycle Origin of Items								Outside ICU
Type of waste	Staff change	Bed areas	Clean utility	Dirty utility	Labora- tory	Pantries Staff & patients	Disposal hold	
Instruments hollow ware			•	•			•	SSD
General waste	٠	•		•	•	•	•	General Incineration
Infected waste		•		•			•	Infected Incineration
Soiled linen	•	•		•			•	Laundry
Specimens				•	•			Pathology
Pharmacy			•					Pharmacy

#### Figure 4

#### Information handling

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Currently, hospitals make significant use of information technology, including patient administration linked to the hospital's patient administration system, supplies ordering and stock control, pathology and radiology systems. A specific requirement for ICUs is a computerised monitoring system which records and analyses trends in the physiological data of a patient. Increasingly, use will be made of expert systems providing diagnostic and prognostic advice. Other systems may also be used for teaching and research purposes. The future thrust will be in the development of interfaces between these systems.



2.48 Provision should be made in each bed space for a multi-parameter monitor and a link to a data management system that interfaces with the monitoring, blood gas analyser and laboratory systems. Information registered on the monitor should be repeated at the staff base. Care is needed in the selection of the most appropriate range of parameters to be monitored. Some systems can call up parameters of all patients from a central monitor at the staff base. Increasingly, monitors are capable of their own data processing and are linked together so that it is possible for each monitor to call up the parameters from monitors in other bed spaces (see paragraphs 4.61 to 4.63.)

## Staff changing

2.49 Full changing facilities within the unit are generally only required for nursing staff. Care should be taken to make realistic estimates of full- and part-time nursing staff and to clarify locker allocation policy, taking into account the need for separate facilities for males and females. Other staff may don plastic aprons either routinely on entry to the unit or only when dealing with infected patients. Medical staff may also remove their white coats whilst in the unit. Storage for plastic aprons and hanging white coats should be provided at the entrance to the unit, outside single-bed rooms and in the multi-bed area.



## 3. Specific functional and design requirements

#### Introduction

- 3.1 This Chapter provides guidance on functional requirements and design implications for each of the activity spaces in an intensive care unit (ICU).
- 3.2 Lists of activities and equipment and details of environmental conditions and finishes of walls, floors and ceilings are all identified in the Activity Data Base sheets (see Chapter 7).

## **Reception and waiting**

#### Entrance/waiting area

- 3.3 All patients and visitors should access the unit through a separate entrance from that used by staff. The staff entrance should be the delivery point for supplies and the collection point for specimens. As neither entrance will generally be staffed, measures will be required to control unauthorised access and to prevent theft of equipment, supplies and personal belongings. Appropriate staff may be provided with a pass key or number to facilitate access for deliveries and collections. A bell or entry-phone system connected to the staff base and reception should be used to control access to the ICU by relatives or visitors. Both entrances may be emergency escape routes from the unit.
- 3.4 An added benefit of the entryphone system is the control of access by visitors to prevent them entering the bed areas at inappropriate times, for example, during reporting/handover or whilst procedures are being carried out.
- 3.5 A waiting area should be provided adjacent to the entrance to accommodate visitors awaiting access to the unit. This waiting area should include a payphone, fitted with an inductive coupler to assist people using a hearing aid, and have access to a WC.

#### **Reception/office**

3.6 A reception/office, manned by a clerk or receptionist, should be located adjacent to the waiting area and consultants offices. The reception should have a counter with an openable glass screen for privacy and noise control. The reception should be linked to the unit's communication system. The receptionist will control, during the day, the unit's access system.



## Consulting, examination and treatment

#### Staff base

3.7 Activities taking place at the staff base will include observation of patients, overviewing bedside monitor activity, reporting, report writing, storage of notes etc, telephoning, clerical work, teaching/discussion, viewing X-rays, examining trends data on a central monitor, use of computers, and control of access to the unit. The likely numbers of nursing staff, the choice and location of monitoring and computing equipment, storage policies and requirements for notes, X-rays, request forms and other stationery must also be considered. Work-surface provision should cater flexibly for differing and evolving configurations of computers and monitors. (See the ergonomic drawings in Chapter 7.)

#### **Reporting/handover**

3.8 Adequate space and auditory privacy should be provided for reporting which will generally take place at or near the staff base. Provision may be made for a two-stage process consisting of a reporting session (for example, involving the incoming nursing shift plus some but not all of the outgoing shift), followed by a one-to-one handover at each patient's bedside.

#### Bed areas

- 3.9 Because of the need for good staff access around the patient, an island bed layout is preferred to a peninsular solution (see paragraph 2.14.)
- 3.10 The 'Intensive Therapy Units, Stage Two – Case Study Analysis' produced by MARU for the Department of Health in June 1988 drew attention to the need to provide an adequate number of electrical socket-outlets at each bed. It concluded that insufficient outlets "result in the use of extension plugs to cope with the wide range of equipment in use at the same time - this can include as many as 9 infusion pumps, ventilator, monitors, air mattress, dialysis machine, humidifier, fans, suction machine, and TV". To meet increasing demand, the current recommendation is for 24 socket-outlets at each bed. The chosen method of supply of medical gases and electrical socket-outlets should allow unimpeded access to the patient by medical and nursing staff. A strategy based on services supplied from the ceiling provides unobstructed access and uncluttered floor space around the patient's bed. The majority of patients will be attached to various life-support equipment, including a multi-parameter monitor, a ventilator, svringe and infusion pumps, and other specialised equipment.paragraph7.9 lists the items of equipment usually present in a bed space together with the associated service requirements.
- 3.11 Windows and natural light are essential in the single-bed rooms and multibed areas as an aid to patient orientation. Outside views are desirable.



#### Single-bed rooms and gowning lobbies

- 3.12 Single-bedrooms are used for source and protective isolation of patients. They may also be used:
  - if a patient requires additional privacy, peace and quiet;
  - for confused or aggressive patients;
  - for paediatric patients.
- 3.13 All single-bed rooms should provide protective and source isolation. Entry should be via a gowning lobby providing a clinical handwash basin, a plastic apron dispenser and storage space for white coats as well as facilities for disposing of used aprons and coats. Ceilings and windows should be sealed. Doors should be tight fitting with seals to minimise air transfer (see paragraphs 5.38 to 5.45). These lobbies are critical to the effectiveness of the ventilation system. They must be provided for all single-bed rooms and correctly operated in the manner intended if effective ward isolation is to be achieved.
- 3.14 Single-bed rooms should allow for manoeuvring bulky equipment, for example a bed with cot sides, orthopaedic traction, mobile X-ray machine, and space for staff to undertake procedures from all sides of the bed. A clinical wash-hand basin should be provided in each room.

#### Multi-bed area

- 3.15 Adjustable bed space division is desirable to cater for the varying service and equipment requirements generated by different types of patients. The siting and the method of provision of services will greatly influence the layout of the multi-bed area. Small, lightweight screens offer privacy to patients and can be readily moved. Beds should be positioned to maximise patient privacy.
- 3.16 The size and shape of each multi-bed space should allow space for the use of mobile equipment and room for staff to undertake procedures from all sides of the bed. Each bed space should have a clear floor area of at least 20 m<sup>2</sup> and there should be an unobstructed corridor 2.5 metres wide between rows of beds. Adequate separation of beds is a major aspect of infection control. A clinical wash-hand basin should be provided in each bed space. All bed spaces in the main area should have space and facilities for renal replacement techniques.
- 3.17 Movement of patients from one bed space to another within the unit is likely to be infrequent but may occasionally be necessary if a patient requires isolation (see the ergonomic drawings in Chapter 7). The number of isolation rooms required is likely to increase in the future. Space for extension or alteration should be allowed when planning a new unit (see paragraph 2.26).



#### Haemodialysis/haemofiltration

- 3.18 Haemodialysis is rarely used today in Intensive Care Units. Haemofiltration is used more extensively because of simplicity of use and reduced service requirements. A hospital planning an Intensive Care Unit should carefully consider, in conjunction with the Critical Care Team, including the Consultant Nephrologist, their requirements in this respect.
- 3.19 If it is decided that haemodialysis is essential, then water of satisfactory purity and at adequate pressure to facilitate the use of the dialysis machine must be provided. The use of reverse osmosis (RO) plant to purify the water supply will be necessary (see HBN 53 Satellite Dialysis Unit, Safety Information Bulletin No. 85/2 and Safety Action Bulletins Nos. 87/20, 89/72 and 90/4). RO water may be provided by either portable units used in conjunction with individual dialysis machines or by central plant. Drainage from the dialysis machines should be constructed from materials that do not support bacterial growth and should be easily accessible to accommodate necessary frequent cleaning. A suitable air break should be incorporated at the outlet point (see paragraphs 5.102 and 5.103).
- 3.20 Storage for dialysis equipment, tubing and associated fluids should be provided elsewhere in the unit (see paragraph 3.36).

#### **Bedside storage**

- 3.21 There are several ways of providing bedside storage. A balance has to be kept to avoid the costly waste of over-ordering and stocking as well as infection control problems of stocking too many items at the bedside that may not be used. Ideally storage provision at the bedside should be kept to a minimum and is only required for charts and small quantities of medical and surgical supplies for the treatment of an individual patient. A surface for note writing, and for preparation of procedures, is also necessary. Storage may be on free-standing units in the area to the front of the bed or on supply trolleys.
- 3.22 Storage of patients' clothes and personal effects will be dealt with in accordance with Hospital operational policy but will not normally be at the bedside. Some personal items may be held at the bedside for the benefit of the patient's orientation and emotional support. This may vary from unit to unit and may depend on the type of patient and length of stay.



## Support spaces

#### **Clean utility**

3.23 The clean utility should provide space for preparing trolleys for sterile procedures, preparing and checking drugs and for storage of sterile supplies, procedure packs, Controlled Drugs, intravenous fluids, and medical and surgical supplies. If drugs are stored in this room, corridor walls should be partly glazed for security reasons. This space should be easily accessible from the staff base and bed areas. Small quantities of supplies may also be held near each bed space for immediate use. Empty pharmacy boxes may be kept in the clean utility for collection by the pharmacy porter. Air conditioning may be required if a number of refrigerators are located in this room, (see the ergonomic drawings in Chapter 7).

#### **Dirty utility**

- 3.24 The dirty utility provides facilities for disposal of contents, following use, of bedpans, urine bottles, vomit bowls, washbowls etc, although in an ICU the use of bedpans and urine bottles is very limited. The dirty utility should be situated close to the patient areas.
- 3.25 A limited stock of either disposable or non-disposable items, such as bedpans, urine bottles and vomit bowls will be stored here.
- 3.26 The dirty utility is also used for urine testing and holding specimens.
- 3.27 Space for holding of materials for disposal or reprocessing should be limited because sacks and bags, once full, should be closed and taken to the disposal hold to await collection. The Hospital operational policy for disposal will determine the frequency of collection. "Sharps" containers will be held in the dirty utility for collection by portering staff.
- 3.28 Mechanical extract ventilation and hand washing facilities should be provided.

#### Disposal hold

- 3.29 This room should be accessible from outwith the ICU. Collections (except for "sharps" containers which are held in the dirty utility for security reasons) may then be made without portering staff needing to enter the main circulation space of the unit. The room should be kept locked.
- 3.30 Bagged refuse and soiled linen are held here safely and securely while awaiting collection. They are identified by colour-coding, in line with Hospital operational policy.



3.31 The size of the disposal hold should be determined by the frequency of collection.

#### Storage

#### Bulk supplies store

3.32 This space is intended as a bulk supplies holding store for medical and surgical supplies and intravenous fluids from which to stock the clean utility and other areas. The amount of storage required will be determined by local supplies policy – whether topping-up, exchange trolley, or requisitioning – for each commodity, stock holding and frequency of deliveries, although it is recognised that there has been a move away from this to "just-in-time" buying. Deep storage should be avoided. Shelves, cupboards and drawers should be provided, (see the ergonomic drawings in Chapter 7). A holding bay is provided immediately adjacent to the store for receipt of delivered items prior to sorting.

#### Linen storage

3.33 Storage is required for linen supplies, either in a linen store or on a linen exchange trolley. The amount of linen storage needed will depend on the linen supplies policy and the number of patients. The area specified in the Schedule of Accommodation may be reduced if laundry turn-around is rapid.

#### Mobile X-ray equipment bay

3.34 An open bay should be provided close to the clinical equipment store for the storage of mobile X-ray equipment and protective lead aprons. A socket-outlet should be provided for charging the mobile X-ray equipment.

#### Furniture store

3.35 This store will hold beds, bed cradles, cots and other bulky items of furniture when they are not in use.

#### Clinical equipment store

3.36 Floor space within this store is needed for a variety of equipment including drip stands, monitoring equipment, and haemofiltration equipment etc. Shelf space is needed for smaller items of equipment such as infusion pumps, ventilator accessories, monitoring equipment and suction apparatus. Drawers, cupboards, wall rails and bins are also required. Electrical socket-outlets are required for charging equipment. Underprovision of equipment storage may lead to unused equipment being kept in bed areas. This store should be located within easy access to the bed areas and adjacent to the equipment service room, (see the ergonomic drawings in Chapter 7).



#### Equipment service room

3.37 Facilities are required within this room for user-servicing as defined in the user manuals supplied by equipment manufacturers, supplemented by any formal local instructions that have been agreed. Such local instructions may require the provision of additional facilities. This room should also be used by visiting electronics and medical engineering (EME) technicians to carry out minor scheduled or unscheduled servicing. The space provision should be sufficient to park and manoeuvre equipment and accommodate a work bench with integral lockable cupboards, preferably in a self-contained room or space. A wash-hand basin should also be provided. It is recommended that manufacturers' user manuals are kept in this room. The supply to socket-outlets should be provided via a residual current protected circuit device, and emergency power isolation buttons should be installed at the workbench and adjacent to the room entrance. Medical gas outlets supplying oxygen, medical compressed air and vacuum should be provided. Some items of equipment may require decontamination in the sterile services department (SSD) prior to scheduled servicing being done elsewhere. Local policy will identify where this will be undertaken (for example, in the SSD, and/or EME). A lobby associated with the equipment service room will provide space for holding equipment awaiting repair and/or calibration.

#### Laboratory

3.38 A status laboratory is required for blood gas analysis and other tests carried out within the unit. The main requirements are for a sink, laboratory benching and adequate bench space on to which equipment will be placed, electrical socket-outlet provision, a specimen fridge freezer and centrifuge, and sufficient space for staff to perform tests and use computer equipment. A cooximeter, sodium, potassium, ionised calcium, glucose and lactate analyser is required. Fume extraction may be required. Separate hand washing facilities are also required. As this is a staff working area, access to daylight is desirable. This space will be in intermittent usage throughout the day and night, (see the ergonomic drawings in Chapter 7).

#### Other pathology tests

Other pathology specimens will be sent directly to the pathology department, possibly by a vacuum tube system. Results from laboratory analysis and tests should be conveyed directly to the bedside monitor by computer link.

#### **Cleaners' room**

3.39

3.40 A ventilated room within the unit is required for the storage of cleaning supplies and domestic equipment. Facilities should be provided in this space for filling and emptying cleaning equipment. A sluice sink is required. A separate wash-hand basin with hot and cold running water should also be provided. (See 'The Control of Substances Hazardous to Health - Guidance



for the Initial Assessment in Hospitals', relating to safe storage and use of chemicals and cleaning materials).

#### Switchroom

- 3.41 The departmental switchroom housing the main isolators and distribution fuse switchgear, should be:
  - sited within the department;
  - accessible directly from a circulation area providing clear and safe access for maintenance staff (access space may be part of the circulation area);
  - sited away from water services;
  - lockable.
- 3.42 Care should be taken to ensure that safety is not compromised during maintenance, from passing traffic or the opening of adjacent doors.

## Facilities for staff

#### Staff changing

- 3.43 Separate male and female changing facilities are likely to be required only for nursing staff. Changing facilities for medical and paramedical staff, technicians and domestic staff will generally be provided elsewhere in the hospital.
- 3.44 Space is required for changing, clothes storage, showers and sanitary facilities. Estimates of changing space and locker provision should take into account the numbers of full-time and part-time nursing staff and also the locker allocation policy. Provision should be made for male as well as female nursing staff, possibly in the ratio 2:1. Space should be provided at the rate of about 0.75 m<sup>2</sup>/nurse with a minimum of 15.5 m<sup>2</sup> for female staff and 7.5 m<sup>2</sup> for male staff (see NHS Estates publication HBN 41 'Accommodation for staff changing and storage of uniforms'). Steps should be taken to ensure the security of personal belongings left in the staff changing areas (see paragraph 4.21.)



#### Staff rest room/pantry

- 3.45 The staff rest room may be used for meal, tea and coffee breaks. Account should be taken of the total numbers of staff working in the unit and also the effect of shift overlaps. Smoking policy should be clarified so that both smokers and non-smokers are catered for, in separate areas. The staff rest room should be located away from, but within easy access to, the bed areas and should have good staff communication links with the rest of the unit. It should have natural daylight and an outside view. Television and radio should be provided. Security arrangements may be necessary.
- 3.46 Facilities are required for making beverages and snacks, and for washingup. Facilities provided may include a sink/drainer, refrigerator, microwave oven, toaster, drinks machine and storage space for crockery and dry goods. A separate hand washbasin will be required. The pantry may be provided as a separate space adjacent to the staff rest room, or as an integral part.

#### Patients' pantry

3.47 The patients' pantry will be used for preparation of patients' special feeds, beverages and snacks and for receipt of meals from the central kitchen for the few patients requiring them. Facilities must include microwave oven and a refrigerator, sink, drinking water tap and a wash hand basin. If a cook-chill system is in operation, space will be required for holding and manoeuvring chilled meal service equipment.

#### **On-call facilities**

3.48 Doctors' on-call facilities are required within the unit and should include provision for en suite shower/WC. On-call facilities should be provided separately and, although within the unit, located away from direct routes between unit entrance, visitors' sitting room and patient treatment areas. The facilities required include a bed, clothes storage, a wash hand basin, a desk and chair and a television set. This space should be linked into the staff communication system.

## Office accommodation

3.49 Activities requiring office accommodation include unit administration, interviewing of staff, counselling of relatives, telephoning, teaching and research work. Facilities will be used by medical and nursing staff. The following offices are required as a minimum for an 8 bed ICU. (See NHS Estates publication HBN 18 – 'Office accommodation in health buildings'.)



#### Nurses' office

3.50 An office is required for the senior nursing officer and other nursing staff for administration, briefing, staff counselling and interviewing relatives. The office will require telephone and IT services and should be linked to the hospital information system. Separate offices may be required for the senior nursing officer in large ICUs and for specialist nurses, e.g. training nurses, research nurses.

#### **Clinical Director's office**

3.51 A single person office is required as an administrative base for the Clinical Director. It should be sufficiently private for confidential discussions between staff, and for interviewing patients and relatives. The room should accommodate an office workstation, with VDT and keyboard, seating for up to three other persons and storage for books and files. It should be located close to the other consultant's office and to the secretarial office.

#### **Consultant's office**

3.52 The other consultants also require an office for administration, briefing and interviewing. The office should have appropriate telephone and IT services including e-mail and fax.

#### Secretarial office

3.53 Secretarial services are required for the clinical director, the ICU manager, consultants and audit assistants. Telephone and IT services are required, the latter being networked within the unit. The usual office furniture, including filing cabinets and notice boards, should be fitted.

#### Audit office

3.54 The audit assistant should have a small office with the usual telephone and IT links. At least two VDUs will be used in this room and a significant amount of sensitive data will be stored on computer. Security arrangements for this room should therefore be carefully considered. If preferred, the Audit Office need not be located within the ICU and could be sited elsewhere in the hospital complex and linked by data transmission.



#### Seminar room

3.55 A seminar room should be provided within the ICU. The space should accommodate up to fifteen people and contain secure storage for audio-visual aids. The room will require seating, projection facilities, wall board, X-ray screen, computer terminals and printers and should be linked to the unit's communication system. The seminar room may also be used as a base for a clinical teacher attached to the unit. The hospital education centre will be used for other more formal and programmed teaching events.

## **Essential complementary accommodation (ECA)**

#### Facilities for relatives - waiting area, overnight stay, pantry

- 3.56 Both day and overnight stay facilities for relatives are required. The latter may be provided elsewhere in the hospital, but the preference is generally for provision within the unit.
- 3.57 The scale of facilities provided will depend on the size of the unit. Accommodation can be planned either as separate waiting and overnight stay rooms or as a suite of dual purpose waiting and overnight stay rooms, the latter offering greater flexibility of use. Overnight stay rooms will include outlets for radio and television, sanitary facilities, including a shower, beverage provision and telephone facilities.
- 3.58 At least two waiting areas are needed. They should be adjacent to the reception area and include one room of about 10 m<sup>2</sup> suitable for interviews, including breaking of bad news and bereavement counselling, and one of 20 m<sup>2</sup> with drinks dispenser, radio, television and adjacent relatives' WC. A separate pantry area may be needed in larger units.
- 3.59 The location of the relatives' rooms must prevent relatives from having continuous access to staff and be outside the area of medical and nursing staff accommodation. Siting should also prevent relatives from overhearing staff conversations, whether related to patients or personal issues.

## **Optional accommodation and services (OAS)**

## Assisted bathroom/WC

Admissions policies and length of stay vary from unit to unit and project teams should therefore consider whether provision of an assisted bathroom is necessary. Facilities required include a height adjustable bath with shower and sitting facilities, stretcher hoist, WC and wash hand basin, oxygen, air and vacuum.



#### Procedures/treatment room

3.61 A procedures/treatment room may be required to enable some interventional procedures to be undertaken within the ICU instead of in the operating theatre. The procedures/treatment room should contain all bedside facilities, including full monitoring, ventilation facilities and medical gases, high intensity lighting and a scrubbing-up sink. The walls should be screened if image intensification is envisaged. Appropriate power supplies for special equipment should be considered, and at least four electrical sockets should be on the unit's uninterruptable supply. In some units, it may be more appropriate to locate this space in the main bed area.

#### Computer room/technician's room

3.62 A computer room may be required. The room should have a bench with at least eight electric sockets, four of which should be served by the unit's uninterruptable supply. There should be at least two telephone points of ISDN standard.

#### Manager's office

3.63 A business office may be needed located close to the intensive care complex. Services should include telephone and IT links including fax.


# 4. General functional and design requirements

#### Introduction

4.1 This Chapter contains guidance concerning aspects of function and design which are common to health buildings generally and which will need to be borne in mind when designing new buildings or upgrading existing premises. Certain aspects which have particular relevance to ICUs are discussed in greater detail.

### Economy

4.2 The planning of hospital buildings requires design solutions which not only satisfy functional requirements but also ensure maximum economy in respect of both capital and running costs. Due weight must therefore be given to the questions of space provision, maintenance (including cleaning), energy consumption and staffing requirements. Planning should ensure that spaces are used as intensively as possible and are not unnecessarily duplicated. Wherever possible spaces should be designed for flexibility of function, not only in their original use but also in terms of future change of use.

### Alterations and extensions to existing buildings

- 4.3 Guidance for new build is not intended to apply retrospectively to alterations to buildings. Nevertheless, the principles are equally valid and they should be applied wherever practicable when buildings are altered\* or extended. Applying the Building Standards (Scotland) Regulations to this type of work sometimes presents difficulties. The basic principle is that the Regulations apply to both alterations and extensions but not to unaffected parts of the building even if these parts do not conform to the Regulations.
  - The cost of alterations and/or extensions should be established in accordance with the guidance outlined in the Healthcare Construction Project Price Guide published by NHS in Scotland Property and Environment Forum Executive. The guidance takes into consideration the estimated life of an existing building and the difference in cost between works to an existing building and that of new building.

\* Alterations include upgradings and adaptations of existing buildings.



- 4.5 Before any decision is made to carry out such a project an option appraisal should be undertaken as described in the Healthcare Construction Project Price Guide. Consideration must be given to the long-term strategy for the service, the space required for the new service and the size of the building. Regard must also be paid to the orientation and aspect of the building and the adequacy and location of all necessary support services.
- 4.6 If there emerges a prima facie case for upgrading, a thorough analysis of all functional and physical conditions of the existing building should be undertaken.
- 4.7 When comparing alteration and/or extension of existing buildings with new build, economic considerations will not be the only criteria to be considered. Due account should be taken of matters such as location, accessibility, staffing, etc. The check of physical and other aspects of existing buildings should include:
  - availability of space for alterations and additions;
  - type of construction;
  - insulation;
  - age of the buildings, condition of fabric for example external and internal walls, floors, roofs, doors and windows, which can be determined by a condition survey;
  - life expectancy and adequacy of engineering services, ease of access and facility for installation of new wiring and pipework, if required;
  - the heights of ceilings (high ceilings do not necessarily call for the installation of false ceilings which are costly and often impair natural ventilation);
  - changes of floor levels to obviate hazards to disabled people;
  - fire precautions;

4.8

4.9

physical constraints to adaptation such as load bearing walls and columns.

Having decided that existing premises are suitable for upgrading or conversion, the main requirement will be to assess how best the accommodation can be planned so as to facilitate the practice of modern care.

This summary of the main aspects of upgrading is general in character and it is recognised that each upgrading project will present its own problems. In many instances compromises may have to be made between Planning Note standards and what it is possible to achieve. Alterations should be functionally sound not merely cosmetic – and appropriate for the projected needs of patients and staff for a number of years to come. Extensions should be regarded as new build wherever practicable.



## Statutory and other requirements

4.10 NHS Circular No 1991 (GEN)1 issued in January 1991 advised Health Boards of the requirement to comply with all relevant legislation following the removal of Crown immunity under Section 60 of the NHS and Community Care Act 1990. Health Boards and NHS Trusts are reminded of their responsibility for ensuring compliance with all statutes, regulations, codes and standards.

# Smoking

- 4.11 Following NHS Management Executive letter MEL(1992)24 issued 30 July 1992, which set a target date of 31 May 1993, all health boards and NHS Trusts have introduced and implemented written no-smoking policies. No smoking is now the standard in all NHS premises. Although the policies may allow for provision for designated smoking areas for staff and patients, increasingly, boards and Trusts are adopting a total restriction on smoking. MEL(1992)24 refers to a fuller set of guidance available for those boards and Trusts who might find it a helpful resource. This guidance includes a statement that consideration should be given on how to adequately ventilate smoking rooms.
- 4.12 Health Circular HC(85)22 dated May 1985 reviews the problems presented by smoking in health buildings and, while recognising that the responsibility for determining local policies rests with the health authority, recommends that smoking should be confined to specially designated areas which are clearly signposted. In an ICU the whole unit may be designated a "no smoking area"; failing this, smoking should be limited to an area within the staff rest room. In smoking areas ventilation should be sufficient to prevent discomfort to non-smokers and the spread of odours to other areas of the unit.

# Fire safety

- 4.13 To ensure progressive evacuation to areas capable of accepting patients reliant on life-support equipment, great care needs to be taken in the choice of location for the ICU in relation to other departments. The use of the post-anaesthesia recovery area of the operating department is the most desirable area for receiving patients evacuated from the ICU.
- 4.14 The project team members should familiarise themselves with NHS in Scotland Firecode which contains technical guidance on fire safety in hospitals and other National Health Service premises.
- 4.15 During the design stage it is important to establish those aspects of fire safety strategy which affect the design, configuration and structure of a unit. At appropriate stages of the design process the architect and engineer will



be required to discuss their proposals with the local fire brigade, and ensure that the project team and all other NHS staff are fully acquainted with the fire safety strategy for the design in operational terms (staff responsibilities, etc.) equipment provision, and engineering layouts. Health Technical Memoranda 57, 58, 59, 60 and NHS Estates publication "Wayfinding" give detailed information on the selection of fire resisting components and fire signs.

4.16 The principles of fire safety apply to both new projects and to alterations and upgrading of existing buildings.

### Communications

- 4.17 Staff/staff and cardiac arrest call systems are essential. Patient/nurse call systems may also be required. Call points are indicated on the Activity Data Base sheets. A visual and audible indication of operation should be provided at the staff base to give responding staff unambiguous identification of the call course and priority (see paragraphs 5.87 to 5.89.)
- 4.18 Whilst staff within the multi-bed unit are already in direct contact with each other, a staff communication system linking each bed space to the staff base, support spaces and staff facilities is essential, for rapid response to a call. This can be achieved in a variety of ways, including the provision of a two-way speech facility, and closed circuit television. Care needs to be taken in selecting equipment appropriate to the plan form of the ICU. For the costed option refer to Chapter 5.

### Telephones

4.20

- 4.19 Central telephone facilities for internal and external calls should be extended to serve the unit in accordance with the requirements shown in the Activity Data Base sheets. Wiring should terminate at each extension point in a standard line jack unit. When telephones are fitted with an audible bell or buzzer this should be fitted with a muting facility for night-time operation. All telephones should be fitted with visual indicators.
  - Outlets should be provided for fixed payphones for the use of staff and visitors only. Payphones for use by visitors should be located near to the visitors' accommodation and the waiting area, and should be fitted with an inductive coupler to assist people using a hearing aid. Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is given in HBN 48 ' Telephone services'. Refer also to paragraphs 5.90 to 5.93.



### Security/control of access

- 4.21 Assaults on hospital staff and theft of NHS property are recognised problems. The project team should discuss security with the officer in charge of the local Police Crime Prevention Department and the hospital or district security officer or adviser at an early stage in the design of the building. Fire and Security Officers should be consulted concurrently because the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to circular NHS No 1984 (Gen)7 and the updated NHS Security Manual issued with Management Executive Letter MEL(1992)35 on 21 July 1992.
- 4.22 An ICU should have two points of entry. Security measures are needed to control unauthorised access to these entrances to the ICU and to reduce the likelihood of thefts from changing areas, supply areas and pantries. It is recommended that access to the ICU be controlled by use of an entryphone/intercom system, linked to the staff base and reception. Locks should be fitted to changing room doors. The security measures chosen must not inhibit emergency escape from the unit or access by the staff at any time. Specific and heightened security is required in units which admit children because of issues which surround child protection. Refer also to paragraphs 3.3 and 5.85 to 5.86.

#### Valuables

4.23 Facilities should be provided for the temporary security of patients' valuables in a staff office. Valuables requiring longer-term storage should be kept in accordance with the hospital operational policy.

#### Drugs

4.24 Secure storage for Controlled Drugs will be required in an ICU.

### Damage in health buildings

4.25

When designing and equipping health buildings, the likely occurrence and effects of accidental damage should be considered. Damage in health buildings has increased over the years, to some extent as a result of lightweight, often less robust, building materials. Measures to minimise damage should be taken in the form of protective corners, buffers and plates where necessary, and to proper continuation of floor surfacing, i.e. strong screeds and fully bonded floor coverings. Protective devices, if used, should be capable of being renewed as need arises and should be designed as part of the decoration to retain the relaxed domestic character.



### Building component data

4.26 The Building Component Database consists of a series of Health Technical Memoranda (HTMs), 54–71 which provide specification and design guidance on building components for health buildings which are not adequately covered by current British Standards. No firms or products are listed. The numbers and titles of the various SHTMs and HTMs in the series are listed in 'References'.

### **Environmental considerations**

- 4.27 The effect of operations and actions on the environment is of significant importance and is an integral part of the responsibility for the health and wellbeing of the community. Care must be taken to contain the environmental impact of activities to a practical minimum consistent with maintaining responsibilities of providing high quality patient care. Commitment to the requirements of the Environmental Protection Act and all other relevant statutory legislation is essential. It is of particular importance to seek to:
  - continue to promote the efficient use of energy in an economical and environmentally sound manner by promoting energy conservation and where economically viable, investing in energy saving technology and management;
  - provide environmental training to appropriate staff, ensure that all staff are aware of the environmental policy and how they can contribute to the overall environmental performance;
  - promote waste minimisation and reduce the environmental impact of waste through beneficial use, where practicable, or safe disposal where not;
  - reduce, where practicable, pollution to air, land and water.

# Internal environmental conditions

#### Noise and sound attenuation

- 4.28 The ICU should be located away from noise generating departments. Careful consideration should also be given to deciding where, within the unit, monitoring equipment alarms will sound.
- 4.29 Provision should be made to ensure confidentiality for staff reporting/handover activities.



#### Floors

- 4.30 Floors in an ICU have to withstand harsh treatment, including:
  - the rolling loads of heavy mobile equipment;
  - frequent spillages with subsequent "mopping-up";
  - regular hard cleaning.

Flooring should be slip resistant under wet conditions. Coved skirtings make for easy cleaning; the material used should be integral with, and have properties similar to, the floor finish.

- 4.31 The comfort of people who work long hours in an ICU should be considered. They often prefer a resilient to a hard finish, and a light-coloured finish to a dark finish.
- 4.32 Carpets are suitable for use in the offices, staff rest room, overnight stay accommodation and visitors' waiting areas. For further information on soft floor coverings see HTM 61.
- 4.33 It is important that whatever floor covering is chosen it can be effectively cleaned, maintained and repaired. Rapid developments in soft floor covering technology have produced a wide variety of new materials. (See Health Technical Memorandum 61 'Flooring'.) Floors should not present or appear to present a slip hazard and the patterning should not induce disorientation. Surface drag, static electricity, flammability and infection hazards are other factors which need to be considered see also 'Maintenance and Cleaning', paragraph 4.60.

#### Walls

4.35

- 4.34 Wall finishes in an ICU must be durable and able to withstand wet cleaning and the accidental impact of trolleys and heavy mobile equipment. Especially vulnerable points should have additional protection. Paint, sprayed plastic skin, and plastic sheet with welded joints, have been found to satisfy these requirements; the type of material used should take into account the possibility of movement of structural walls.
  - Joints between sheets should be sealed to prevent, water penetration when the walls are washed. Walls, like floors, should be matt, light in colour, and should not distort the colour rendering of light sources. Strong or dark colours should be avoided.



#### Ceilings

4.36 Noise in an ICU can be reduced by an acoustically absorbent ceiling. While some acoustic surfaces now available do not present a microbiological hazard it is essential that the architect, ventilation engineer and hospital Infection Control Officer should together ensure that the choice of ceiling and the maintenance routines are satisfactory. The ceiling in single-bed rooms must be sealed.

#### **Doors and frames**

4.37 Doors and frames are particularly liable to damage from mobile equipment, and materials that will withstand this should be used. All double swing doors should incorporate clear glass vision panels, but privacy, safety, or other considerations may require that the panels should be capable of being obscured. Where necessary, doors, except fire-resisting doors, should be capable of being fastened in the open position. Magnetic door retainers should not restrict the movement of traffic. Doors to single-bed rooms must be tight fitting with seals to minimise air transfer in the closed position.

#### Ventilation

- 4.38 Natural ventilation is usually caused by the effect of wind pressure. It will also occur to some extent if there is a temperature difference between inside and outside the building. This thermo-convective effect frequently predominates when the wind speed is low and will be enhanced if there is a difference in height between inlet and outlet openings. Ventilation induced by wind pressure can promote high air change rates through a building if air is able to move freely within the space from windward to the leeward side of the building.
- 4.39 Internal partitions, fire compartment walls and closed doorways can, however, often impede the flow path and when this happens the process will be more dependent on single-sided ventilation. Nevertheless, even with this degree of obstruction to air movement, acceptable ventilation may still be obtained without excessive window openings which could prejudice safety, security and comfort. Some types of windows, e.g. vertical sliding, can enhance single-sided air exchange by temperature difference and these will improve the overall rate of natural ventilation in protected or sheltered areas where the effect of wind pressure is likely to be minimal. Section 2.3 of HTM 55 and BS 5925 provide further guidance on this subject.
- 4.40 Whilst all bed areas should be mechanically ventilated and cooled, other areas should be naturally ventilated, where possible.
- 4.41 Single-bed rooms should be provided with a system which can provide "source and protective isolation" of the patient.



4.42 Single-bed rooms should also be provided with humidity control and local adjustable temperature control.

#### Heating

4.43 Space heating should be designed for continuous operation and should be available during the summer months for use on cold days and nights. Heat emitters should be free of sharp edges and should be easy to clean. Emitters should not create an obstruction and should not be located behind beds. Exposed hot water pipework, accessible to touch, should be insulated.

#### Finishes

4.44 The choice of finishes should form an integral part of the design process and should be co-ordinated within the overall design scheme. Finishes should be functional and be compatible with the need for comfort, cleanliness and safety. The quality of finishes should, in general, conform with the standard of finishes specified for the rest of the hospital. Cleaning regimes should be considered when materials are selected.

#### Natural and artificial lighting

- 4.45 The design of windows must reconcile different needs as well as providing natural daylight and outside views. In addition to the various statutory requirements, the following aspects also require consideration:
  - illumination and ventilation;
  - insulation against noise;
  - thermal loss or solar gain;
  - the prevention of glare;

4.47

- the provision of a visual link with the outside world.
- 4.46 Design should ensure that it is possible for cleaners to have easy access to the inside and outside of windows. Guidance on types of window and on the safety aspects is available in HTM 55 'Windows'.
  - Daylight is essential for both patients and staff orientation. An external outlook is beneficial for some patients and all staff. Windows should be provided in bed areas and also in those areas occupied by staff, such as offices and staff rest rooms. Where the ICU is located on the ground floor, it may be necessary to provide glazing which allows staff and patients to see out but prevents anyone else from seeing in.



4.48 Lighting at the bed should provide for patient observation whilst also providing for a minimal level of lighting at night by selective or variable switching of luminaires. A mobile examination light should also be available. At night, lighting levels adjacent to the bed should enable staff to monitor all invasive lines and drainage bottle levels.

#### Internal rooms

4.49 Internal rooms may contribute to economy in planning but the resulting continuous need for artificial lighting and mechanical ventilation will add to both capital and running costs. Such rooms do not provide good working conditions hence should be used only for activities of infrequent or intermittent occurrence or which demand a controlled environment. Rooms that are likely to be occupied for any length of time by staff or patients should have windows.

## Art in hospitals

- 4.50 Works of art and craft can make a significant contribution towards the desired standard of the interior of wards and day hospitals. This need not be limited to the conventional hanging of pictures on a wall. Every opportunity should be taken to include works by local artists and craftspeople. These may include paintings, murals, prints, photographs, sculptures, decorative tiles, ceramics and textile hangings.
- 4.51 Often it is works of art and craft which lend special identity and which help give a sense of locality.
- 4.52 Advice should be sought from experts on:
  - obtaining funding;
  - ensuring quality in all art and craft works;
  - appropriately locating art and craft works;
  - selecting artists and craftspeople.
- 4.53 Colour can be used to good effect for decorative and other purposes. Colour schemes can be devised to aid in the identification of particular rooms or parts of the department. Drab colours should be avoided.

# People with a disability

4.54 It is essential to ensure that suitable access and facilities are provided for people who have problems of mobility or orientation or other special needs. This category includes, besides people who are wheelchair-bound, those who for any reason have difficulty in walking, those with a sensory handicap



such as visual or hearing impairment, and those whose first language is not English.

- 4.55 Readers should refer to SHFN 14 'Disability access'. Project teams are reminded of the need to comply with the provisions of:
  - The Chronically Sick and Disabled Persons Act 1970 and The Chronically Sick and Disabled Persons (Scotland) Act 1972;
  - The Chronically Sick and Disabled Persons (Amendment) Act 1976;
  - The Disabled Persons Act 1981;
  - The Disabled Persons (Services, Consultation and Representation) Act 1986;
  - The Disability Discrimination Act 1995.
- 4.56 Attention is drawn to BS 5810: 1979 Code of Practice for Access for the Disabled to Buildings (under review). One of the effects of the 1981 Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public.

# Wayfinding

4.57 To encourage patients and visitors to look after themselves, to use their initiative and to have freedom of movement about the unit, particular attention should be paid to wayfinding. The form of signposting used and the method of displaying notices should not detract from the desired environment but should be sufficiently explicit to be understood by patients who may be either confused or are from a different culture. Only certain doors require conventional labelling, e.g. fire exit doors, bathrooms, WCs and offices. Further guidance is available from NHS Estates publication 'Wayfinding: Guidance for healthcare facilities'.

# Waste disposal

4 58

The segregation, storage and the safe disposal of waste should comply with the Health and Safety Commission - Health Service Advisory Committee guidance 'Safe Disposal of Clinical Waste', TSO 1992, issued with letter reference NHS MEL(1993)2 and the guidelines on Clinical Waste Management issued with NHS MEL(1994)88.

4.59 The waste disposal provision of used items should be consistent with the current policy of the health body for the disposal of clinical waste. A room for the temporary holding of waste should be provided at the entrance to the department.



## Maintenance and cleaning

4.60 Materials and finishes should minimise maintenance and be compatible with their intended function. Building elements that require frequent redecoration or are difficult to service or clean should be avoided. Special consideration should be given to elements such as door sets, corners, partitions, and counters which may be subject to heavy use. Floor finishes should be restricted in variety and, where soft floor coverings are specified and spillage likely, should have a backing impervious to fluids and a non-absorbent pile. Wall coverings should be chosen with cleaning in mind. Advice on these topics is published in HTMs 56 – 'Partitions', 58 – 'Internal doorsets' and 61 – 'Flooring'.

# Provision for Automatic Data Processing (ADP)

- 4.61 Information technology has a central role in health management. The use of computers and telecommunications and, indeed the rate of technological innovation continues to increase. The implications for project teams are threefold: firstly, a requirement for the housing of the computers; secondly, a requirement for the provision of ducts for transmission cabling; and thirdly, sufficient space and adequate power supplies for modems, visual display terminals (VDTs) and printers, and associated software and stationery. Even if the introduction of automatic data processing (ADP) is not proposed at the time that the project team completes its brief it will be advisable to design in such a way that equipment can be introduced easily and quickly at some later date.
- 4.62 There are two principal matters of concern: visibility and noise. VDTs are now a familiar sight, and it will easily be appreciated that they cannot be reduced beyond a certain size. Consequently, sufficient and convenient space must be provided for them. Since the brightness of the letters displayed on the screen cannot exceed a certain limit, special attention must be given to the ambient lighting to ensure that the contents of the screen are legible. Additional space will be required in front of the screen for a keyboard. Printers are often noisy. Noise may not be too noticeable in bed areas during normal working hours but during quiet hours it will probably not be acceptable. If it is not possible to position a printer at a site remote from patient areas, expenditure on a quieter printer or on means of quietening a noisy printer can be justified.

4.63 Computer expertise is now widely available in the NHS and project teams should ensure that, at an early stage, they inform themselves concerning current and projected local computing policies, and that their proposals conform to them.



### Clinical teaching and overnight accommodation

4.64 If it has been agreed that the teaching of undergraduate and postgraduate medical students will take place in the accommodation and their numbers necessitate additional space, reference should be made to the document 'Teaching Hospital Space Requirements' issued 22 April 1974 SHHD/DS(74)99.



# 5. Engineering services

### Introduction

5.1 This Chapter describes the engineering services contained within the intensive care unit (ICU) and how they integrate with the engineering systems serving the whole site. The guidance should not inhibit the design solution, but will acquaint the engineering members of the multi-disciplinary design team with the design criteria and material specification needed to meet the functional requirements.

### **Model specifications**

5.2 A series of model specifications including Scottish Supplements, for the specialised engineering services in healthcare buildings, has been issued nationally and is sufficiently flexible to meet local needs. The NHS in Scotland cost guidance for the engineering services in each functional unit of this accommodation is based on the qualities of material and workmanship described in the relevant parts of the model specifications.

### Economy

5.5

- 5.3 Engineering services are a significant proportion of the capital cost and thereafter remain a continuing charge on revenue budgets. Therefore the project design engineer should ensure not only the utmost economy in initial provision, consistent with meeting the functional requirements and maintaining clinical standards, but also the optimum benefit from the total financial resources these services are likely to absorb during their lifetime.
- 5.4 Where various design solutions are available the consequential capital and running costs should be compared using the procedures outlined in the Scottish Capital Investment Manual.

The economic appraisal of design solutions should include heat conversion and distribution losses at the point of use. Where buildings are located remote from the development's load centre, these losses can often be significant.

5.6 The energy management and accounting system should be part of the hospital building management system (BMS) and should include metering of all services where practicable. If a hospital BMS is not available, the energy and accounting system for the unit should stand alone. It should be suitable



for integration with a future BMS. Further detailed guidance is available in SHTM 2005 – 'Building management systems'.

- 5.7 After satisfying the Building Standards (Scotland) Regulations (and subsequent amendments) on standards of thermal insulation, consideration should be given to the economics of additional insulation to the ground floor slab and the roof particularly where accommodation is located in a 'low-rise' building. Where there is a solidly constructed ground floor, the inclusion of floor insulation will have the additional benefit of contributing to patient and staff comfort.
- 5.8 In view of the increasing costs of generating heat energy, consideration should be given to the economics of recovering some of the energy which would otherwise be discharged by mechanical ventilation systems and to turning off or reducing heating and ventilation in those spaces which are used only for part of the day.

### **Maximum demands**

5.9 User demand on engineering services is often difficult to predict, but experience indicates that services designed for simultaneous peak conditions are seldom fully utilised in practice. The estimated maximum demand and storage requirement (where appropriate) for each engineering service in this accommodation will need to be assessed individually to take account of the range, size and shape of the functional units, geographical location, operational policies and intensity of use. The Property and Environment Forum Executive may provide estimates of the maximum demands and storage requirements for a specific project if required by the project team. As a guide and for preliminary planning purposes only, the following table gives the estimated demands for an 8 bed unit.



Service	Typical max.	Notes
	demand	
Heating/ventilation/DHWS (kW)	90	
Domestic HWS (I/s)	1.8	720 litres storage (2 hours recovery)
Cold Water (I/s)	2.6	4,000 litres storage (24-hour supply)
Supply ventilation (m <sup>3</sup> /s)	2.26	$\mathbf{O} \mathbf{Y}$
Extract ventilation (m <sup>3</sup> /s)	2.34	Clean and dirty
Cooling (kW)	33	
Electrical (kVA)	12	Includes essential 6kVA
Medical gases (l/min)	()	
Oxygen	160	
Medical compressed air	300	
Vacuum	160	
Nitrous oxide*	60	Project option. Anaesthetic gas scavenging (AGS) required

\*Nitrous oxide is provided only in very exceptional circumstances.

### Space for plant and services

The satisfactory performance of plant in healthcare buildings is particularly important and the building design should allow for:

- easy and safe means of access protected as far as possible from unauthorised entry;
- frequent inspection and maintenance with sufficient access panels being provided for this purpose;
- eventual removal and replacement of plant with particular attention being paid to the requirements of the Manual Handling Operations Regulations (1992) and succeeding legislation.



- 5.11 Recommended spatial requirements for mechanical, electrical and public health engineering services in health buildings are given in SHTM 2023 – 'Access and accommodation for engineering services'. The information in this publication is specifically intended for use during the initial planning stages when precise dimensional details of plant are not available and it makes reference to the Construction (Design and Management) Regulations.
- 5.12 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Heat emitters should be contained within a 200mm wide perimeter zone under window sills and critical dimensions should be taken from the boundary of this zone. The 200mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.
- 5.13 Services contained in the space above the false ceiling, with the exception of drainage should be confined to those required for the accommodation immediately below the false ceiling. Provision of satisfactory access should be provided to pipework, fittings and valves concealed in partitions, walls and ceilings.

# **Control access**

- 5.14 Devices for control and safe isolation of engineering services should be:
  - located in circulation rather than working areas to avoid disruption of clinical work;
  - protected against unauthorised operation, for example switchgear and fuseboards should be housed in secure cupboards and, where appropriate, water stopcocks and drain down valves should be designed/positioned to thwart deliberate flooding;
  - clearly visible to and accessible where intended for operation by the department's staff;
  - easily accessible and visible to commissioning and maintenance personnel.

# Activity data

5.15

Environmental and engineering technical data and equipment details are described in the Activity Data Base sheets (see Chapter 7). They should be referred to for space temperatures, lighting levels, outlets for power, telephones, equipment details etc, and when positioning equipment and outlets. Any item that involves patient operation should be of a simple pattern and designed to inhibit interference.



## Safety

5.16 The Health and Safety at Work etc Act 1974, as partly amended by the Consumer Protection Act 1987, together with the Workplace Regulations, the Work Equipment Regulations and the Construction (Design and Management) Regulations 1994 impose statutory duties on employers and designers to ensure, so far as is reasonably practical, that design and construction is such that articles and equipment will be safe and without risk to health at all times when being set, used, cleaned or maintained by a person at work. Engineering components, e.g. pipework, terminals, etc, are covered by the term 'articles' and thus these duties apply to the designers of engineering services for non-domestic buildings.

### **Fire safety**

- 5.17 Fire safety measures should not only meet the requirements of the Building Standards (Scotland) Regulations and be to the satisfaction of the local fire brigade but also should conform with NHS in Scotland Firecode. Firecode gives design guidance and requirements for fire safety in healthcare buildings through a series of Scottish Health Technical Memoranda and Scottish Fire Practice Notes. Project team members should familiarise themselves with NHS in Scotland Firecode.
- 5.18 The design engineers should verify the design proposals are in accordance with the procedures described in paragraphs 4.13 to 4.16 of this Note.

### Noise

5.19 Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to internal areas, or noise from other sources e.g. speech which can be transmitted by the ventilation system, can adversely affect the operational efficiency of the department and cause discomfort to patients and staff. However, in addition to designing for control of noise levels, there may also be a need to ensure speech privacy so that confidential conversations are unintelligible in adjoining rooms or spaces. This will be important in consulting/examination and treatment rooms, particularly where these are located adjacent to waiting areas. The noise limits and means of control advocated in SHTM 2045 – 'Acoustics' should provide an acceptable acoustic environment.



### Engineering commissioning

- 5.20 It is essential that engineering services should be fully commissioned and adequate test facilities and devices should be included in the design to facilitate flow measurement and regulation of all water, ventilation and gaseous services. The services should be commissioned in accordance with the methods identified in relevant Health Technical Memoranda. Engineering services for which a specific SHTM or HTM is not available should be commissioned in accordance with the following as appropriate:
  - Engineering commissioning published by The Institute of Healthcare Engineering and Estate Management (IHEEM).
  - Engineering Services commissioning codes published by the Chartered Institute of Building Services Engineers (CIBSE).
  - Trade associations' commissioning codes.

Commissioning should also be carried out and documented in accordance with the requirements of Scottish Hospital Technical Note 1 – 'Post commissioning documentation for health buildings in Scotland'. It is essential that full information regarding commissioning codes and test methods to be used are included in the specification for engineering services.

### Location of electrical and medical gas outlets

- 5.21 Electrical and medical gas outlets to each bed space should be provided from the ceiling (seeparagraph3.10). Numerous strategies have been reviewed, but only two provide unobstructed access to the patient. Each consists of equipment suspended from the building structure. The strategies are:
  - Continuous linear trunking running above and parallel to the bed head. The trunking can accommodate a large number of electrical and gas outlets and support all equipment on a shelving system suspended underneath;
  - Articulated arms similar to those found in an operating theatre. One arm supports small items of equipment, infusion pumps, etc. The other arm supports larger items of equipment, ventilators, etc. The two arms can together accommodate a large number of electrical and medical gas outlets. Some installations utilise a third arm, particularly if dialysis equipment is required. This strategy is relatively expensive and is therefore included as an optional service.



## Mechanical services

#### **General scope**

- 5.22 The mechanical services include the provision of heating, ventilation/air conditioning, hot and cold water services and medical gas supplies. For cost guidance purposes the distribution of all piped systems is deemed to commence at their point of entry into the accommodation and includes pipework, fittings, controls and connections to equipment and outlets. The cost guidance includes for air handling and treatment plants, ductwork and fittings, together with associated ventilation system controls.
- 5.23 For environmental requirements in individual spaces reference should be made to the Activity Data Base sheets. Recommended room temperatures, air change rates, hot water service temperatures, etc are grouped under 'Technical Design Data' on each A-Sheet.

#### Heating

- 5.24 General space heating requirements can usually be met by low pressure hot water radiators. They should be of the low surface temperature type and the system should be designed to ensure that the surface temperature does not exceed 43°C. Where multi-finned radiators enclosed in a metal casing are used to achieve this low surface temperature, the casing should be easily accessible/ removable/openable to allow rapid access for cleaning. Consideration should also be given to the use of ceiling heating, as this releases space within the room areas. Exposed pipework accessible to touch serving heat emitters should be insulated in accordance with the guidance in Scottish Health Guidance Note "Safe" hot water and surface temperatures'.
- 5.25 Radiators should normally be located under windows or against exposed walls, with sufficient clear space between the top of the radiator and the window sill to prevent curtains reducing the output. There should be adequate space below to allow cleaning machinery to be used. Where a radiator is located on an external wall, back Insulation should be provided to reduce the rate of heat transmission through the building fabric.
- 5.26 Radiators may also be used to offset building fabric heat loss in mechanically ventilated spaces. Where, for example, a number of spaces are supplied from a common ventilation system, individual room temperature control may be achieved by using thermostatically controlled radiators.
- 5.27 All radiators should be fitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for pre-setting the maximum room temperature, should be controlled via a sensor located integrally or remotely



as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature.

5.28 Flow temperature to heating appliances should be controlled by the BMS in accordance with space requirements and external temperatures i.e. compensated ICU should be on its own zone.

#### Ventilation

- 5.29 Wherever possible, individual spaces should be naturally ventilated. Deep planned spaces may need mechanical ventilation. Planning should, therefore, seek to minimise the need for mechanical ventilation by ensuring that, wherever practicable, core areas are reserved for:
  - rooms that require mechanical ventilation for clinical or functional reasons, irrespective of whether their location is internal or peripheral; for example, sanitary facilities, dirty utility and beverage preparation areas;
  - spaces which have only transient occupation and, therefore, require little or no mechanical ventilation; for example, circulation and some storage areas.
- 5.30 Air movement induced by mechanical ventilation should be from clean to dirty areas where these can be defined. The design should allow for an adequate flow of air into any space having only mechanical extract ventilation, via transfer grilles in doors or walls. Such arrangements, however, should avoid the introduction of untempered air and should not prejudice the requirements of fire safety or privacy.
- 5.31 Fresh air should be introduced via a low velocity system and should be tempered and filtered before being distributed via high level outlets. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to patients and staff.
- 5.32 Ventilation supply plant should include air filters having a minimum arrestance of 85% when tested in accordance with BS EN 779 1993. In urban or other areas of high atmospheric pollution, a higher standard of filtration may be economically justified to reduce the level of staining to internal finishes. Filters must be readily accessible for replacement and should be provided with a pressure-differential indicator.
- 5.33 The unit can be supplied from a multi-zone plant with separate ducts providing temperature control to each single bedroom and multi-bed area. Each single bedroom also requires humidity and adjustable temperature control. Ancillary areas can be ventilated by a tempered air supply from the same plant. The extract system can consist of a single unit and combined ductwork. It should discharge direct to atmosphere.



- 5.34 A separate extract system will be required for "dirty" areas, for example, utility and sanitary facilities. It should operate continuously throughout the day and night. A dual motor fan unit with an automatic changeover facility should be provided.
- 5.35 Ventilation of the unit as a whole should be considered in order to ensure that both supply and extract systems are in balance, taking due account of infiltration.
- 5.36 External discharge arrangements for extract systems should be protected against back pressure from adverse wind effects and should be located to avoid reintroduction of exhausted air into the building through air intakes and windows.

#### Multi-bed area

5.37 The multi-bed area should be mechanically ventilated and this should also include mechanical cooling.

#### Single-bed rooms

- 5.38 The mechanical ventilation system for single-bed rooms should be designed to provide "source and protective isolation" (see paragraphs 2.26 and 3.13). A simple non-changeover system which provides balanced supply and extract ventilation to each single-bed room and gowning lobby is proposed. Such a "constant mode" system has a number of advantages and avoids the complications and reliability problems associated with changeover systems. While the air change rate should be capable of dealing with ventilation requirements with acceptable air entry temperatures to maintain the room at prescribed conditions, an appropriate minimum rate would be that suitable for a treatment room i.e.10 air changes per hour.
- 5.39 The gowning lobby, which functions as an airlock, will require a relatively high and balanced supply and extract air change rate to be effective against airborne organisms moving between circulation areas and single-bed rooms. For this reason, the gowning lobby should be relatively small.
- 5.40 Staff entering the gowning lobby from the corridor will go through a gowning and clinical hand-washing procedure and, during this period, the ventilation system will dilute the air entrained from the corridor. Further entrainment and dilution occurs as staff move from the gowning lobby to the single-bed room. The amount of air and number of organisms transferred from the corridor to the single-bed room through this process should be exceptionally low and will be inversely proportional to the time spent "gowning up". The reverse will also apply as staff leave the single-bed room. An air change rate of 15 per hour (balanced) would provide a total change of air in the lobby every four minutes.



5.44

5.41 The mechanical ventilation system serving each single-bed room should also include mechanical cooling and provide for a range of temperatures which can be adjusted by staff. The humidity within the single room should also be controlled. Further detailed guidance is contained in SHTM 2025 – 'Ventilation in healthcare premises'.

Single-bed rooms (alternative mechanical ventilation system)

- 5.42 The effectiveness of the method of ventilation for the isolation rooms described in paragraphs 5.38 to 5.41 depends upon:
  - lobbies being provided;
  - staff discipline, in that they must stay for a period in the lobby before entering the single-bed room;
  - an acceptance of the fact that the provision of gowning lobbies restricts contact between the single rooms and the Unit as a whole.

If for some reason(s) lobbies are not provided and/or it is unlikely that a satisfactory operating procedure can be implemented, the following alternative method of ventilation is proposed.

- 5.43 Provide each single-bed room with mechanical supply and extract facilities to meet the following requirements:
  - each room should be capable of being held at a positive pressure relative to adjacent spaces;
  - each room should be capable of being held at a negative pressure relative to adjacent spaces;
  - the ventilation should be capable of being controlled locally by unit staff to allow positive or negative ventilation to be selected;
  - the pressurisation status of the room should be indicated locally;
  - the selection of positive or negative ventilation for any room should not materially affect the balance in the unit as a whole.

The most effective manner in which to achieve the foregoing may be by the provision of separate ventilation plants to serve each single-bed room and the multi-bed area (i.e. three separate plants). Failing this, a single plant can be suitable zoned to enable independent control of temperature and humidity to each single-bed room and temperature control to the multi-bed area.

5.45 The air change rate to the single-bed areas should be capable of dealing with the ventilation requirements with acceptable air entry temperatures to maintain the room at prescribed conditions. An appropriate minimum rate would be a rate similar to that of a treatment room, i.e. ten air changes per hour. This rate of supply should be maintained whether the room is in positive or negative mode.



#### Controls

- 5.46 The space temperature within the multi-bed and single-bed areas will usually be controlled by the mechanical ventilation heating and cooling system. The multi-bed design temperature should be centrally controlled, whereas single-bed rooms should have local temperature controls which are accessible to nursing staff. The single-bed room humidity should also be centrally controlled. Further guidance is contained in SHTM 2005 'Building management systems'.
- 5.47 Supply and extract ventilation systems should include controls and indicator lamps in the plant room to confirm the operational status of each system. Alarms should be repeated in the Estates department. Their selection should take account of the extent to which they can be linked to, or provided by, a building management system serving the whole hospital. Further guidance is contained in SHTM 2005 – 'Building management systems'.

#### Hot, cold and drinking water services

- 5.48 Guidance concerning the design and installation of cold water supply pipework and distribution systems is given in SHTM 2027 – 'Hot and cold water supply, storage and mains services'. For frost protection and to prevent condensation staining decorative finishes, all cold water pipework, valves and flanges should be insulated and vapour sealed. For additional information see Scottish Hospital Technical Note 2 – 'Domestic Hot and Cold Water Systems for Scottish Health Care Premises', NHS in Scotland Property and Environment Forum 1999.
- 5.49 To limit the risk of Legionnaires disease, the water services should be designed, installed and commissioned in accordance with the recommendations in Scottish Health Technical Memorandum 2040 The Control of Legionellae in Health Care Premises A Code of Practice, NHS in Scotland Property and Environment Forum 1999.
- 5.50 The domestic hot water supply should be taken from the general hospital calorifier installation at a minimum outflow temperature of 60°C ± 2.5°C, and distributed to all outlets so that the return temperature at the calorifier is not less than 50°C. Outlet temperatures and fittings for sanitary equipment are shown in the Activity Data Base sheets. (See also Scottish Health Guidance Note – "Safe" hot water and surface temperatures'.) The general principle being unless a higher temperature is required for functional reasons, the outlet temperature for domestic hot water should not exceed 43°C, and the water temperature at all outlets accessible to patients should not exceed 43°C or lower in certain circumstances. Thermostatic mixing valves should be of a type that has limited variation in temperature control with water pressure variation and which automatically closes the hot water supply if the cold water supply fails. The provision of one thermostatic mixing valve to serve a group of baths or showers is not acceptable. Guidance on thermostatic mixing valves is available in Scottish Health Guidance Note -"Safe" hot water and surface temperatures'.



- 5.51 Where fully potable cold water systems are not provided, drinking water outlets should be provided in the preparation room and servery/pantry. The supply should be direct from the mains.
- 5.52 The requirements for the control of legionellae bacteria in hot and cold water systems are set out in SHTM 2040 'The control of legionellae in healthcare premises a code of practice'.

#### **Piped medical gases**

- 5.53 Piped medical gases to each bed should be located as described in paragraph 5.21 and will normally include oxygen, medical compressed air and vacuum. Exceptionally, nitrous oxide and anaesthetic gas scavenging (AGS) may also be provided. Services to the bed space should be duplicated in the equipment service room. Further guidance is contained in SHTM 2022 – 'Medical gas pipeline systems'.
- 5.54 Medical gas supplies, vacuum and gas scavenging systems, particularly for high dependency areas, are under continuous review and SHTM 2022 recommendations with regard to number of outlets and design flow rates should be treated with caution. Design flow rates should take into account more accurate assessment of the simultaneous use of outlets and the consumption of the equipment being served by the outlets. Note SHTM 2022, Part 1, paragraph 4.35 regarding the use of oxygen to power ventilators.

### **Electrical services**

#### General scope

- 5.55 The electrical installation includes:
  - the main intake switchgear;
  - lighting;
  - power (including supplies to ventilation plant);
  - earth bonding of extraneous metal work;
  - telephone wiring;
  - wireways for data links;
  - clocks;
  - fire alarms;
  - staff location;
  - staff call.

The installation shall conform in all respects with BS 7671 – Requirements for electrical installations (current edition) and SHTM 2007 'Electrical Services – supply and distribution' and SHTM 2020 – 'Electrical safety code



for low voltage systems'. Emergency electrical supplies shall be provided in accordance with SHTM 2011 – 'Emergency electrical services'.

- 5.56 Reference should be made to the Activity Data Base sheets for the recommended levels of internal illumination, disposition of outlets for power, telephones, call systems and clocks, etc in individual spaces.
- 5.57 The point of entry for the electrical supply will be a departmental switchroom housing the main isolators, the main distribution equipment and metering. The switchroom will also be the distribution centre of subsidiary electrical services and, wherever possible, all equipment should be mounted at a height to give easy access from a standing position. The switchroom should be positioned so as to minimise the cost of cabling required to serve the accommodation. All distribution boards and main switches should be contained in secure cupboards, preferably in areas where there is normally a continuous staff presence.

#### **Electrical installation**

5.58 The electrical installation in occupied areas should be concealed in screwed steel conduit and steel trunking using appropriately insulated copper conductors – see SHTM 2007. In certain circumstances however metal sheathed or steel wired armoured (SWA) cables may be used. External installations should use screwed galvanised steel conduit with waterproof fittings. Plant areas should use screwed galvanised steel conduits and galvanised steel trunking. Steel conduits and trunking wireways for communications and data systems should also be concealed wherever possible.

#### **Electrical interference**

- 5.59 Care should be taken to avoid mains borne interference, electrical radio frequency and telephone interference affecting physiological monitoring equipment, computers and other electronic equipment used here and elsewhere. Guidance on the avoidance and abatement of electrical interference is contained in HTM 2014 'Abatement of electrical interference'. Fluorescent luminaires should comply with BS EN 55015: 1993.
- 5.60 Electrical products systems and installations should not cause or be unduly affected by electromagnetic interference. This requirement is in the form of an EC Directive on Electro-Magnetic Compatibility (89/336/EEC as amended by 97/263/EEC and 92/31/EEC). This Directive has been implemented in UK law by the Electromagnetic Compatibility Regulations 1992 (SI No. 2372).



### Lighting

- 5.61 Practical methods of lighting the various functional spaces are contained in CIBSE Lighting Guide LG 02 'Hospital and Health Care Buildings'. The choice of luminaire should take account not only of the requirements for light distribution and visual comfort appropriate to the space, but also the operational efficiency of the light source used. Luminaires should be of a type which are easily cleaned and maintained, as well as being manufactured and tested in accordance with the requirements specified in the relevant sections of BS 4533. Generally, energy efficient luminaires should be used. Infrequently used luminaires may be fitted with compact fluorescent or incandescent lamps.
- 5.62 In reception and circulation areas, colour graphics and lighting should be coordinated to create a calm and welcoming atmosphere whilst also contributing to the safe movement of patients in the department.
- 5.63 It is essential that fluorescent lighting in clinical areas is derived from one of the recommended types of lamps having suitable colour rendering characteristics. In such areas the colours chosen for walls, floors and ceilings should be carefully selected. Architects and engineers should collaborate to ensure that the decorative finishes are compatible with the colour rendering properties of the lamp and that spectral distribution of the light source is not unduly altered. Consideration should be given to using the same lamp characteristics in clinical and non-clinical areas in order to simplify maintenance and stock replacement lamps.
- 5.64 Each bed should be illuminated by luminaires located above or behind the bedhead. The luminaires should be controlled by dimmer switches capable of providing appropriate illuminance at all times. (See also paragraph 4.48.)
- 5.65 Additional luminaires should be provided within the general circulation space of the multi-bed area and these should also be controlled by dimmer switches.
- 5.66 Local luminaires, controlled by dimmer switches, should be provided at the staff base.
- 5.67 Dimmer controlled localised night lighting of the nurses' station should provide 300 lux on the table. This will meet the needs of staff and act as a focal point for patients at night. Where visual display terminals are to be used, the lighting should be designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible and meet the Health and Safety (Display Screen Equipment) Regulations 1992 implementing EU Directive No. 90/270/EEC 1990 Further guidance is contained in CIBSE Lighting Guide LG3. Emergency lighting should be provided on primary escape routes in accordance with SHTM 2011 'Emergency electrical services' and BS 5266 and should comply with the relevant sections of NHS in Scotland Firecode.



- 5.68 The lighting of corridors and other circulation areas, which generally are areas not covered by the Activity Data Base sheets, should be in accordance with the guidance contained in HBN 40 – 'Common activity spaces, Volume 4: Circulation areas' and HBN/SHPN 40 Volume 5: Scottish Appendix.
- 5.69 Mobile examination luminaires, where provided, should operate at extra low voltage (normally fed from an in-built step-down transformer), be totally enclosed and be equipped with a heat filter. The temperature of external surfaces should be such as to avoid injury to patients and staff.

#### **Controlled Drugs cupboard**

- 5.70 A red indicating lamp should be provided on each Controlled Drugs cupboard and, where appropriate, outside the doorway to the room in which the cupboard is located and at a continuously staffed location. The lamps should be interlocked with the cupboard and alarm system to give visual and audible indication at the continuously staffed location of unauthorised entry to the cupboard.
- 5.71 An indicating lamp denoting that the circuit is energised should also be fitted to each cupboard. The supply circuits for the lamps and alarm system should be derived from essential circuits. The electrical supply to the cupboard should be via an interference proof connection unit to avoid unauthorised disconnection. The cupboards should comply with BS 2881. Further information is contained in HTM 63 'Fitted storage systems'. More general information is contained in 'Guidelines for the Safe and Secure Handling of Medicines' (1988).
- 5.72 Guidance is also contained in the Scottish Home and Health Department publication 'Guidelines for the Safe and Secure Handling of Medicines', issued with NHS Circular No. 1988 (GEN) 33.

#### Socket-outlets and power connections

- 5.73 Socket-outlets in each bed space should be located as described in paragraph 5.21 and supplied from at least two separately fused circuits of common phase. A total of 24 13A socket-outlets should be provided at each bed.
- 5.74 Sufficient 13 amp switched, shuttered socket-outlets, connected to ring or radial circuits, and should be provided to supply all portable appliances likely to be used simultaneously. The installation of twin outlets should be considered where activities occur in juxtaposition. Socket-outlets located away from the bedheads and not directly serving patients' needs should be wired on separate circuits.



- 5.75 To enable domestic cleaning appliances, with flexible leads nine metres long, to operate over the whole of the department, switched socket-outlets should be provided in corridors and in individual rooms where considered necessary.
- 5.76 Appliances requiring a three-phase supply or those rated in excess of 13 amp single phase should be permanently connected to separate final subcircuits fed from the distribution board and independently switched at a local isolator of appropriate fused rating. Fixed appliances of less than 13 amp rating should be permanently connected to a double pole switched 13 amp spur outlet with indicating light and suitably fused for the appliance rating. These spur outlets may form part of a ring circuit. Isolation switches should be provided adjacent to all engineering plant and equipment for use by maintenance staff. Where appropriate provide lockable switches or separate means of disconnection.
- 5.77 All electrical appliances, equipment and plant items whether automatically operated or not shall be provided with indicator lamps to show when the equipment is energised. Such indicators should be incorporated in the control unit of the apparatus, in the control switch of the apparatus, in the plug top of the apparatus or in the socket outlet from which the apparatus derives its supply.
- 5.78 The electrical supply connections to electro-medical equipment should comply with BS EN 60601-2 1993. Advice on the power supply requirements for radiodiagnostic equipment is contained in SHTM 2007 'Electrical services supply and distribution'.

#### Socket-outlets for minor scheduled servicing of medical equipment

- 5.79 Socket-outlets for user servicing of medical equipment, see HEI 98, within a designated area of the equipment service room may also be used by a visiting EME technician to carry out minor scheduled servicing. The layout within the designated area should, therefore, ensure that no adventitiously earthed metallic structure, such as radiators or pipes, is within easy reach of the operator sitting at the bench. The floor within this area should be covered with a rubber mat.
- 5.80 Shuttered socket-outlets should be connected via an emergency trip. This circuit should be protected by a core balance earth leakage protective device having a nominal tripping current not exceeding 15mA and complying with the requirements of BS 4293. In addition, a master emergency trip should be provided outside the entrance to the room. A shrouded earth terminal should also be provided at one end of the bench. The socket-outlets should be mounted in plastic trunking and all metallic fixings should be isolated from earth.



5.81 A plastic chain and stanchion or equivalent should be available to enclose the designated area when the visiting technician is carrying out "live working procedures". Socket-outlets, outside this area, should have a notice warning that earth leakage protection is not provided.

### **Emergency electrical supplies**

- 5.82 Guidance on emergency electricity supplies is contained in SHTM 2011 'Emergency electrical services'. The uninterrupted power supply (U.P.S.) system recommended for relatively low power life support equipment should be wired to at least three colour coded and suitably annotated 13A socketoutlets at each bed position. Visual and audible indication should be provided within the ICU to indicate that the U.P.S. has taken the load or is failing to charge.
- 5.83 Socket-outlets connected to "essential circuits" will include those at the bedhead and at the staff base. The supply to the Controlled Drugs cupboard should also be from an "essential circuit". Consideration should be given to a duplicate U.P.S. to act as a standby to the duty U.P.S. to cover for failure and to extend U.P.S. availability if required.
- 5.84 All communication, clock and alarm systems, bedpan disposal units and refrigerators should be supplied from "essential circuits". U.P.S. for equipment other than the above may be required. Such U.P.S. should be derived from a separate system and socket-outlets suitably colour coded and annotated should be provided as required.

#### Entrance door security systems

- 5.85 The main entrance to the ICU should be controlled by a door security system which may operate in conjunction with a closed circuit television system and a verbal communication system with an electromagnetically operated door lock to be controlled from the staff base (see also paras 4.21 and 3.3 of this Note). Locks should open automatically upon initiation of a fire alarm. Override facilities should be provided in order to give staff access/egress for normal work. Consideration should be given to the provision of an electronic/mechanical key pad door locking system. A security alarm actuating switch or button may be located unobtrusively at the nurse station or other suitable location. It should be connected to a continuously staffed area such as the hospital telephone switchboard or the porters' room.
- 5.86

The requirements of Scottish Office PAN 46 Planning for crime prevention, and NAHAT Security Manual, together with supplements shall be adhered to.



#### Patient/staff call system

5.87 Call points shall be as indicated on Activity Data Base sheets and each unit will normally comprise a push button, reassurance lamp and reset switch. Visual and audible indication of operation should be provided at the nurses' station to give responding staff unambiguous identification of the call. The audible signal initiated by the patient should operate for one second every ten seconds until cancelled. See also paragraph 4.17 of this Note.

#### Staff/staff call system

5.88 A separate pull-push switch should be located at each bedhead to initiate special emergency (CRASH) group call arrangements to predetermined receivers. These pull-push switches should form part of the staff/staff call system and should override existing calls on the system. The emergency group call system should interface with the paging system to ensure automatic paging of predetermined receivers without involving the telephone operator. The interface module (emergency call to the paging system) should be located in the department's switch cupboard and should be hard wired to the paging system decoder(s) located in the telephone operator's room. The crash system should operate in conjunction with the unit staff/staff call system which can be achieved by a two stage visual/audio signal system or as indicated in paragraph 4.18 of this Note.

#### **Call systems general**

5.89 Patient/staff and staff/staff call systems should operate at extra low voltage and further general guidance is given in SHTM 2015 – 'Bedhead services' and SHTM 2020 – 'Electrical safety code for low voltage systems' and HBN 48 – 'Telephone services'. Because of the rapid developments in the communications/security industry, project teams should evaluate the options available at the time of planning, particularly with regard to cordless technology and integration with the telephone system.

#### Telephones

5.90

The hospital telephone system should be extended to serve this unit in accordance with the requirements shown in the Activity Data Base sheets. Wiring should terminate at each extension point in a standard line jack unit. Consideration should be given, however, to a cordless telephone system which can be integrated with the staff alarm and security systems, and the staff location system. Because of the rapid developments in the communications/ security industry, project teams should evaluate the options available to them at the time of planning.



- 5.91 Coin and/or card operated pay phones which may be fixed or mobile depending upon local policy should be provided to enable visitors and patients to make phone calls (if necessary in private). Consideration should be given to providing a free phone service for taxis in public areas as appropriate. The handsets of public telephones should be provided with inductive couplers to assist people wearing hearing aids.
- 5.92 Self-contained intercommunication systems are relatively inflexible and limited in the extent of their economic application. Any subsequent modifications to them usually involve disproportionate cost. Only in very rare instances can such systems be justified for functional or clinical reasons. Consequently, reasons for providing a separate intercommunication system should be clearly shown. Option appraisals should be undertaken in considering the systems to be selected.
- 5.93 Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is contained in HBN 48 'Telephone services'. Refer also to paragraphs 4.19 and 4.20.

#### Wireways

#### Data links

5.94 Wireways for data links should be provided between this department and the main hospital data management system (see paragraphs 4.61 to 4.63). Normally, the cables can be accommodated in the extra low voltage compartment provided for other systems and, therefore, there should be no need to make extra provision.

#### Physiological monitoring equipment

5.95 Wireways for automated physiological monitoring should be provided to each bed space and staff base (see paragraphs 2.47 and 2.48). A separate conduit/trunking network is required to avoid electrical interference.

#### **Electric clocks**

5.96 Battery quartz type clocks with sweep second hands should be provided where indicated on the Activity Data Base sheets.

#### Radio and television

5.97 If a radio or television system is required, it should be supplied from the communal hospital Installation equipment. Further guidance is contained in SHTM 2015 – 'Bedhead services'.



### Lightning protection

5.98 Protection of the hospital building against lightning should be provided in accordance with SHTM 2007 – 'Electrical services supply and distribution', HSE Data Sheet DB 2 and BS 6651.

### Internal drainage

#### **General scope**

- 5.99 The primary objective is to provide an internal drainage system which:
  - uses the minimum of pipework;
  - remains water and air-tight at joints and connectors; and
  - is sufficiently ventilated to retain the integrity of water seals.

#### **Design parameters**

- 5.100 The design should comply with the relevant British Standards and Codes of Practice, including BS 5572, BS 6367 and BS 8301 and the current Building Regulations. Recommendations for spatial and access requirements for public health engineering services are contained in HSE Data Sheet EA5.
- 5.101 The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations, such as available angles of bends, junctions and their assembly, as well as space considerations, usually limit the minimum gradient to about 1:50 (20 mm/m). For larger pipes, for example 100mm diameter, the gradient may be less, but this will require workmanship of a high standard if an adequate self-cleaning flow is to be maintained. It is not envisaged that pipes larger than 100mm diameter will be required within interfloor or ground floor systems serving this department.
- 5.102 Provision for inspection, rodding and maintenance should ensure "full bore" access and be located to minimise disruption or possible contamination. Manholes should not be located within this department.



#### Materials specification

- 5.103 The materials specified for the drainage system in this department will depend upon their location and the nature of the effluent being discharged. Waste pipework should as far as practicable be concealed. Although adequate for drainage requirements, UPVC may not always be acceptable to the fire officer and should not be installed above 'sensitive' areas, e.g. operating theatres, intensive therapy, radio-diagnostic, catering departments, electrical switch-rooms.
- 5.104 Maintenance problems may arise as a result of misuse of the system, for example, disposal of paper towels down WCs. Appropriate disposal facilities, therefore, should be provided. Warm-air hand dryers can mitigate the problem.



# 6. Cost information

#### Introduction

6.1 For all types of health buildings it is clearly of vital importance that building costs and revenue expenditure should be kept as low as possible consistent with acceptable standards. Within this general context Scottish Health Planning Notes provide a synopsis of accommodation for health buildings which the NHS in Scotland recommends for the provision of a given service.

### **Scottish Capital Investment Manual**

- 6.2 The Scottish Capital Investment Manual, published by the National Health Service in Scotland Management Executive, provides detailed guidance for each of the main stages of capital schemes including those that may ultimately be delivered using private finance. It gives practical guidance on the technical considerations of the full capital appraisal process and also provides a framework for establishing management arrangements to ensure that the benefits of every capital investment are identified, evaluated and realised. Projects will not get Scottish Executive approval unless adequate project management arrangements can be demonstrated to be in place.
- 6.3 The Management of Construction Projects section of the Manual provides guidance on mandatory procedures and best practice for the planning and implementation of construction projects. It covers the stages of a project from the full business case through to technical commissioning and handover. The procedures are divided into six stages:
  - full Business Case, leading to approval;
  - design;
  - tender and contract;
  - construction and equipment supply;
  - technical commissioning and handover;
  - post-completion.

### **Cost guidance**

6.4 The Departmental Cost Guides which reflect the building and engineering requirements of new-build accommodation associated with this SHPN are promulgated by the NHS in Scotland Property and Environment Forum



Executive in their annual publication Healthcare Construction Project Price Guide.

# Equipment

6.5 Group 1 items are provided for in the Departmental Cost Guides associated with this SHPN. Specific guidance on Group 2 and 3 equipment is available from the Common Services Agency's Scottish Healthcare Supplies.

#### Equipment is categorised into four groups:

#### Group 1:

Items (including engineering terminal outlets) supplied and fixed within the terms of the building contract;

#### Group 2:

Items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

#### Group 3:

As Group 2 but supplied and fixed (or placed in position) under arrangements separate from the building contract;

#### Group 4:

Items supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on space or engineering service requirements.

# **Functional unit**

The functional unit for this Note is the "bed". Three sizes of department have been costed: 6,8 and 10 beds. The activity spaces and areas used for costing the functional units are listed in the Schedules of Accommodation at the end of this Chapter.

# Essential complementary accommodation (ECA)

This comprises activity spaces which are essential to the running of the ICU, but which in certain circumstances may be available in a convenient location elsewhere in the hospital. The ECA costed in this Note is listed in the Schedules of Accommodation at the end of this Chapter and detailed in Chapter 3.

6.7

6.6


# **Optional accommodation and services (OAS)**

6.8 Where appropriate this Note draws attention to other ways of providing services or facilities, including the likely cost implications. This information will allow project teams to select the solution which is most suitable to their needs. The Optional Accommodation and Services costed in this Note are listed in the schedules and detailed in Chapter 3.

## Dimensions and areas

- 6.9 At the early stages of a project, designers should use the brief to make an approximate assessment of the total area of accommodation involved. Schedules of areas are given at the end of this Chapter. It is emphasised that these areas are for guidance in assessing options and planning schemes only.
- 6.10 In determining spatial requirements, the essential factors are the critical dimensions, i.e. the minimum linear dimensions within which activities may be performed with reasonable efficiency. The area required for an activity space is the product of the critical dimensions. Reference should also be made to the ergonomic diagrams in 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix.
- 6.11 The schedules of areas were prepared for the purpose of establishing the cost guidance. It is emphasised that the areas published do not represent recommended room sizes, maximum or minimum costs, nor are they to be regarded in any way as specific individual entitlements.

## **Circulation space**

6.12 The circulation space comprises space for all corridors, a heating and ventilation zone adjacent to external walls, small vertical ducts and spaces occupied by partitions, walls and planning flexibility. This space is included in the cost guidance.

## **Communications space**

6.13 Staircases, lifts and plant rooms, with the exception of electrical switch cupboards, are not included in the cost guidance. The cost of communications space is covered in the 'on-costs' defined in paragraph 1.11 of Healthcare Construction Project Price Guide



## **Engineering space**

6.14 The cost guidance provides for space taken by mechanical and electrical service routes and for small vertical ducts. The space is included in the Schedules of Accommodation as part of the circulation provision.

## **Engineering services**

6.15 The engineering services as described in Chapter 5, and exemplified in the Activity Data Base sheets, are included in the cost guidance. Primary engineering services are assumed to be conveniently available at the boundary of the department but the cost guidance does include a share of the central refrigeration plant and distribution system. The cost guidance also includes for the ventilation plant and distribution system.

#### Mechanical services:

- heating;
- ventilation;
- mechanical cooling;
- hot and cold water (including supply and drainage for dialysis);
- fire main;
- medical gases.

### **Electrical services:**

- main intake switchgear, local isolators and distribution boards;
- lighting;
- power (including supplies to ventilation plant);
- earth bonding of extraneous metal work;
- telephone wiring (excluding handsets);
- wireways for data links;
- wireways for physiological monitoring equipment;
- clocks;
- fire and alarm systems;
- staff/staff call systems;
- staff location and emergency system.



## Equipment Group 1:

- controlled Drugs cupboard;
- services trunking systems for eight bedheads as described in paragraph 5.21.



## **Schedules of Accommodation**

6.16

The following schedules are based on the text in Chapter 3, and are illustrative of the acceptable accommodation for the functional units detailed.

		6 beds		8 beds		10 beds		
Para.	Activity Space	Space		Total		Total		Total
No.		area	Ott	area	Otr	area	011	area
	NA /	sq. m.	Qly	sq. m.	Qly	sq. m.	Qiy	sq. m.
3.3	Waiting area	-	1	4.5	1	7.0	1	9.0
3.6 0.7		47.0	4	47.0	4	47.0		17.0
3.1	Stall base	17.0	1	17.0	1	17.0	1	17.0
3.1Z		25.5	2	51.0	2	51.0	2	51.0
3.12		7.0	2	14.0	2	14.0	2	14.0
3.15	Multi-bed area	20.0	4	80.0	6	120.0	8	160.0
3.32	Buik supplies store	5.0" 9.5	1	30.0	1	40.0		50.0
3.3Z	Clean utility	0.0 4.0*	1	8.5 7.5	1	8.5	1	0.0 40.5
3.23 2.24	Dieta utility	1.2	1	7.5 15.0		10.0	1	12.5
3.24	Dirty utility	2.5	1	15.0	1	20.0	1	25.0
3.29	Disposal noid	-	1	2.0		2.0	1	3.0
3.33	Linen bay	2.0"	1	12.0	1	16.0	1	20.0
3.30	Clinical equipment store	5.0^	1	30.0	T	40.0	1	50.0
3.34 2.25	INIODIIE X-ray equipment store	-	1	5.0		5.0	1	5.0
3.35		15.0	1	15.0	1	15.0	1	15.0
3.38		2.0*	1	12.0	1	16.0	1	20.0
3.37	Equipment service room	2.0*	1	12.0	1	16.0	1	20.0
3.37	Equipment service room lobby	-	1	9.0	1	10.5	1	12.0
3.43	Staff changing male	-	1	7.5	1	7.5	1	10.0
3.43	Staff changing female	-	1	16.0	1	16.0	1	20.0
3.43	Staff shower	-	2	5.0	2	5.0	2	5.0
3.43	Staff WC	-	2	4.0	2	4.0	2	4.0
3.45	Staff rest room	-	1	21.0	1	21.0	1	28.0
3.46	Staff pantry	6.0	1	6.0	1	6.0	1	6.0
3.47	Patients' pantry	6.0	1	6.0	1	6.0	1	6.0
3.56	Relatives' sitting room	2.0*	1	12.0	1	16.0	1	20.0
3.56	Relatives' waiting/interview room	10.0	1	10.0	1	10.0	1	10.0
3.56	Relatives' pantry	6.0	1	6.0	1	6.0	1	6.0
3.56	Relatives' WC – type 1	2.0	1	2.0	1	2.0	1	2.0
3.50	Nurses' office	15.0	1	15.0	1	15.0	1	15.0
3.48	On-call room	10.0	1	10.0	1	10.0	1	10.0
3.48	Ensuite WC and shower	6.0	1	6.0	1	6.0	1	6.0
3.51	Clinical Director's office	12.0	-	-	1	12.0	1	12.0
3.52	Consultant's office	12.0	1	12.0	1	12.0	2	24.0
3.53	Secretarial office	12.0	1	12.0	1	12.0	1	12.0
3.54	Audit office	10.0	1	10.0	1	10.0	1	10.0
3.55	Seminar room	20.0	1	20.0	1	20.0	1	20.0
3.40	Cleaners' room	7.0	1	7.0	1	7.0	1	7.0
3.41	Switchroom	2.0	1	2.0	1	2.0	1	2.0
	Net total			511.5		592.0		715.5
	ADD – Planning provision	5%	-	25.6		29.6		35.8
	Sub-Total			537.1		621.6		751.3
	ADD – Engineering zone	3%		16.1		18.6		22.5
	ADD – Circulation	40%		214.8		248.6		300.5
	Gross Totals		-	768.0		888.8		1074.3
	5.500 10(0)0		-			000.0		101 4.0

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## **Essential Complementary Accommodation**

			5%	3%	40%	
Para. no.	Activity Space	Space area sq.m	Planning sq.m	Engineering sq.m	Circulation sq.m	Total area sq. m.
3.56	Relatives' overnight stay	10.5	0.5	0.3	4.4	15.7
3.56	Relatives' shower	2.5	0.1	0.1	1.0	3.7

## **Optional Accommodation and Services**

			5%	3%	40%	
Para. no.	Activity Space	Space area sq. m.	Planning sq.m.	Engineering sq.m.	Circulation sq.m.	Total area sq.m.
3.60	Assisted patients' bathroom with WC	15.5	0.8	0.5	6.5	23.3
3.61	Procedures/treatment room	20.0	1.0	0.6	8.4	30.0
3.62	Computer room	15.0	0.7	0.5	6.3	22.5
3.63	Manager's office	12.0	0.6	0.4	5.0	18.0
5.21	Extra for ceiling mounted articulated arm delivery systems		No	additional area	required	



# 7. Activity data, critical dimensions and ergonomic drawings

## Activity data

- 7.1 The Activity Data Base is a computerised information system developed by NHS Estates to help project and design teams by defining the users' needs more precisely.
- 7.2 The Activity Data Base is not designed for Scottish application and therefore, if used by a NHSiS Trust, should be adapted with caution.
- 7.3 In particular, a number of Activity Spaces in common use in Scottish Hospitals may not be included in the Activity Data Base and the individual room activities, technical data and components may well be different in a Scottish context.
- 7.4 Further information about the use and preparation of activity data can be obtained from NHS Estates, Department of Health, 1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.
- 7.5 It is unlikely that the NHS in Scotland Property and Environment Forum will be publishing a Scottish version of the Activity Data Base.

## **Critical dimensions**

- 7.6 Critical dimensions are those dimensions which are critical to the efficient functioning of an activity; thus the size of components, their position and the space around them may all be critical to the task being performed. Guidance on these dimensions for a particular activity is provided in the form of ergonomic drawings. These illustrate components, that is equipment, furniture and fittings, and provide ergonomic data on the space required for users to move, operate or otherwise use the component; information about the component, for example fixing heights, and the users, for example reach, is also provided.
  - This Chapter contains ergonomic drawings relevant to this Note. In addition, ergonomic data common to the design of a number of departments is contained in NHS Estates publication 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix, to which reference should also be made.



# List of ergonomic drawings relevant to SHPN 27

- 7.8 1a. Bed space: fixed beam service delivery system
  - 1b. Bed space: fixed beam service delivery system
  - 2a. Bed space: double arm double pivot point service delivery system
  - 2b. Bed space: double arm double pivot point service delivery system
  - 2c. Bed space: double arm double pivot point service delivery system
  - 3. Staff base
  - 4. Clean utility
  - 5. Clinical equipment store and workshop
  - 6. Bulk store
  - 7. Laboratory





#### 1a. Bed space: fixed beam service delivery system

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#### 1b. Bed space: fixed beam service delivery system







#### 2a. Bed space: double arm double pivot point service delivery system

Notes: 1350 (1300) Preferred minimum: (Restricted minimum, not recommended for general use.) All sizes in millimetres.	1. This dimension cannot be reduced since space is required to change the position of the equipment carriers and work at the head of the patient and to park equipment. 2. This space may be more depending upon the position of the arm and equipment carrier. It should never be less than 600 since access is required by staff
NORMAN RAITT ARCHITECTS	and equipment to the patient's nead.





#### 2b. Bed space: double arm double pivot point service delivery system

#### NORMAN RAITT ARCHITECTS



#### 2c. Bed space: double arm double pivot point service delivery system

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#### 3. Staff base

NORMAN RAITT ARCHITECTS



3. A between bed screen height of more than 1000 will obstruct the clear view of the unit.

4. The height of the centre of the x-ray illuminator for viewing should be 1600.

2. In order to provide a good view of the

surface height is 900, which is suitable for

patients and bed spaces from the staff base, it is recommended that the work



## 4. Clean utility





## 5. Clinical equipment store and workshop





## 6. Bulk store





## 7. Laboratory



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## Bed space equipment and service requirements

7.9

Shown below is a list of items of equipment usually present in a bed space. Some items are only used intermittently. The shape, size and deployment of the equipment is for review with the ergonomist. The services required by each item are also shown.

### Items of equipment

ltem no.	Item
1.	Bed – Kings Fund Airfluidised Low air loss
2.	Oxygen flowmeter pipeline
3.	Suction apparatus high pressure Suction apparatus low pressure Suction wound drainage
4.	Ventilator
5.	Monitor, multiparameter temperature, blood pressure, oxygen/carbon dioxide, CVP, etc
6.	Infusion pump
7.	Syringe pump
8.	Computer terminal
9.	Examination lamp/spot
10.	Humidifier – heated
11.	Electric fan
12.	Blood warmer
Intermit	tent use
13.	ECG machine
14.	EEG machine
15.	X-ray mobile image intensifier
16.	Ultrasound/echocardiography
17.	Endoscopy (fibre optic light source)
18.	Defibrillator
19.	Anaesthetic machine
20.	Haemofiltration
21.	Haemodialysis (see paragraphs 3.18 to 3.20)



## Service requirements

Type of service	Required by item no(s)	Total no. of outlets required in each bed space
Oxygen	2,4,19	2-3
Suction	3,17	2
Air	4	2
Nitrous oxide and AGS (project option)	-	1
Electrical socket – outlet	1,4,5,6,7,8,9,10, 11,12,13,14,15, 16,17, 20,21	20
Water	21	1
Drainage	21	1



## References

References are identified by paragraph number.

- 1.3 **Standards for Intensive Care Units**. Intensive Care Society, 1997.
- 2.26 **Guidance for Clinical Health Care Workers**. Expert Advisory Group on Aids 1990.

BS 7320:1990 Specification for sharps containers. BSI 1990.

**Decontamination of equipment, linen or other surfaces contaminated with Hepatitis B and/or Human Immunodeficiency Viruses**. Health Circular HC(91)33.

**Scottish Infection Manual**. The Scottish Office Department of Health Public Health Policy Unit 1998.

- 2.27 SI 3246:1994 The Control of Substances Hazardous to Health Regulations (COSHH) - Guidance for the Initial Assessment in Hospitals. TSO 1994.
- 2.30 Food Safety Act 1990. TSO 1990.

Food Hygiene Amendment Regulations 1990. TSO 1990.

- 2.44 **SHPN 13 Sterile services department**. The Scottish Office NHS in Scotland Management Executive, TSO 1994.
- 2.45 **LPG aerosol containers: risks arising from storage, use and disposal**. Safety Action Bulletin SAB(88)79, Department of Health 1988.
- 3.10 Intensive Therapy Units, Stage Two Case Study Analysis. Department of Health, Medical Architecture Research Unit (MARU) 1988.
- 3.19 **HBN 53 Satellite Dialysis Unit**. NHS Estates, TSO 1996.

**Water for Haemodialysis: Aluminium and Fluoride Levels**. Safety Information Bulletin SIB(85)2, Department of Health, January 1985.

**Dialysis Equipment: Observance of Manufacturers' Operating Instructions and the Department's Defect Reporting Procedures.** Safety Action Bulletin SAB(87)20, Department of Health, September 1987.

**Dialysis Water Supplies: Contamination Risk**. Safety Action Bulletin SAB(89)72, Department of Health, September 1989.

**Dialysis Solution Concentrate: Advice on Correct Usage.** Safety Action Bulletin SAB(90)4, Department of Health, January 1990.



- 3.40 SI 3246:1994 The Control of Substances Hazardous to Health Regulations (COSHH) – Guidance for the Initial Assessment in Hospitals. TSO 1994.
- 3.44 **HBN 41 Accommodation for staff changing and storage of uniforms**. NHS Estates, TSO 1984.
- 3.49 **HBN 18 Office accommodation in health buildings**. NHS Estates, TSO 1991.
- 4.3 SI 2179:1990(S187) The Building Standards (Scotland) Regulations (with subsequent amendments). TSO 1990.
- 4.4 **Healthcare Construction Project Price Guide**. NHS in Scotland Property and Environment Forum Executive (annual publication).
- 4.5 **Healthcare Construction Project Price Guide**. NHS in Scotland Property and Environment Forum Executive (annual publication).
- 4.10 Removal of Crown immunity under Section 60 of the NHS and Community Care Act 1990. NHS Circular No 1991 (GEN)1 January 1991.
- 4.11 The Scottish Office NHS in Scotland Management Executive letter MEL(1992)24, 30 July 1992.
- 4.12 Health Circular HC(85)22. 1985.
- 4.14 **NHS in Scotland Firecode**. NHS in Scotland Property and Environment Forum Executive 1999
- 4.15 HTMs 57- 60. See 4.26 below.Wayfinding. NHS Estates, TSO 1999.
- 4.20 HBN 48 Telephone services. NHS Estates, TSO 1997.
- 4.21 NHS Circular No 1984 (Gen)7.

**NHS Security Manual** (issued with Management Executive Letter MEL(1992)35). National Association of Health Authorities and Trusts (NAHAT) 1992.

- 4.26 **HTM 54 User manual**. NHS Estates, TSO 1989.
  - HTM 54.1 User manual update. NHS Estates, TSO 1993.

HTM 55 - Windows. NHS Estates, TSO 1998.

HTM 56 - Partitions. NHS Estates, TSO 1998.

HTM 57 - Internal glazing. NHS Estates, TSO 1995.

HTM 58 - Internal doorsets. NHS Estates, TSO 1998.



HTM 59 - Ironmongery. NHS Estates, TSO 1998.

HTM 60 - Ceilings. NHS Estates, TSO 1989.

HTM 61 - Flooring. NHS Estates, TSO 1995.

HTM 63 - Fitted storage systems. NHS Estates, TSO 1989.

HTM 64 - Sanitary assemblies. NHS Estates, TSO 1995.

HTM 66 - Cubicle curtain track. NHS Estates, TSO 1989.

HTM 67 - Laboratory fitting out systems. NHS Estates, TSO 1993.

HTM 68 - Duct panel assemblies. NHS Estates, TSO 1993.

HTM 69 - Protection. NHS Estates, TSO 1993.

HTM 70 - Fixings. NHS Estates, TSO 1993.

**HTM 71 - Materials management modular storage**. NHS Estates, TSO 1998.

- 4.27 SI 3234:1994 The Environmental Protection Act (Amendment No.2). TSO 1994.
- 4.32 **HTM 61 Flooring**. See 4.26 above.
- 4.33 HTM 61 Flooring. See 4.26 above.
- 4.39 **HTM 55 Windows**. See 4.26 above.

**BS 5925:1991 Code of practice for ventilation principles and designing for natural ventilation**. BSI 1991.

- 4.46 **HTM 55 Windows**. See 4.26 above.
- 4.55 **SHFN 14 Disability access**. NHS in Scotland Property and Environment Forum Executive 1999.

Chronically Sick and Disabled Persons Act 1970. TSO 1970.

Chronically Sick and Disabled Persons (Scotland) Act 1972. TSO 1972.

Chronically Sick and Disabled Persons (Amendment) Act 1976. TSO 1976.

Disabled Persons Act 1981. TSO 1981 (print on demand).

**Disabled Persons (Services, Consultation and Representation) Act 1986.** TSO 1986.

Disability Discrimination Act 1995. TSO 1995.



#### 4.56 **BS 5810:1979 Code of Practice for access for the disabled to buildings**. BSI 1979.

- 4.57 **Wayfinding**. NHS Estates, TSO 1999.
- 4.58 **Safe Disposal of Clinical Waste 1992** (issued with letter reference NHS MEL(1993)2). Health Services Advisory Committee, Health and Safety Executive 1992.

The Scottish Office NHS in Scotland Management Executive letter MEL(1994)88.

4.60 **HTM 56 - Partitions**. See 4.26 above.

HTM 58 - Internal doorsets. See 4.26 above.

HTM 61 - Flooring. See 4.26 above.

- 4.64 **Hospital Building Teaching Hospital Space Requirements** (SHHD/DS(74)99). The Scottish Office 1974.
- 5.2 Model Engineering Specification. NHS Estates.
- 5.4 **Scottish Capital Investment Manual**. The Scottish Office NHS in Scotland Management Executive, TSO.
- 5.6 **SHTM 2005 Building management systems**. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.7 SI 2179:1990(S187) The Building Standards (Scotland) Regulations (with subsequent amendments). TSO 1990.
- 5.10 SI 2793:1992 The Manual Handling Operations Regulations. TSO 1992.
- 5.11 SHTM 2023 Access and accommodation for engineering services. NHS in Scotland Property and Environment Forum Executive 1999.

SI 3140:1994 Construction (Design and Management) Regulations. TSO 1994.

5.16 Health and Safety at Work etc Act 1974. TSO 1974.

Consumer Protection Act 1987. TSO 1987.

SI 3004 1992 The Workplace (Health Safety and Welfare) Regulations. TSO 1992.

SI 2306:1998 Provision and Use of Work Equipment Regulations. TSO 1998.

SI 3140:1994 Construction (Design and Management) Regulations. TSO 1994.

5.17 **NHS in Scotland Firecode**. NHS in Scotland Property and Environment Forum Executive 1999.



- 5.19 **SHTM 2045 Acoustics**. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.20 **Engineering Commissioning**. The Institute of Healthcare Engineering and Estate Management (IHEEM).

**Engineering services commissioning codes**. Chartered Institute of Building Services Engineers (CIBSE).

Scottish Hospital Technical Note 1 - Post commissioning documentation for health buildings in Scotland. The Scottish Office NHS in Scotland Management Executive. TSO 1993.

- 5.24 Scottish Health Guidance Note: "Safe" hot water and surface temperatures. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.32 BS EN 779:1993 Particulate air filters for general ventilation. Requirements, testing, marking. BSI 1993.
- 5.41 SHTM 2025 Ventilation in healthcare premises. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.46 SHTM 2005 Building management systems. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.47 SHTM 2005 Building management systems. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.48 SHTM 2027 Hot and cold water supply, storage and mains services. NHS in Scotland Property and Environment Forum Executive 1999.

Scottish Hospital Technical Note 2 - Domestic hot and cold water systems for Scottish healthcare premises. NHS in Scotland Property and Environment Forum Executive 1999.

- 5.49 SHTM 2040 The control of Legionellae in healthcare premises A code of practice. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.50 Scottish Health Guidance Note: "Safe" hot water and surface temperatures. NHS in Scotland Property and Environment Forum 1999.
- 5.52 SHTM 2040 The control of Legionellae in healthcare premises A code of practice. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.53 **SHTM 2022 Medical gas pipeline systems**. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.54 **SHTM 2022 Medical gas pipeline systems**. NHS in Scotland Property and Environment Forum Executive 1999.



## 5.55 **BS 7671:1992 Requirements for electrical installations IEE wiring** regulations (current edition with amendments). BSI 1992.

**SHTM 2007 - Electrical services supply and distribution**. NHS in Scotland Property and Environment Forum Executive 1999.

**SHTM 2020 - Electrical safety code for low voltage systems**. NHS in Scotland Property and Environment Forum Executive 1999.

**SHTM 2011 - Emergency electrical services**. NHS in Scotland Property and Environment Forum Executive 1999.

- 5.58 SHTM 2007 Electrical services supply and distribution. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.59 HTM 2014 Abatement of electrical interference. See 4.26 above.

BS EN 55015: 1993 Specification for limits and methods of measurement of radio interference characteristics of fluorescent lamps and luminaires. BSI 1993.

5.60 Electro-Magnetic Compatibility (89/336/EEC) (as amended by 91/263/EEC and 92/31/EEC) TSO 1989.

SI 2372:1992 Electro-Magnetic Compatibility Regulations. TSO 1992.

5.61 Lighting Guide: Hospitals & Healthcare Buildings (LG 02). Chartered Institute of Building Services Engineers (CIBSE) 1989.

BS 4533:1986 Luminaires. BSI 1986.

5.67 SI 2792:1992 The Health and Safety (Display Screen Equipment) Regulations. TSO, 1992.

Lighting Guide: Hospital and healthcare premises No. LG3. Chartered Institute of Building Services Engineers (CIBSE) 1989.

**SHTM 2011 - Emergency electrical services**. NHS in Scotland Property and Environment Forum Executive 1999.

BS 5266:1988 Emergency Lighting. BSI 1988.

**NHS in Scotland Firecode**. NHS in Scotland Property and Environment Forum Executive 1999.

5.68 **HBN 40 - Common activity spaces, Volume 4: Circulation areas**. NHS Estates, TSO 1995.

SHPN 40 - Common Activity Spaces, Volume 5: Scottish Appendix. NHS Estates, TSO 1996.

5.71 BS 2881:1989 Specifications for Cupboards for the Storage of Medicines in Healthcare Premises. BSI 1989.

HTM 63 - Fitted storage systems. See 4.26 above.



**Guidelines for the Safe and Secure Handling of Medicines** (issued with General Letter GEN(1988)33). Department of Health, R. Duthie TSO 1988 (out of print).

- 5.72 **Guidelines for the Safe and Secure Handling of Medicines** (issued with General Letter GEN(1988)33). Department of Health, R. Duthie TSO 1988 (out of print).
- 5.78 BS EN 60601-2: 1993 : Medical electrical equipment particular requirements for safety. BSI 1993.

**SHTM 2007 - Electrical services supply and distribution**. NHS in Scotland Property and Environment Forum Executive 1999.

- 5.79 HEI 98
- 5.80 BS 4293:1993 Specification for residual current-operated circuitbreakers. BSI 1993.
- 5.82 **SHTM 2011 Emergency electrical services**. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.86 **Planning for crime prevention (Planning Advice Note 46)**. The Scottish Office 1994.

**NHS Security Manual** (issued with Management Executive Letter MEL(1992)35). National Association of Health Authorities and Trusts (NAHAT) 1992.

5.89 **SHTM 2015 - Bedhead services**. NHS in Scotland Property and Environment Forum Executive 1999.

**SHTM 2020 - Electrical safety code for low voltage systems**. NHS in Scotland Property and Environment Forum Executive 1999.

HBN 48 - Telephone services. NHS Estates, TSO 1997.

- 5.93 HBN 48 Telephone services. NHS Estates, TSO 1997.
- 5.97 **SHTM 2015 Bedhead services**. NHS in Scotland Property and Environment Forum Executive 1999.
- 5.98 SHTM 2007 Electrical services supply and distribution. NHS in Scotland Property and Environment Forum Executive 1999.

HSE Data Sheet DB 2. Health and Safety Executive.

**BS 6651:1992 Code of practice for protection of structures against lightning**. BSI 1992.

5.100 **BS 5572:1978 Code of practice for sanitary pipework**. BSI 1978.

**BS 6367:1983 Code of practice for drainage of roofs and paved areas**. BSI 1983.



BS 8301:1985 Code of practice for building drainage. BSI 1985.

**HSE Data sheet EA5**. Health and Safety Executive.

- 6.2 **Scottish Capital Investment Manual**. The Scottish Office NHS in Scotland Management Executive, TSO.
- 6.4 **Healthcare Construction Project Price Guide**. NHS in Scotland Property and Environment Forum Executive (annual publication).
- 6.10 HBN 40 Common Activity Spaces, Volumes 1-4. NHS Estates, TSO 1995.

SHPN 40 - Common Activity Spaces, Volume 5: Scottish Appendix. NHS Estates, TSO 1996.

- 6.13 **Healthcare Construction Project Price Guide**. NHS in Scotland Property and Environment Forum Executive (annual publication).
- 7.7 HBN 40 Common Activity Spaces, Volumes 1-4. NHS Estates, TSO 1995.

SHPN 40 - Common Activity Spaces, Volume 5: Scottish Appendix. NHS Estates, TSO 1996.



# Publications in SHPN series

Given below is a list of all Scottish Hospital Planning Notes. Those Notes which have to be read along with their counterpart Health Building Note (HBN) are marked with an \*. This list is correct at time of publication of this Note, but refer also to the Health Building Notes and Scottish Health Planning Note Reference Guide published by the NHS in Scotland Property and Environment Forum Executive.

- 1 Health Service building in Scotland 1991 TSO
- 2 Hospital briefing and operational policy 1993 TSO
- 4 Adult acute wards (with DBS) 1992 TSO
- 4 Adult acute wards Supplement 1 Activity space data sheets 1992 TSO
- 6 Radiology department 1995 TSO
- 12 Out-patients department (with DBS) 1993 TSO
- 12 Out-patients department Supplement A Activity space data sheets 1993 TSO
- 12 Out-patients department Supplement 1 Genito-urinary medicine clinics 1993 TSO
- 12 Out-patients department Supplement 2 Oral surgery, orthodontics, restorative dentistry 1996 TSO
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- 34 Estate maintenance and works operations Supplement I Activity space data sheets 1993 TSO
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- 51 Accommodation at the main entrance of a District General Hospital Supplement A Activity space data sheets 1993 TSO
- 51 Accommodation at the main entrance of a District General Hospital Supplement 1 - Miscellaneous spaces in a District General Hospital 1992 TSO
- 51 Accommodation at the main entrance of a District General Hospital Supplement 1A - Miscellaneous spaces in a District General Hospital -Activity space data sheets 1993 TSO