Part D - Infection Prevention and Control

800 - INTRODUCTION

Revision 5.0, 1 June 2012

INDEX

800 INTRODUCTION

Scope

800.1.00 This document Infection Prevention and Control (Part D) has been written to assist project teams in the planning, design, construction and/or refurbishment of healthcare facilities of all types and sizes. It does not replace individual hospital and health department guidelines, or policy and procedure manuals. Many of which are detailed in *References and Further Reading* at the end of this document.

In preparing Part D, infection control policy documents from across the jurisdictions have been reviewed. All drafts of this document have been extensively reviewed and approved by stakeholders experienced in infection control.

Part D is intentionally general in scope and does not address the infection control requirements of individual healthcare facility departments (known as Health Planning Units or HPU). These details may be found in individual jurisdiction infection control policies; in *Handbook 260 – Hospital Acquired Infections - Engineering Down the Risk* (Standards Australia 2003c,), and in the relevant HPU documents in Part B.

This document should be read in conjunction with relevant occupational health and safety and environmental health policies, and relevant Australian/New Zealand Standards. Many of these are listed in *References and Further Reading*.

Also refer to the *Glossary of Terms* for explanation of many key terms used in infection control.

Contributing Factors

800.1.05 Healthcare acquired infection (HAI) is a significant problem for m modern healthcare facilities. It leads to poor outcomes for the patient (including death) and management inefficiencies. On average, infections complicate seven to ten percent of hospital admissions, with between ten and seventy percent of these infections being preventable.

Healthcare facility design and appropriate control of building processes can be an effective mechanism for moderating risks of infection. Any additional costs in building design related to measures that enhance infection prevention and control, can be evaluated against the significant costs that may result from health acquired infection (*Krieger et al*. 2002).

Within the context of the built environment, the following facets of construction and fit-outs that contribute to effective infection prevention and control are addressed in this guideline. They are:

- facilities for the isolation of infectious patients;
- air handling and ventilation;
- linen handling;
- separation of ‘clean’ and ‘dirty’ work flows;
- storage;
- waste management; and
- surface finishes.

Consultation Process

800.1.10 The documentation and implementation of infection control principles is critical to the planning, design and construction/renovation process in all areas of the facility. Building services should comply with the relevant Australian or New Zealand standards, legislative, and regulatory requirements, in addition to the relevant guidelines issued by each jurisdiction or controlling authority.

Infection control personnel have a fundamental role in signing off at each stage of the project. This will ensure that all infection control guidelines and standards are complied with, and that changes to the design have taken into account any implications for infection control or address the reasons as to why they may not been included.

Risk Management

800.1.15 Risk identification and management strategies throughout the life of the project are critical and are addressed under the *Construction and Renovation* section of this guideline.

Commencing from the design stage construction-related infection control precautions should be integrated into the design and documentation of the facility. Dust control and infection control principles developed during the pre-design stage should be continued forward into the design development stage. The pre-design team should comprehensively brief the design team and submit the findings of the survey and risk profile.

Occupational Health & Safety (OHS) legislation requires designers to identify, assess and control risks in order to provide an optimal ergonomic design and to do this in consultation with stakeholders.

Safety considerations need to address the health and safety of end users, including staff, maintenance personnel, patients and visitors.

By adopting a risk management approach, many safety and security related hazards can be eliminated or minimised at the planning stage before work even begins, reducing the likelihood of adverse incidents occurring

Refer to:

- AS/NZS ISO 31000 – Risk Management (Standards Australia 2009);
- Part C Section 790 – Safety and Security Precautions;
- Individual jurisdiction policies and OHS legislation;
- NSW Health TS-11 Engineering Services & Sustainable Development Guidelines, Sydney (NSW Health 2007); and
- NSW Health TS-7 Floor Coverings in Healthcare Buildings, V1.1, North Sydney (NSW Health & CHAA, UNSW 2009).

Sterilization and Disinfection

800.1.20 Sterilization and disinfection practices are critical to infection prevention and control but are not addressed in this guideline. Details may be found in individual jurisdiction and healthcare facility policy and procedure manuals and in the following documents:

- Australian Government Department of Health and Ageing 2004: www.health.gov.au/internet/main/publishing.nsf/Content/icg-guidelines-index.htm;
- Part B - Health Planning Unit - Sterile Supply Unit; and
- AS/NZS 4187 Cleaning, disinfecting and sterilizing reusable medical and surgical

instruments and equipment, and maintenance of associated environments in health care facilities (Standards Australia 2003a).

Pandemic Preparedness

800.1.25 Contingency plans for the bio-preparedness of each facility/service from initial planning and design phase through to completion, should be identified when considering infection control requirements. These may include fever clinic locations, isolation rooms, access, flow and logistics of an infectious disease outbreak, air conditioning supply and controls, water and waste management.

Part D - Infection Prevention and Control

820 - BUILDING ELEMENTS

Revision 5.0, 1 June 2012

INDEX

820 BUILDING ELEMENTS

Hand Hygiene

820.1.00 general; or

One of the most important infection control strategies is effective hand hygiene. Healthcare standards require health service providers to develop, implement and monitor multimodal strategies to ensure a sustained reduction of healthcare associated infections (*Krieger et al*. 2002). Principles underpinning these standards include the provision of and access to the necessary facilities to perform appropriate hand washing, or access to alcohol based hand rubs as required.

Current evidence suggests that the cost benefit associated with the prevention of HAI is financially viable and that appropriate hand hygiene may contribute to a reduction in the costs associated with the treatment of patients with infections (*Pittet et al*. 2000).

Healthcare workers and visitors should be encouraged to wash their hands before and after every patient contact, before and after handling food and after using amenities.

820.1.05 Hand hygiene is a general term that applies to hand washing; antiseptic hand wash; antiseptic hand rub; or surgical antisepsis, as defined by the World Health Organisation (WHO) guidelines on hand hygiene in health care (*World Health Organization, World Alliance for Patient Safety*, 2009).

820.1.10 Hand hygiene may be classified as:

- routine/social;
- clinical / procedural (non-surgical procedures); and

surgical.

As a minimum, facilities should comprise:

- a hand basin with temperature-controlled warm and cold water supplies (cold water only may be provided to Type C facilities, such as public amenities);
- taps appropriate to the function of the basin;
- facility-supplied liquid soap;
- single-use paper or cloth towels; and
- waste receptacle.

Descriptions of the various types of hand basins and their location are provided in the next section.

820.1.15 SOAP

All basins should be provided with liquid, neutral pH soap and all clinical (Type A) basins and scrub troughs in addition should be provided with antimicrobial liquid soap. Soap dispensers are to be the non-refillable type, and mounted on the splashback.

820.1.20 HAND DRYING

Single use cloth or paper hand towels are to be provided at all hand basins. They should be located to prevent splash contamination. Dispensers should be smooth

surfaced and easy to clean to prevent dust or soil contamination.

Cloth towel dispensers should prevent the re-use of the towel prior to laundering. They should not be located with clinical hand basins or with hand basins in food preparation, laboratory or pharmacy areas.

Paper towel rolls may be used in public amenities and beverage bays.

Hot air hand dryers are not recommended for installation in healthcare facilities.

820.1.30 ALCOHOL-BASED HAND RUBS

Where hands are not visibly soiled, alcohol-based hand rubs/gels for routine decontamination are recommended and are an accepted part of hand hygiene practice. Dispenser brackets or wall mountings should be provided and appropriately placed in all clinical areas.

However, it is not recommended that alcohol hand-rub dispensers are placed adjacent to hand basins as an alternative to hand washing. They should be accessible at or near each bed or treatment bay, or on the corridor wall.

Alcohol-based hand rub products are potentially flammable, subsequently their use, placement and bulk storage should be considered in conjunction with fire safety and occupational health and safety requirements.

820.1.35 GLOVES

A dispenser for disposable gloves, sufficient to hold all glove sizes (usually three), should be located in close proximity to all clinical hand basins (Types A and B). The dispenser should allow re-stocking without the need to touch new gloves and be located away from the splashback to prevent splash contamination.

Glove dispensers are also required in areas such as emergency treatment bays and dialysis bays where staff are identified as being at risk of a blood borne virus (BBV) exposure, whether or not a hand basin is located in the bay.

820.1.40 HAND CREAM/LOTION

A pump pack may be located at hand basins for dispensing moisturising creams or lotions. Dispensers should be non-refillable. The type of lotion used should be compatible with alcohol hand hygiene products.

820.1.45 SIGNAGE

There should be clear visible signs reminding all staff and visitors to attend to hand hygiene. The allocation of funds should be made for the supply and installation of such signs as part of the commissioning budget for new health building projects.

820.1.50 WASTE RECEPTACLES

Waste receptacles are located at each hand basin for disposal of single use towels. The bins should be of adequate size, non-touch design and easy to clean.

820.1.55 MIRRORS

Mirrors should not be installed above hand basins in food preparation areas; nurseries; clean and sterile supply areas; or other areas where aseptic control would be compromised by staff touching their hair.

Mirrors may be installed in anterooms; near personal protective equipment (PPE) bays; and near the entry to surgical scrub rooms, to assist staff to correctly don caps, masks and to check their hair.

Hand Basins - Types and Uses

820.2.00 GENERAL

The following descriptions are based on *Room Data* and *Room Layout Sheets* for *Standard Components* provided in Part B.

820.2.05 HAND BASINS

To be effective in good hand hygiene compliance, it is essential that hand basins are available, visible and accessible.

Depending on their use, hand basins may be defined as:

- clinical - large 'scrub' (Type A);
- clinical - medium (Type B);
- non-clinical - small or medium (including vanities) (Type C); and
- surgical scrub troughs.

Hand basins are required in all patient care areas and in all areas where careful attention to hygiene is essential such as kitchens, laundries, pharmacies, laboratories, etc, and in staff, patient and visitor amenities. The placement of hand basins for visitor use at the entrance to all clinical areas should be considered.

Free-flowing warm and cold water should be provided. Plugs should not be provided other than to hand basins in patient amenities (vanity basins, etc).

Splashbacks are required behind all basins. These should be large enough to contain splashes and prevent moisture seeping behind the splashback. They should be water resistant and easy to clean.

The number and location of hand basins particularly in relation to other plumbing fixtures such as showers and toilets, should be considered in the early stage of the design process in order to rationalize plumbing lines and contain building costs (Standards Australia 2003c).

Also Refer to *Part C, Section 710 - Space Standards and Dimensions - Hand wash Facilities* for advice regarding weight tolerance for basin attachment.

820.2.10 HAND BASIN DESIGN

Hand basins with the design criteria should be provided:

- have no overflow;
- have curved sides, to minimise splashing;
- are large enough to enable good hand hygiene techniques;
- are either sealed to the wall or far enough away from the wall to allow effective cleaning;
- have a waterproof splashback;
- have suitable taps; and
- have water delivered at a suitable temperature to allow hand washing under running water.

Hand basins should be made of a hard, non-scratch material (usually porcelain), and be easily cleanable. Polycarbonate or other moulded plastic materials are not suitable.

Drainage design should be easy to access internally and externally for regular cleaning of 'S' bends to remove biofilm build up.

820.2.15 TYPE A CLINICAL BASIN - LARGE (SCRUB BASIN)

The Type A clinical scrub basin is required in areas requiring clinical hand washing prior to undertaking aseptic and sterile procedures (catheter/IV insertion, dressings) and in areas where hand washing up to the elbows may be necessary.

The basin is a large wall-mounted type with hands-free taps that may be wall-mounted elbow taps, foot/knee operated or electronic sensor taps, with warm and cold water delivered by a common spout. Tap placement should allow washing up to the elbow.

Refer *Standard Components: Room Data and Room Layout Sheet - Bay Handwashing Type A.*

820.2.20 TYPE B - CLINICAL BASIN - MEDIUM

This hand basin is used in areas requiring general hand hygiene by staff and visitors, for example: outside isolation rooms; inpatient unit corridors; clean and dirty utility rooms; and food preparation areas.

The basin is a medium wall-mounted type. The taps may be either wall mounted or basin mounted with elbow or wrist hands-free operation, and warm/cold free-running water. Note that a domestic style one lever operation is considered an appropriate substitute for a wrist operated tap.

If located outside isolation rooms, this basin may additionally require a shelf for personal, protective items such as disposable masks, gowns, and goggles. Shelving should be designed to minimise dust collection e.g. wire shelving.

Refer to *Standard Components: Room Data and Room Layout Sheet - Bay Hand washing Type B and Bay Hand washing, PPE*.

820.2.25 TYPE C - NON-CLINICAL BASIN - SMALL / MEDIUM

These basins are located in areas such as staff, patient and public amenities. For basins in accessible toilets, comply with *AS 1428 Design for Access and Mobility, Part 1* (Standards Australia.2010).

This type is a small wall-mounted basin, which may be part of a vanity unit. The taps may be wall-mounted or basin-mounted. Supply warm and cold water (cold water only may be provided to Type C facilities such as public amenities).

For ease of cleaning and use, taps should be lever operated as commercially available.

Refer to *Standard Components: Room Data and Room Layout Sheet - Bay Hand washing Type C*.

820.2.30 SCRUB SINK/TROUGH

This is a long sink that can accommodate one or more staff scrubbing for a sterile procedure - usually in a surgical environment.

Refer to *Part C, Section 730 - Ergonomics* for the heights, width of space per person and type of taps. Refer *Standard Components: Room Data and Room Layout Sheets - Scrub Up / Gowning* (six, eight and ten square metres).

820.2.35 TAPS AND WATERSPOUTS

The use of spray taps is not supported. A domestic style one lever operation is considered an appropriate substitute for a wrist operated tap.

Clinical basins and scrub sinks / troughs should have waterspouts fitted with anti-splash devices. Clinical basins and scrub sinks/troughs should have sufficient space

between the waterspout and the basin/sink/trough to enable adequate washing up to the elbow.

Alignment of the waterspout is required so the water flow does not run directly into the drain aperture, thus avoiding aerosol splashback to the hands and face of the user. Position the waterspout to ensure the water flow hits at the front of the basin/sink/trough.

In healthcare facilities, comply with *AS/NZS 3718 - Water Supply –Tap ware* (Standards Australia 2005a).

For tap ware fitted to basins in 'accessible' toilets comply with *AS1428 Part 2* (Standards Australia 2010).

Hand basins - Schedule and Placement

820.3.00 SCHEDULE OF ACCOMMODATION

The following table indicates recommended basin and tap combinations for particular rooms/spaces. For rooms not listed refer to a similar area.

Room/Space	Basin Type	Remarks
Acute Inpatient Bedrooms (single & multi-bed)	A	Wall mounted, elbow, foot, knee or electric sensor taps
Birthing rooms	A	
Critical care - adult, paediatric & neonatal:- enclosed rooms/ open bays	A	
Day medical bed bays (oncology, dialysis etc)	A	
Day Procedure rooms (endoscopy etc)	A	Unless a scrub trough
Imaging Rooms - interventional	A	Unless a scrub trough
Recovery Bed Bays	A	
Patient Bays - resuscitation, acute in emergency department.	A	
Treatment / Procedure Rooms	A	
Dental Surgery	A	
Consult / Exam Rooms	B	Wall or basin mounted with elbow or wrist / hands free operation
Clean Utility Rooms	B	
Imaging Rooms - General	B	
Mortuary	B	
Pathology Laboratory	B	
Isolation anteroom / airlock / PPE Bay / Unit corridors	A or B	Type of basin may depend on function of room
Entry to or from a clinical unit (ward)	B	To encourage hand washing of visiting staff or visitors to an inpatient unit.

Clean-up room / Dirty utility room	B	
Beverage Bay / Food servery	B or C	
Formula Rooms	B	
Sterilizing Areas	B	
Cleaners Room (if provided)	B or C	
Plant Room & Maintenance Area	C	
Patient dining	C	
Staff /Public /Visitor Toilets	C	
Accessible Toilets	C	
Parent room / Baby change room	C	
Patient *en suite*	C (or vanity)	Basin and taps to comply with AS 1428.1
Operating scrub bay	Scrub trough	
Post mortem (autopsy)	Scrub trough	

820.3.05 PLACEMENT

Hand basins for staff use should be provided in the following ratios:

- ICU - one per bed, and in corridors at a ratio of one per four beds;

  SCN/NICU - not more than six metres apart and at least one per three cots. For high level care nurseries, ideally one per cot but at least one per two cots (Standard Australia 2003c);

  at entry to unit or ward to facilitate staff and visitor hand hygiene;
- emergency departments- one per four open bays, one per resuscitation bay/room;
- ambulatory care - one per four open bays, outside isolation rooms and at intervals in corridors;
- inpatient unit - one per single bedroom, minimum of one per multi-bed bay, outside isolation rooms and at intervals in corridors; and
- other patient treatment areas - generally staff should be no more than ten metres from a hand basin.

Note that a hand basin should be readily accessible from a Cleaner's room if the room itself does not contain one.

Hand Hygiene Bay

820.4.00 The term 'hand hygiene bay' refers to a hand basin that occupies its own dedicated space, not to the basin that is an integral component of a room. They are most commonly located outside single bedrooms, in corridor recesses in patient care areas, and at unit entries. It is vital that these bays are identified early in the planning and design process, and not imposed on a finished building as this will infringe on and reduce the overall functional area of adjoining spaces. The basin is usually a Type B basin.

Each bay will require soap, paper towels and a waste receptacle. Its function / location will determine the need for other items of PPE. Refer to *Part B Standard Components.*

Baths

820.5.00 In Class 9a healthcare buildings, the Building Code of Australia (BCA) requires 'one island-type plunge bath in each storey containing a ward area'. Baths should be appropriate to the clinical requirements of the facility and meet jurisdictional regulations for occupational health and safety as well as environmental health. They may be domestic style, peninsular or hip bath.

The bath surface should be non-porous and accessible for cleaning with non-slip surrounds.

Spa-style baths without jets may be installed in areas such as birthing units and palliative care units for pain management.

Spa baths (i.e. baths with jets) are generally not supported for use by most jurisdictions. If required in specialised units for pain relief e.g. palliative care units, they should only be installed with the expert advice of an environmental health officer or equivalent because of the design potential for backflow of water and bacterial contamination.

Isolation Rooms

820.6.00 INTRODUCTION

This guideline describes and identifies requirements for the isolation of patients with known or suspected infectious conditions or patients who require protection from external sources. It does not address isolation rooms for the care of patients with implanted isotopes.

Refer to *HPU 500 - Nuclear Medicine Unit* for these details

820.6.00 TYPES OF ISOLATION ROOMS

There are four types of isolation room. The types and uses are detailed in the table below.

NSW and Victoria	Other jurisdictions as per HB260 (Standards Australia 2003c)
Class S - Standard	Standard isolation - Type 4
Class P - Positive pressure	Patient protection - Type 3
Class N - Negative pressure	Respiratory isolation - Type 5
Class Q - Quarantine	Quarantine isolation - Type 5 plus airlock

820.6.10 Isolation Rooms S/Type 4 and N/Type 5 when not required for the care of infectious patients can accommodate other patients once the room is vacated and cleaned as per the infection control policy of the facility.

The risk of utilising these rooms for patients other than those with infectious conditions is that doors can be left open, compromising the door seals, and negative air pressure may be turned off, which may further compromise the integrity of the mandatory mechanics required for infection control.

820.6.12 Accommodate patients with airborne transmitted infections, such as varicella, measles, tuberculosis, in Class P/Type3 Isolation Rooms is not appropriate.

820.6.15 CLASS S / TYPE 4 - STANDARD ISOLATION ROOM

A Class S / Type 4 Isolation Room is a single room with a shower/toilet *en* suite that

is not shared. It is used for patients who require contact isolation to minimise the potential for infections being transmitted to other patients and staff.

A Type A hand basin is required within the room, and self-closing doors to help control room temperature are recommended. A hand washing/PPE Bay may be provided outside the door and may be shared with an adjoining room.

There are no specific requirements for air conditioning.

820.6.20 CLASS P / TYPE 3 - POSITIVE PRESSURE ISOLATION ROOM

A Class P / Type 3 isolation room is a single room with a shower/toilet *en* suite that is not shared. It is used to reduce the risk of airborne transmission of infection to susceptible patients with prolonged granulocytopenia, such as allogeneic bone marrow recipients.

A Type A hand basin is required within the room and self-closing doors to control room pressures are required.

The positive pressure air handling system within the room operates at a higher pressure, with respect to adjacent rooms/spaces, and supply air is high efficiency particulate air (HEPA) filtered. Air exhausted from these rooms is not infectious and therefore does not require filtration. For details of air changes etc, refer to *AS 1668.2 - Ventilation design for indoor air contaminant control Part 6.6 Protective Isolation Rooms* (Standards Australia 2005).

An enclosed anteroom is not required but sufficient and appropriate storage space should be provided outside the room for PPE, linen and supplies, and for waste disposal inside the room.

A communication system should be provided so that staff and patients can communicate with people outside the room without having to leave the room.

For further information refer to *AS 1668.2 - Section 6.6 Protective Isolation Rooms* (Standards Australia 2005).

820.6.25 CLASS N / TYPE 5 - NEGATIVE PRESSURE ISOLATION ROOM

A Class N / Type 5 isolation room is a single room with a shower/toilet *en* suite that is not shared. It is used for patients who require airborne droplet nuclei isolation (e.g. varicella, measles, pulmonary or laryngeal tuberculosis) to reduce transmission of disease via the airborne route.

A Type A hand basin within the room and a self- closing door are required, plus sufficient and appropriate storage for clinical waste.

An enclosed anteroom may or may not be provided but if no anteroom, a hand wash / PPE bay will be required outside the room with space to store gowns, gloves and masks etc.

The air handling system in Class N / Type 5 isolation rooms operates at a lower pressure with respect to adjacent areas such as the anteroom and corridor. Air in negative pressure rooms will be exhausted to the outside in accordance with *AS 1668.2*, to prevent air recirculation (Standards Australia 2005a).

The discharge points should be located as far as possible from air intakes and from where people congregate or work. If external exhaust is not possible, air should be recirculated through HEPA filters. Provision of a dedicated exhaust system to each room, separate to the building's common exhaust air system, will reduce the risk of contamination.

A communication system should be provided so that staff and patients can communicate with people outside the room without leaving the room.

Health Planning Units that require one or more Class N rooms include:

- emergency unit;
- all critical care units (adult, paediatric, neonatal);
- paediatric inpatient units; and
- infectious diseases unit.

Procedural areas such as bronchoscopy rooms and sputum induction rooms require similar negative pressure air handling systems.

The air handling systems designed for airborne infection isolation should be connected to the emergency backup power in case of power failure. These rooms have additional seals to prevent inadvertent escape of pathogens, therefore with no ventilation, isolation of airborne patients with infectious conditions becomes a patient safety risk if power outage is sustained.

820.6.30 CLASS Q / TYPE 5 - QUARANTINE ISOLATION ROOM

A Class Q / Type 5 isolation room is a single room with a dedicated *en* suite that is not shared and includes all design requirements as noted in the negative pressure rooms. In addition, the quarantine isolation room will require an anteroom designed to function as an absolute airlock (refer below).

Incorporation of a good electronic communication system (intercoms) between the isolation room and airlock will assist in eliminating or reducing unnecessary traffic into the room.

One hospital in each Australian capital city will have designated Class Q rooms providing facilities for patients with highly infectious pathogens such as haemorrhagic fevers and pneumonic plague. These patients require a further level of containment over and above the standard negative pressure isolation room.

820.6.35 COMBINED ALTERNATING PRESSURE ISOLATION ROOMS

Combined alternating pressure rooms (enabling the room to have either negative or positive pressure) are NOT recommended due to the following concerns:

- difficulty in the configuration of appropriate airflow for two fundamentally different purposes;
- risk of operator error;
- need for complex engineering; and
- the absence of failsafe mechanisms.

820.6.40 CALCULATION OF NUMBERS OF SINGLE ROOMS - GENERAL

In the redevelopment of healthcare facilities, project planning teams should use available service planning and incidence data to determine the number and type of single rooms required, and the mix of isolation rooms.

Assessment of actual demand to isolate patients should include:

- number of patient admissions with infections known or suspected to require isolation;
- the duration of isolation required;
- clustering of cases that may be influenced by seasonal and other trends; and
- type of unit where patient isolation may be necessary.

Estimates of numbers and types of isolation rooms should consider the following:

- trends in disease in the general population and the particular population served;
- demographic trends in the population served; and

- specialties of the healthcare facility, plus any projected changes in the facility's activities.

Data collected over one year or longer will provide more reliable estimates and assist in determining peak needs for diseases with marked seasonal variations.

Retrospective data (based on discharge) should be used with caution as the data may not include suspected, but unconfirmed, cases of certain infections requiring isolation, thereby causing an underestimation of requirements. For planned new facilities, data from comparable facilities serving comparable populations may be available in place of retrospective data.

820.6.45 *HB260* (Standards Australia 2003b) makes the following recommendations:

- rooms suitable for infection control purposes are Type 4 (Class S) and Type 5 (Class N) rooms;
- these rooms should be provided at a rate of at least twenty percent of all available beds in a hospital (excluding psychiatry and rehabilitation);
- these rooms can also be used as general-purpose single patient rooms where there is not a need for patient separation for infection control purposes from the general hospital community;
- all hospitals should have at least one Type 5 (respiratory isolation) room, irrespective of their size and should aim to provide between one and three percent of all available beds for respiratory isolation; and
- some hospitals will require more than these minimum numbers of rooms for infection control purposes.

The final assessment of the requirements for numbers and types of isolation rooms should be made in consultation with clinical specialists and the infection control committee.

820.6.50 CLASS N / TYPE 5 ISOLATION ROOMS

When calculating requirements for persons known or suspected of having infections that require airborne precautions, it is important to collect data on patients suspected of having tuberculosis or other transmissible diseases, or contacts that require isolation because they are in the potentially infectious period. Patients will require isolation until confirmed as uninfected by clinicians, or until the treatment or the clinical course of the infection renders the patient non-infectious.

Consider the need for one negative pressure room per 100 acute beds as a minimum. (Standards Australia 2003b).

820.6.55 CLASS P / TYPE 3 ISOLATION ROOMS:

The requirement for Class P / Type 3 isolation rooms should be determined by collecting data on local threats from pathogens such as Aspergillus, as well as evidence (from within and beyond the facility) on the ability to protect vulnerable patients. This will depend on the clinical specialties within the facility or catchment area.

820.6.60 DESIGN PRINCIPLES FOR ISOLATION ROOMS

The aim of environmental control in an isolation room is to control the airflow and therefore reduce the number of airborne infectious particles so that they are unlikely to infect another person within the environment. This is achieved by controlling the quality and quantity of intake and exhaust air, diluting infectious particles in large volumes of air, maintaining differential air pressures between adjacent areas, and designing patterns of airflow for particular clinical purposes.

The location and design of isolation rooms within a particular Health Planning Unit (department or ward) should ideally enable their isolation from the rest of the Unit. Multiple isolation rooms should be clustered and located away from the main entrance of the department.

An exception would be emergency units where it is recommended that designated isolation rooms be located near the entry to prevent spread of possible airborne infection throughout the unit.

Consideration may be given to one whole floor level, or a defined section of inpatient accommodation, being designed with separate air conditioning and exhaust to enable healthcare facilities to accommodate an infectious outbreak.

When planning isolation room accommodation consider:

- sufficient and appropriate storage space for waste receptacles inside the room;
- sufficient and appropriate storage space for PPE inside or outside the room;
- provision of an observation window with a privacy blind between double glazing (to allow staff to observe patients without entering the isolation room);
- provision of a communication system such as a phone or intercom to allow communication between staff, patients, interpreters, visitors, etc without leaving the room; and
- appropriate surface finishes (ceiling, walls, floor coverings etc.).

820.6.65 ENGINEERING REQUIREMENTS

Details of engineering requirements and services for isolation rooms are available from a number of sources:

- AS 1668.2 - The use of ventilation and air conditioning in buildings. Part 2: Ventilation design for indoor air contamination control (Standards Australia 2005a);
- HB260 - Hospital acquired infections - Engineering down the risk (Standards Australia 2003b);
- Guidelines for Environmental Infection Control in Health-Care Facilities (Center for Disease Control and Prevention 2003);
- TS-11, Engineering and Sustainable Development Guidelines (NSW Health 2007a);
- Infection Control Principles for the Management of Construction, Renovation, Repairs and Maintenance within Health Care Facilities, 2nd Edition (Loddon Mallee Region Infection Control Resource Centre, for DHS Victoria, 2005); and
- Infection Control in the Built Environment (NHS Estates 2002).

820.6.70 ANTEROOMS

Anterooms allow staff and visitors to change into, and dispose of, personal protective apparel used on entering and leaving rooms when caring for infectious patients.

Anterooms increase the effectiveness of isolation rooms by minimising the potential escape of airborne nuclei into the corridor when the door is opened.

For class N/Type S isolation rooms the pressure in the anteroom is lower than the adjacent ambient (corridor) pressure, and positive with respect to the isolation room. The pressure differential between rooms should be not less than fifteen (15) Pascals.

Anterooms are provided for Class N isolation rooms in intensive care units, emergency departments, birthing units, infectious diseases units, and for an agreed number of patient bedrooms within inpatient units accommodating patients with respiratory conditions. The need for anterooms for Class N or class P rooms in other HPUs should be considered on a case by case basis.

An anteroom should not be shared between rooms or to function as an airlock.

An anteroom will need to be large enough to incorporate additional disposal facilities e.g. sanitizer, as well as allowing bed movement into and out of the bedroom.

820.6.75 AIRLOCKS

Anterooms in Class Q rooms act as full airlocks with two interlocking doors that cannot be opened simultaneously. The airlock will need to be large enough to incorporate additional disposal facilities as well as allowing bed movement with doors interlocked.

Ensuring that the pressure in the airlock is lower than the adjacent ambient (corridor) pressure, and positive with respect to the isolation room. The pressure differential between rooms should be no less than fifteen Pascals. The door to the airlock from the corridor is to be well sealed with good quality seals on each side. The airlock should have supply air (no exhaust) with a door grille between the airlock and the isolation room.

820.6.76 FUNCTIONAL CLASSIFICATION OF ISOLATION ROOMS

Table 1: The functional classification of isolation rooms

	Class P / Type 3	Class S / Type 4	Class N / Type 5	Class Q / Type 5
Key ventilation criteria	Greater air pressure in the room than in the corridor.	No air pressure difference between room and the adjacent corridor.	Lower air pressure in the room than in the adjacent corridor or anteroom.	Lower air pressure in the room than in the adjacent airlock.
Transmissi on based rationale	To prevent transmission of pathogens from the outside environment to profoundly immuno-compromised patients.	To prevent contact or droplet transmission.	To prevent airborne transmission.	Quarantine of patients with highly transmissible pathogens to prevent airborne transmission.
Examples for use	To prevent infections such as aspergillus (fungal infection) in allogeneic bone-marrow transplant recipients.	VRE / MRSA; Gastroenteritis; Cutaneous anthrax; Hepatitis A.	Measles; Varicella, suspected or proven. Pulmonary or laryngeal tuberculosis. Suspected contact of measles, Varicella, SARS, etc.	Highly infectious pathogens such as haemorrhagic fevers, pneumonic plague.

Non Inpatient Areas

820.7.00 In patient waiting areas in non-inpatient units, including ambulatory care and community health units, may need to be able to separate patients who have been diagnosed with, or are suspected of having, a communicable disease.

Emergency, recovery, day procedure and bronchoscopy units will all require isolation rooms.

Part D - Infection Prevention and Control

860 - PHYSICAL ENVIRONMENT

Revision 5.0, 1 June 2012

INDEX

860 PHYSICAL ENVIRONMENT

Environmentally Sustainable Design

860.1.00 Sustainability applies to many areas such as:

- natural and cross-flow ventilation;
- air handling and ventilation;
- thermal integrity (insulation etc); and
- water management.

Within the context of infection prevention and control and the built environment, the most important are air-handling, water management and waste management.

Air conditioning, Ventilation and Water Systems

860.2.00 GENERAL

The control of infection risk in general and specialised areas of a healthcare facility is greatly influenced by the design and effectiveness of the air conditioning and ventilation systems. Considerable care and effort is required to ensure the appropriate results are achieved.

The management of airflows and the creation of a stable environment are essential to the control of the spread of infection. The provision of natural ventilation to patient care areas should be approached with caution.

Non air-conditioned spaces rely on natural airflows to achieve comfortable conditions. Both the natural airflows required to achieve comfortable conditions and the airflows generated by supplementary ventilation (fans) generate turbulence and unpredictable airflows. These have the potential to spread infection from person to person, therefore fans should not be installed or used.

Particular attention needs to be taken with the design of heating, ventilation and air conditioning systems to allow access as required by *AS 3666* via inspection and maintenance hatches in equipment. Whenever possible air handling plant should be mounted in plant rooms and not in ceiling spaces, to allow for ease of maintenance without disruption to patients and clinical operations (Standards Australia 2006).

Ventilation equipment should maintain the temperature, humidity and purity of the air, plus the inflow of fresh air, all within prescribed limits.

Ceiling spaces should not be used as return air plenums, but via ductwork.

All supply air and return air registers and grills should be removable for cleaning and not be installed directly above a patient bed.

Details of air-handling systems are addressed in *Guidelines for Environmental Infection Control in Health-Care Environments* (Center for Disease Control and Prevention 2003).

Also refer to *AS1668.2 - The use of ventilation and air conditioning in buildings - ventilation design for indoor air contaminant control* (Standards Australia 2005).

860.2.05 LEGIONELLA

Legionnaires' disease is a serious and potentially life threatening lung infection caused by the bacteria Legionella.

Legionella pneumophila can be transmitted through the air by inhaling fine droplets of

water contaminated with the organism, and are associated with warm water environments such as cooling towers; evaporative air conditioners; showers; warm water systems; spa pools; misting or droplet sprays and fountains. Legionella bacteria thrive at the optimum temperature of 37 degrees Celsius and die at about 46 degrees Celsius.

Air conditioners and cooling towers should comply, and be maintained in accordance, with Federal/State/Territory guidelines on cooling towers and hot and cold water services. Comply with and maintain in accordance with government regulations and Australian and New Zealand Standards.

Refer to *AS/NZS 3666* for further details (Standards Australia 2006).

860.2.10 WATER PIPES

'Dead legs' is the term given to pipes or fittings that have little or no water flow through them. These sections of a system are believed to provide the optimum conditions for Legionella to grow and multiply in the biofilm that adheres to the pipes.

Dead legs should not be designed or built into a new system. Pipe work should be designed to be as direct as possible, avoiding stretches that do not recirculate.

Consideration should be given to the removal of dead legs at every available opportunity when sites are undergoing renovations.

860.2.15 SPLIT SYSTEMS

Retro fitting of split system air conditioners is a common way of resolving local cooling problems. Care should be taken when using this approach in patient care areas. Issues to be considered include:

- routing of condensate drains;
- air flow and turbulence effects; and
- maintenance and adequacy of filters.

860.2.20 RETICULATED WATER SYSTEMS

For further information refer to the following documentation:

- *HB 260 - Sections 3.2.(l) Reticulated Water systems and 3.2.(s) Ice Making machines* (Standards Australia 2003c); and
- *AS/NZS 3666.1:2002 Air-handling and water systems of buildings-Microbial control - Design, installation and commissioning* (Standards Australia 2006).

860.2.25 THERMOSTATIC MIXING VALVES

Where thermostatic mixing valves are fitted, ensure that the control of water temperature is possible. The valves should also be easily removable for maintenance purposes.

Thermostatic valves should be fitted as near as possible to the point of use.

860.2.30 ICE-MAKING MACHINES

Ice making machines may be a source of infection due to deficient plumbing, irregular cleaning, and handling with contaminated hands.

Ice intended for human consumption should be obtained from self-dispensing 'on demand' ice machines rather than from a trough reservoir.

Ice intended for receptacles for therapeutic use or donor organs can be obtained from an ice-making machine located in a clean area: a clean utility room will not be suitable for storage of such a machine. Routine cleaning and maintenance should be

incorporated into the equipment surveillance program (Standards Australia 2003a).

Linen Handling

860.3.00 The following refers to linen handling in inpatient accommodation units and other patient care departments. The following are not applicable to the requirements for a Linen Handling Unit.

Clean linen should be stored:

- in a dedicated space/bay that is not part of any other function;
- in a clean dry location that prevents contamination by aerosols, dust, moisture and/or vermin;
- on clean shelves and, if necessary, wrapped in a protective covering;
- separately from used/soiled linen; and
- in a manner that allows stock rotation.

The risk of disease transmission from soiled linen is negligible. However used/soiled linen should be handled as little as possible and with minimal agitation to prevent gross contamination of the air and the linen handlers, and should be placed into bags at the point of generation.

Refer to *AS4146: Laundry Practice* (Standards Australia 2000).

Separation of Clean and Dirty Workflows

860.4.00 Workflows are to be separated in rooms where clean and dirty functions occur in the same space e.g. in dirty utility rooms and clean-up rooms.

HB260 notes that

> *"Clean and dirty utility rooms should be physically separated by design and function. Within the rooms, separate areas should be provided for incoming and outgoing equipment and waste including dirty linen and clinical waste. A sink for instrument cleaning should be provided. The size of the sink should be appropriate for the size of the instruments to be cleaned. Hand washing basins may be fitted in clean and dirty utility rooms." (Standards Australia 2003c).*

Work should flow from clean to contaminated areas, with care taken to avoid contaminated equipment re-entering clean work areas. Further information about workflow is given in *AS/NZS 4187* (Standards Australia 2003a).

Ideally, there should be separate loading docks or at least separate entries for food supplies, general clean supplies and linen, and for removal of waste and soiled linen.

Storage

860.5.00 Sufficient storage space should be provided for: medical equipment; medical and administrative supplies; linen, medications and wastes, including dirty linen; general and clinical waste; and spare beds.

All storage conditions should comply with any relevant Standards. Shelving materials used in storage areas are to be waterproof, impervious and easy to clean. *HB260* (Standards Australia 2003b).

860.5.05 STERILE SUPPLIES

Sterile supplies should be handled with care and stored in a manner that maintains

the integrity of packs and prevents contamination from any source (dust, vermin, sunlight, water, condensation etc). Ensure temperature and light control to storage areas, and ensure that they are easily cleaned. Store supplies off the floor, with the lowest shelf at least 300 millimetres above floor level so as to avoid mechanical damage during cleaning. Refer to *Part B HPU 190 – Sterile Services Unit* and to *AS/NZS 4187* (Standards Australia 2003a).

Waste Management

860.6.05 WASTE CATEGORIES

Waste can generally be categorised as follows:

- clinical waste;
- chemical waste;
- radioactive waste;
- cytotoxic wastes
- recyclables;
- organic waste;
- liquid waste; and
- general waste.

Each requires its own disposal method and, very often, colour-coded receptacles.

Waste requirements should be assessed early in the project. In clinical areas waste holding needs should be carefully identified and ensure that appropriate space is allocated is made for waste bins and other containers. Additional space may be required in dirty utility rooms for temporary holding of in-use waste bins (usually mobile) and disposal rooms for holding full containers (including sharps bins) awaiting collection by environmental services staff. Central waste holding and loading docks are not addressed in this document. Specifications for these may be found in jurisdictional policies and guidelines.

All sharps bins should be positioned out of the reach of children at a height that enables safe disposal by all members of staff. It should be noted that health services are dependent on the type and style of sharps containers as a result of their supplier contract arrangements. If the contract changes, the method of fixture may also change and that may cause damage to walls. Many companies provide holders, stands etc, for sharps.

Relevant Australian and New Zealand Standards include:

- *AS/NZS 3825:1998 Procedures and devices for the removal and disposal of scalpel blades from scalpel handles* (Standards Australia 1998a); and
- *AS/NZS 3816 Management of clinical and related wastes* (Standards Australia 1998).

Part D - Infection Prevention and Control

880 - SURFACES AND FINISHES

Revision 5.0, 1 June 2012

INDEX

880 SURFACES AND FINISHES

General

880.1.00 The nature and type of surfaces and finishes used in healthcare facilities are integral to the management of infection control risks.

This topic is also covered in more detail in *Part C Section 710 - Space Standards and Dimensions - Finishes*.

880.1.05 In healthcare facilities, all surfaces in patient care areas should be smooth and impervious, and easily cleaned.

Avoid unnecessary horizontal, textured, moisture-retaining surfaces, or inaccessible areas where moisture or soil can accumulate.

880.1.10 All fixtures and fittings should be designed to allow easy cleaning and to discourage the accumulation of dust. Blinds contained in double glazing, curtains and roller-type blinds made of fabric that can be removed and laundered are preferable to louvered and vertical blinds that are extremely difficult to clean, and hence not practical

Bed screens should be washable, easy to remove and to hang, and when pulled around the bed, ensure there is room for staff to carry out procedures without brushing against the screen. They should be secured when not in use.

880.1.15 Where there is likely to be direct contact with patients, or with blood or body fluids, floors and walls should be surfaced with smooth, impermeable seamless materials such as vinyl. In equipment processing areas work surfaces should be non-porous, smooth and easily cleaned.

Ceilings

880.2.00 Finish all exposed ceilings and ceiling structures in areas occupied by patients or staff, and in food preparation or food storage areas, to ensure that these can be readily cleaned with equipment used routinely in daily housekeeping activities.

In food preparation and other areas where dust fallout would present a potential problem, provide a finished set plasterboard ceiling that covers all conduits, piping, duct work and open construction systems.

880.2.05 Except in areas required to support ceiling mounted equipment such as radiology rooms and inpatient units with ceiling hoists provided, set plasterboard ceilings from wall to wall without fissures should be provided. Note that open joints or crevices may retain or permit passage of dirt particles in operating rooms; birthing rooms; positive and negative pressure isolation rooms; nurseries; and sterile processing rooms.

Ensure that light fittings are recessed, flush fitting and designed to prevent dust build up on the surfaces of the fitting, and to prevent ingress of dust.

880.2.10 Acoustic and/or lay-in ceilings where particulate matter may interfere with hygienic environmental control should not be used, for example in the acute ward setting.

Floors

880.3.00 Ensure that floor coverings are easy to repair and easy to clean. Treatment areas should not be carpeted.

In areas subject to frequent wet cleaning, do not use floor materials which may be physically affected by germicidal cleaning agents.

880.3.05 In areas used for food preparation or assembly, ensure that floors are non-slip, water resistant and greaseproof to comply with individual jurisdiction, or State and Territory Food Hygiene Regulations. Floor surfaces, including joints in tiles in these areas should be resistant to food acids (epoxy grout).

Floors in sterilizing services areas should be non-slip and have smooth surfaces for cleaning. Refer to *AS4187* (Standards Australia 2003a).

880.3.10 For further information refer to:

Part C - Section 710, and to TS-7 - Floor Coverings in Healthcare Buildings (NSW Health & CHAA 2008).

Gaps

880.4.00 A joint is any point where two planes or surfaces meet e.g. wall and ceiling; wall and floor; or two sections of a bench top. A gap is defined as a space where two surfaces do not meet resulting in a space or opening that can harbour dust, germs, mould or vermin.

Good design and detailing of joints are important to infection control. Gaps between surfaces should be avoided or properly sealed. In particular gaps in the following areas should be prevented:

- between skirting and floor;
- between benches and walls;
- between cupboards and floor or wall; and
- between fixtures attached to floors and walls.

880.4.05 Ensure that floor and wall construction, finishes and trims in dietary and food preparation areas; sterile stock areas; and pharmacies, are free of gaps/spaces that can harbour rodents and insects. Comply with the relevant public health regulations.

880.4.10 Tightly seal floor and wall penetrations by pipes, ducts and conduits, to minimise entry by rodents and insects. Joints of structural elements should be sealed similarly.

Skirtings

880.5.00 Skirtings, floor and wall joins should be made integral with the floor, tightly sealed against the wall, and constructed without voids in all patient care areas; in kitchens; clean and dirty utility rooms; sterilising areas; and other areas subject to frequent wet cleaning.

880.5.05 Other than special treatments included as feature face work in public or staff recreation areas, wall finishes should be smooth and easily cleaned, and where in the immediate vicinity of plumbing fixtures, water-resistant.

Part D - Infection Prevention and Control

900 - CONSTRUCTION AND RENOVATION

Revision 5.0, 1 June 2012

INDEX

900 CONSTRUCTION AND RENOVATION

Risk Management

900.1.00 RISK MANAGEMENT STRATEGY

A formal approach to risk management should be part of all building construction and renovation activities. There is a liability on the part of the proprietor to ensure that all steps have been taken to minimize the risk of transmission of infection during such activities (WA Health 2007).

A process for assessing risk and adopting appropriate precautions is provided below. A more detailed review of risk is beyond the scope of this document, but reference to the following documents will provide the framework for a relevant risk management strategy:

- *AS/NZS 4360 – Risk Management* (Standards Australia 2004);
- *Infection Control Principles for the Management of Construction - Renovation, Repairs and Maintenance within Health Care Facilities*, 2nd Edition (Loddon Mallee Region Infection Control Resource Centre for DHS Victoria 2005);
- *HB 228 – Guidelines for Managing Risk in the Healthcare Sector* (Standards Australia 2001); and
- *HB260 – Hospital Acquired Infections - Engineering down the risk* (Standards Australia 2003c).

900.1.05 RISK IDENTIFICATION

Building, renovation and maintenance activities within a healthcare facility impose risks upon the incumbent population unlike any other building site.

In occupied facilities, building practices therefore require a range of appropriate precautions. Identification of the population at risk; knowledge of the transmission route of a likely pathogen; and location of the at-risk population in relation to the construction, all need to be taken into account in the planning stages.

The risk identification strategy should address as a minimum:

- the extent of construction work;
- the identification of the patient population at risk;
- the location of the patient population in relation to the site and construction;
- ventilation system types and potential impact;
- traffic and supply routes;
- determination of air monitoring requirements, methodology and frequency;
- air quality samples taken to establish a baseline; and
- the identification of possible contaminants and their locations, as contaminants may be present in ceiling dust; service shafts (especially in the presence of damp); sprayed on fire retardants; and bird droppings.

900.1.10 Infection control measures to be considered during construction and renovation include:

- at the time of site induction for building workers, infection control should be presented as a major component of the OHS induction. This induction process should be documented and signed off by each participating worker;
- worker compliance with procedures to be monitored, and the results of this monitoring fed back to the workers routinely through the builder. A systematic approach should be in place to ensure the management of major breaches;

- adequate inspections by the nominated representatives should take place during the construction of the barriers. These inspections should be monitored and reported on; and
- all inspections should be documented, including a non-conformance system for defaults, complete with a corrective and preventative action loop.

Handover

900.2.00 Prior to handover it is the responsibility of the commissioning team to ensure the area complies with standards for occupation. As a minimum the following should be checked:

- thorough cleaning and decontamination of all surfaces including walls, ceilings, windows, ventilation systems, service cavities and ceiling spaces;
- the integrity of all surfaces and joints;
- the placement of hand basins, storage facilities etc against plans;
- conduct air sampling and particle counts, and implement a program of regular air sampling in high-risk areas, allowing time for culturing, results and repeat cleaning and testing prior to occupation e.g. operating theatre. Dot testing may take a period of a week to complete and receive microbiology air testing result in order to support commencement of theatre procedures;
- on completion, recertify HEPA filters and laminar/clean flow systems where installed.

Refer also to *Part F - Project Implementation* (NSW-specific).

900.2.05 AIR SAMPLING

Air sampling should be part of the risk management program and be implemented during commissioning. Cumulative data should be used to establish indoor and outdoor background levels of filamentous fungi for a particular site. This will enable establishment of risk profiles for particular locations in and around the healthcare facility.

It is important to consult with a microbiologist experienced in environmental sampling to identify what outcomes are required of the sampling. Equally important it is necessary to have an approximate idea of the expected number of fungi that will be obtained: this will determine the appropriate sampling system.

For further details, refer to: *Infection Control Principles for the Management of Construction - Renovation, Repairs and Maintenance within Health Care Facilities,* 2nd Edition (Loddon Mallee Region Infection Control Resource Centre for DHS Victoria 2005).

Verification

900.3.00 All infection control measures described in this section are required to be verified by inspection.

A multidisciplinary team should be established comprising, but not limited to; infection control experts (medical and nursing); hospital engineers; OHS staff; environmental health staff; client representatives; and project staff (architect, facility planner, consulting engineers, project manager etc). These resources should be involved and consulted throughout the stages of planning, design, construction and commissioning.

Construction Risk Assessment and Action Plan

900.4.00 The following information has been extrapolated from a guidelines document originally developed by the John Hopkins Hospital 2003 and revised in 2009.

http://www.hopkinsmedicine.org/heic/policies/Policies_PDF/IFC005/IFC005.pdf

900.4.05 The Construction Risk Assessment and Action Plan comprises four key steps:

- identification of the construction activity type;
- selecting the appropriate infection control group;
- determining the construction classification class; and
- implementation of the infection control construction guidelines.

900.4.10 **STEP 1 - IDENTIFY THE CONSTRUCTION ACTIVITY TYPE**

The identification of the Construction Activity Type (*Table 1*) is defined by:

- the amount of dust generated; and
- the duration of the involvement of the heating ventilation and air conditioning systems (HVAC).

Table 1: Definitions of the Construction Activity Types

Type A **Inspections and general upkeep activities**	**Type B** **Small scale, short duration activities, which create minimal dust**	**Type C** **Any work that generates a moderate to high level of dust**	**Type D** **Major demolition and construction projects**
Includes but not limited to : removal of ceiling tiles for visual inspection (limited to 1 tile per 5 m2); painting (but not sanding); installation of wall covering; electrical trim work; minor plumbing; any activities that do not generate dust or require cutting into walls or access to ceiling other than for visual inspection.	Includes, but is not limited to, installation of telephone and computer cabling, access to chase spaces, cutting into walls or ceiling where dust migration can be controlled.	Includes, but is not limited to, demolition or removal of built-in building components or assemblies, sanding of wall for painting or wall covering, removal of floor covering/wallpaper, ceiling tiles and casework, new wall construction, minor ductwork or electrical work above ceiling, major cabling activities.	Includes, but is not limited to heavy demolition, removal of a complete ceiling system, and new construction.

900.4.15 STEP 2 - SELECT THE INFECTION CONTROL RISK GROUPS

The Infection Control Risk Groups as defined in the table below are based on the project location and occupancy. Liaise with the local infection prevention and control unit if any type of location is not detailed in the following guideline.

Where possible, as in outpatient facilities and day treatment centres, work should be conducted after patient care hours since these areas have specific patient attendance times.

Table 2: Infection Control Risk Groups

Group 1 - Low	Group 2 - Medium	Group 3 - Medium/High	Group 4 - Highest
Office areas	Patient care and other areas not listed under Groups 3 or 4	Emergency Rooms	Oncology Units
Non-patient/low risk areas not listed elsewhere	Laundry	Medical Imaging – general	Radiation Therapy
	Cafeteria	Recovery Rooms	Oncology Clinical Areas
	Dietary	Delivery Rooms	Chemotherapy
	Materials management	High Dependency Unit	Transplant
	PT/OT/Speech	Newborn nurseries	Pharmacy admixture/clean rooms
	Admissions/Discharge	Paediatrics (except Paediatric ICU)	Operating Rooms
	MRI	Microbiology labs	Sterile Supply Units
	Nuclear Medicine	Virology Labs	Cardiac Catheterisation
	Echocardiography	Long stay-sub-acute Units	Angiography rooms
	Laboratories not specified under Group 3	Pharmacy	Outpatient invasive procedure rooms
	Public corridors used by patients and to transport linen & supplies	Endoscopy	Anaesthetic and Pump Rooms
		Bronchoscopy	All intensive Care Units – adult, paediatric, neonatal
		Dialysis	

900.4.20 STEP 3 - DETERMINE THE CONSTRUCTION CLASSIFICATION CLASS

Using the Construction Activity Type and the Infection Control Risk Group selected, apply the matrix below to determine the Construction Classification Class.

The Construction Classification Class (see *Table 3*) determines the procedures to be followed during construction and renovation projects.

Table 3: The Construction Classification Matrix.

Construction Activity Risk Level	Type A	Type B	Type C	Type D
Group 1	Class I	Class II	Class II	Class III/IV
Group 2	Class I	Class II	Class III	Class IV
Group 3	Class I	Class III	Class III/IV	Class IV
Group 4	Class III	Class III/IV	Class III/IV	Class IV

900.4.25 STEP 4 - IMPLEMENT THE INFECTION CONTROL CONSTRUCTION GUIDELINES

Infection Control Construction Guidelines (as detailed in *Table 4*) outline procedures to control the release of airborne contaminants, resulting from construction demolition or renovation activities.

Implement the appropriate Infection Control Construction Guidelines based on the Construction Activity Class identified through using the matrix as identified in *Table 3*.

An Infection Control Checklist can be found in *1020 Infection Control Checklist*.

Table 4: The Infection Control Construction Guidelines

Class	Guideline
Class I	Execute work by methods to minimise raising dust from construction operations. Replace any ceiling tile displaced for visual inspection as soon as possible.
Class II	Provide active means to prevent air-borne dust from dispersing into atmosphere. Seal unused doors with duct tape. Contain construction waste before transport in tightly covered containers. Wet mop and/or vacuum with HEPA filtered vacuum. Place dust-mat at entrance and exit of work area and replace or clean when no longer effective. Isolate HVAC system in areas where work is being performed. Wipe casework and horizontal surfaces at completion of project.
Class III	Isolate HVAC system in area where work is being done to prevent contamination of the duct system. Complete all construction barriers before construction begins. Maintain negative air pressure within work site utilising HEPA filtered ventilation units or other methods of maintaining negative pressure. In each jurisdiction, the relevant public safety officers will monitor air pressure. Do not remove barriers from work area until complete project is thoroughly cleaned. Wet mop or vacuum twice per eight (8) hour period of construction activity or as required in order to minimise tracking. Remove barrier materials carefully to minimise spreading of dirt and debris associated

	with construction. Barrier material should be wet wiped, HEPA vacuumed or water misted prior to removal. Contain construction waste before transport in tightly covered containers. Place dust-mat at entrance and exit of work area and replace or clean when no longer effective. Wipe casework and horizontal surfaces at completion of project.
Class IV	Isolate HVAC system in area where work is being done to prevent contamination of duct system. Complete all construction barriers before construction begins. Maintain negative air pressure within work site utilising HEPA filtered ventilation units or other methods of maintaining negative pressure. In each jurisdiction, the relevant public safety officers will monitor air pressure. Seal holes, pipes, conduits, and punctures to prevent dust migration. Construct Anteroom and require all personnel to pass through the room. Wet mop or HEPA vacuum the Anteroom daily. During demolition, dust producing work, or work in the ceiling, disposable shoes and coveralls are to be worn and removed in the Anteroom when leaving work area. Do not remove barriers from work area until completed project is thoroughly cleaned. Remove barrier materials carefully to minimise spreading of dirt and debris associated with construction. Barrier material should be wet wiped, HEPA vacuumed or water misted prior to removal. Contain construction waste before transport in tightly covered containers. Place dust-mat at entrance and exit of work area and replace or clean when no longer effective. Keep work brooms clean and remove debris daily Wet mop hard surface areas at completion of project, HEPA vacuum carpeted surfaces at completion of project. Wipe casework and horizontal surfaces at completion of project.

Part D - Infection Prevention and Control

920 - GLOSSARY OF TERMS

Revision 5.0, 1 June 2012

INDEX

920 GLOSSARY OF TERMS

Definitions

920.1.00 For the benefit of the project team, the following commonly used terms are described below:

- healthcare (or hospital) acquired infection (HAI): any infections that occur during or after a health care encounter that was not present, or incubating, on admission or related to a previous heath care encounter (*Krieger et al*. 2002);
- MRSA: Methicillin resistant Staphylococcus aureus;
- cohorting: accommodation of patients with the same infectious condition together in the same area; and
- immunosuppressed / compromised: suppression of the normal immune system response potentially resulting in a person becoming more susceptible to infection.

Modes of Transmission

920.2.00 Transmission of microorganisms with the potential to cause infection requires the presence of three elements: a susceptible person (host); an infectious microorganism (agent); and an environment that allows interaction between the person and the infectious agent.

Infection control involves the identification of transmissible infectious agents; the identification of susceptible hosts, and intervention to minimise the spread of these agents.

There are five modes of transmission (*Siegel et al*. 2007):

- contact transmission:
    - direct contact - physical transfer from infected person to susceptible host; and
    - indirect contact - transfer from a contaminated object to susceptible host;
- droplet transmission: transfer of the infectious agent over a short distance contained in particles of moisture such as coughing, sneezing;
- airborne transmission: dissemination of infected dust particles or aerosols. May be widely dispersed by air currents and may become inhaled by a susceptible host within the same room or over a longer distance from the source, depending on environmental factors; therefore, special air handling and ventilation are required to prevent airborne transmission;
- common vehicle transmission: transfer of infectious agents in contaminated food, water, drugs, blood etc.; and
- vector transmission (flies, cockroaches, pigeons, mosquitoes, rodents etc) Transfer either directly (bite) or indirectly by contamination of inanimate objects. May be of particular relevance in hot and humid climates.

Immunocompromised Patients

920.3.00 Highly immunocompromised patients, such as those receiving allogenic bone marrow transplants have the greatest risk of infection from airborne or waterborne microorganisms such as Aspergillus. Specific engineering parameters may be required. Refer to:

- *Guidelines for Environmental Infection Control in Health-Care Facilities*, (Center

for Disease Control and Prevention 2003); and

- *HB 260 - Hospital acquired infections - Engineering down the risk.* (Standards Australia 2003c).

Standard and Additional Precautions

920.4.00 Practices such as careful aseptic techniques and the observance of standard and additional precautions are vital. Standard precautions include:

- personal hygiene;
- effective hand hygiene before and after patient contact;
- the use of PPE and barriers that may include gloves, gowns, plastic aprons, masks, eye shields or goggles, and waterproof dressings if required;
- appropriate handling and disposal of sharps and other contaminated or infectious waste; and
- the use of aseptic techniques.

Additional standard precautions are designed for patients known or suspected to be infected with pathogens for which additional precautions beyond standard precautions are needed to interrupt transmission in healthcare settings. Additional precautions are also designed to protect immuno-compromised patients from contracting HAIs whilst in protective isolation.

Personal Protective Equipment (PPE)

920.5.00 In the context of infection control PPE refers to a variety of infection control barriers and respirators used alone, or in combination, to protect mucous membranes, skin, and clothing from contact with recognised and unrecognised sources of infectious agents in healthcare settings. The type of personal protective equipment used will vary based on the level of precautions required.

Personal protective equipment includes:

- gowns;
- plastic aprons;
- masks and respirators'
- gloves;
- eye protection;
- head coverings; and
- overshoes.

Personal protective equipment bays should be provided outside all isolation rooms - including Class S. A PPE bay may be shared between two or more rooms.

See *Standard Components: Room Data Sheets and Room Layout Sheets* for more detail.

Part D - Infection Prevention and Control

1000 - REFERENCES AND FURTHER READING

Revision 5.0, 1 June 2012

INDEX

1000 REFERENCES AND FURTHER READING

General

1000.1.00

- NSW Health 2005a, Policy Directive 2005_132: Waste Management Guidelines for Health Care Facilities, NSW Department of Health;
- NSW Health 2007a, Technical Series TS-11: Engineering Services & Sustainable Development Guidelines, NSW Department of Health;
- NSW Health & CHAA, UNSW 2008, TS-7: Floor Coverings in Healthcare Buildings, NSW Health Department;
- Standards Australia 1992, AS 4031/Amdt 1-1996 Non-reusable containers for the collection of sharp medical items used in health care areas, SAI Global;
- Standards Australia 1997, AS/NZS 4261/Amdt 1-1997 Reusable containers for the collection of sharp items used in human and animal medical applications, SAI Global;
- Standards Australia 1998a, AS 3816 Management of clinical and related wastes, SAI Global;
- Standards Australia 1998b AS/NZS 3825 Procedures and devices for the removal and disposal of scalpel blades from scalpel handles, SAI Global;
- Standards Australia 2000, AS/NZS 4146:2000 Laundry Practice, SAI Global;
- Standards Australia 2001, Handbook 228:2001 Guidelines for managing risk in healthcare, SAI Global;
- Standards Australia 2003a, AS 4187: Cleaning, disinfecting and sterilizing reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities, SAI Global;
- Standards Australia 2003a, Handbook 260: Hospital acquired infections - Engineering down the risk, SAI Global;
- Standards Australia 2005a, AS 1668: The use of ventilation and air conditioning in buildings, SAI Global;;
- Standards Australia 2005b, AS 3718: Water Supply – Tap ware, SAI Global;
- Standards Australia 2009, AS/NZS ISO 31000: Risk Management, DAI Global; and
- Standards Australia 2010, AS 1328 (set): Design for Access and Mobility, SAI Global.

Infection Control

1000.2.00

- Australian Government Department of Health and Ageing 2004, Infection Control Guidelines for the prevention of transmission of infectious diseases in the health care setting, Biotext;
- Center for Disease Control and Prevention 2003, Guideline for Environmental Infection Control in Health-Care Facilities, Center for Disease Control and Prevention;
- Department of Human Services 1999, Guidelines for the Classification and Design of Isolation Rooms in Health Care Facilities, State of Victoria;
- Loddon Mallee Region Infection Control Resource Centre for DHS Victoria 2005, Infection Control Principles for the Management of Construction, Renovation, Repairs and Maintenance within Health Care Facilities (2nd Edition), Bendigo Health Care Group;
- National Health and Medical Research Council (NHMRC) 2010, Australian

Guidelines for the Prevention and Control of Infection in Healthcare;

- Consultation Draft, Australian Government;
- NHS Estates 2002, Infection control in the built environment - design and planning, NHS Estates;
- NSW Health 2007b, PD 2007_036: Infection Control Policy, Revision May 2010, NSW Health;
- NSW Health 2007c, PD 2007_084: Infection Control Policy: Prevention & Management of Multi-Resistant Organisms, NSW Health;
- Queensland Health Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP), 2001, updated 2008, Infection Control Guidelines, Queensland Government. Accessible from: http://www.health.qld.gov.au/chrisp/ic_guidelines/contents.asp;
- SA Health 2007, Infection Control Guidelines, S A Health; and
- WA Health 2007, Health Facility Guidelines for Infection Control, Government of Western Australia.

Legionella and Legionnaires' Disease

1000.3.00 AUSTRALIAN STANDARDS

- Standards Australia 1995, Handbook 32: Control of microbial growth in air-handling and water systems of buildings, SAI Global, p. 51.;
- Standards Australia 2006, AS 3666: Air-handling and water systems of buildings - Microbial control, SAI Global:
    - Part1: Design, Installation and Commissioning;
    - Part 2: Operations and Maintenance; and
    - Part 3: Performance Based Maintenance of cooling water systems.

NEW SOUTH WALES

NSW users refer to the following website for further information regarding Legionella and warm/hot water systems:

www.health.nsw.gov.au/public-ealth/ehb/general/microbial/microbial.html

- NSW Health 2004, Code of Practice for the Control of Legionnaires' Disease, NSW Department of Health;
- NSW Health 2005b, PD 2005_197: Microbial Control, NSW Department of Health;
- NSW Health 2005, PD 2005_344: Water - Requirements for the Provision of Cold and Heated Water, NSW Department of Health;
- State of New South Wales 1991, Public Health Act 1991: An Act relating to the maintenance of proper standards of health for the public, and for other purposes, Part 4, Microbial Control, State of NSW: www.austlii.edu.au/au/legis/nsw/consol_act/pha1991126; and
- State of New South Wales 2003, Public Health (Microbial Control) Regulation 2000, State of New South Wales: www.austlii.edu.au/au/legis/nsw/consol_reg/phcr2000380/.

SOUTH AUSTRALIA

- SA Department of Health 2006, Standard for the control of legionella in manufactured water systems in South Australia : draft. South Australian Department of Health; and
- State of South Australia 2008, Public and Environmental Health (Legionella)

Regulations 2008, State of South Australia, www.legislation.sa.gov.au

VICTORIA

- DHS Victoria 2007, Controlling Legionella in warm water systems, 2007: A guide for Victorian hospitals and aged care facilities, Department of Human Services, Victoria.

Hand Hygiene

1000.4.00

- Australian Commission on Quality and Safety in Health Care, Hand Hygiene Australia
  http://www.hha.org.au

- Center for Disease Control and Prevention 2002, Guideline for Hand Hygiene in Health-Care Settings, Center for Disease Control and Prevention;
- Garling P 2008, Final Report of the Special Commission of Enquiry - Acute Care Services in NSW Public Hospitals, Volume 2, State of NSW;
- Health Quality and Complaints Commission Queensland Government 2008, Hand Hygiene, Standards Version 1.1, Queensland Government;
- Queensland Government, Centre for Healtcare 2007, Policy for Hand Hygiene - Clean hands are life savers, Queensland Health;
- Wilcox, MH & Wigglesworth, NA 2007, R&D Project B(02)16: What is the size and nature of the current need for single room isolation in hospital, and how does success or failure to isolate patients affect the control of methicillin-resistant Staphylococcus aureus (MRSA)?
- World Health Organization, World Alliance for Patient Safety, 2009, WHO guidelines on hand hygiene in health care, World Health Organization. http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf

Other References

1000.5.00

Ann Noble Architects 2003, NHS Research and Development Project B(01)06: Reduction of Hospital Acquired Infections by Design, London;

Chang, CC, et al. 2008, Preventing invasive fungal infection during hospital building works. Internal Medicine Journal, Vol 38 no. 6b, pp 538-41;

Gangneux, J-P, et al. 2006, Bacterial and fungal counts in hospital air: Comparative yields for 4 sieve impactor air samplers with 2 culture media. Infection control & hospital epidemiology vol 27, no. 12, pp.1405-8;

Kao, PH & Yang, RJ 2006, Virus diffusion in isolation rooms, Journal of Hospital Infection, vol.62, no.3, pp.338-45;

Krieger, JK, et al. 2002, The Seattle-King County healthy homes project: implementation of a comprehensive approach to improving indoor environmental quality for low-income children with asthma, Environ Health Perspect, vol.110 Suppl 2, pp. 311-22;

Makison, J. & Swan, J. 2005, R&D Project B(03)02: The effect of humidity on the survival of MRSA on hard surfaces, Department of Health, UK.;

Ozanne-Smith, J, et al. 2008, The relationship between slips, trips and falls and the design and construction of buildings, Australian Building Codes Board;

Pellowe, C et al. 2005, The epic project: updating the evidence base for national evidence-based guidelines for preventing healthcare-associated infections in NHS

hospitals in England. A report with recommendations, Journal of Hospital Infection, vol.59: no.4, 373-4;

Pittet, D, et al. 2000, Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme, Lancet, vol.356, no.9238, pp. 1307-12;

Siegel, JD, et al. 2007, Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in healthcare Settings, Center for disease control and Prevention;

Tang, JW, et al. 2005, Door-opening motion can potentially lead to a transient breakdown in negative-pressure isolation conditions: the importance of vorticity and buoyancy airflows, Journal of Hospital Infection, vol.61, no.4, pp.283-6; and

Walker, JT, et al. 2007, Hospital and community acquired infection and the built environment - design and testing of infection control rooms, Journal of Hospital Infection, 65, Supplement 2, pp43-9.

Part D - Infection Prevention and Control

1020 - INFECTION CONTROL CHECKLIST

Revision 5.0, 1 June 2012

Name of HPU_____(print and complete one per HPU)

Agreed Role Delineation Level_____

	Item	Yes	No
1.0	**Hand washing Facilities:**		
1.1	are the hand basin types specified appropriate for the room?		
1.2	are sufficient numbers of hand basins provided?		
2.0	**Isolation Rooms:**		
2.1	are sufficient numbers of isolation rooms of the appropriate type provided?		
2.2	do the isolation rooms meet the minimum requirements for the class specified?		
3.0	**Physical Environment:**		
3.1	do operating areas sufficiently separate clean and contaminated areas?		
3.2	do cleaning and clean-up areas sufficiently separate clean and contaminated areas?		
3.3	are staff eating and recreational areas sufficiently separate from work areas and patient treatment areas?		
4.0	**Surfaces and Finishes:**		
4.1	are the following finishes appropriate for the room usage?:		
	floor;		
	skirtings;		
	walls;		
	ceilings		

Part D - Infection Prevention and Control

1020 - INFECTION CONTROL CHECKLIST

Revision 1.0, 1 June 2012

I

Name of HPU_____(print and complete one per HPU)

Agreed Role Delineation Level_____

	Item	Yes	No
1.0	Hand washing Facilities:		
1.1	are the hand basin types specified appropriate for the room?		
1.2	are sufficient numbers of hand basins provided?		
2.0	Isolation Rooms:		
2.1	are sufficient numbers of isolation rooms of the appropriate type provided?		
2.2	do the isolation rooms meet the minimum requirements for the class specified?		
3.0	Physical Environment:		
3.1	do operating areas sufficiently separate clean and contaminated areas?		
3.2	do cleaning and clean-up areas sufficiently separate clean and contaminated areas?		
3.3	are staff eating and recreational areas sufficiently separate from work areas and patient treatment areas?		
4.0	Surfaces and Finishes:		
4.1	are the following finishes appropriate for the room usage?: floor; skirtings; walls; and ceilings		