

## SECTION 2: HEALTH AND SAFETY CONTENTS

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## 2.1 INTRODUCTION

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The University is committed to providing a safe and healthy working and learning environment. These Design Standards support that commitment by ensuring that health and safety requirements are included in the design of buildings, structures and landscape works.

This section details the health and safety requirements during the design phase of new works and refurbishment projects.

Project architects and consultants, in designing the building and the contractor during the construction process, shall adhere to:

- all relevant Acts, Regulations, Compliance Codes and Standards (listed throughout this Design Standard); and
- other relevant sections of the University's Design Standards and documents.

Consultants must be aware of their obligations to carry out risk assessments during the design phase for work areas as per Occupational Health and Safety Act 2004.

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## 2.2 INTEGRATING DESIGN AND RISK MANAGEMENT – SAFETY IN DESIGN

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### 2.2.1 *Buildings and Structures Requiring Reviews*

Safety in design (SiD) reviews shall be completed for works associated with the following:

- buildings/structures to be used as workplaces (ongoing or occasional);
- parts of the building/structure including fixtures integral to its use as a workplace;
- temporary structures; and
- roads, footpaths and landscape areas.

For any design where it can be reasonably expected that people may need to work within, on, or around the building or structure, either as an end-user and/or maintainer of the building or structure, then a SiD review shall be completed.

### 2.2.2 *Design Stages for Review*

SiD reviews (Figure 1) shall be carried out in line with the [Model Code of Practice: Safe design of structures](#) (Safe Work Australia). They shall be completed as early in the design process as practicable, during design phase and throughout the life of the project. This can be outlined as follows:

- pre-design phase (siting, feasibility study);
- conceptual and schematic design phase;
- design development phase;
- construction documentation; and
- construction, refurbishment or modification.

It is recommended that at each SiD review a representative from each of the following project stakeholder groups is in attendance, or is given the opportunity to contribute prior to the review.

Representatives include but are not limited to:

- designers (e.g. building, industrial, landscape, interior);
- architects;
- health and safety consultants and experts;
- people who will be utilising the building/structure as a workplace;
- people who will be constructing the building/structure;
- people who will be maintaining/managing the building/structure and associated facilities.

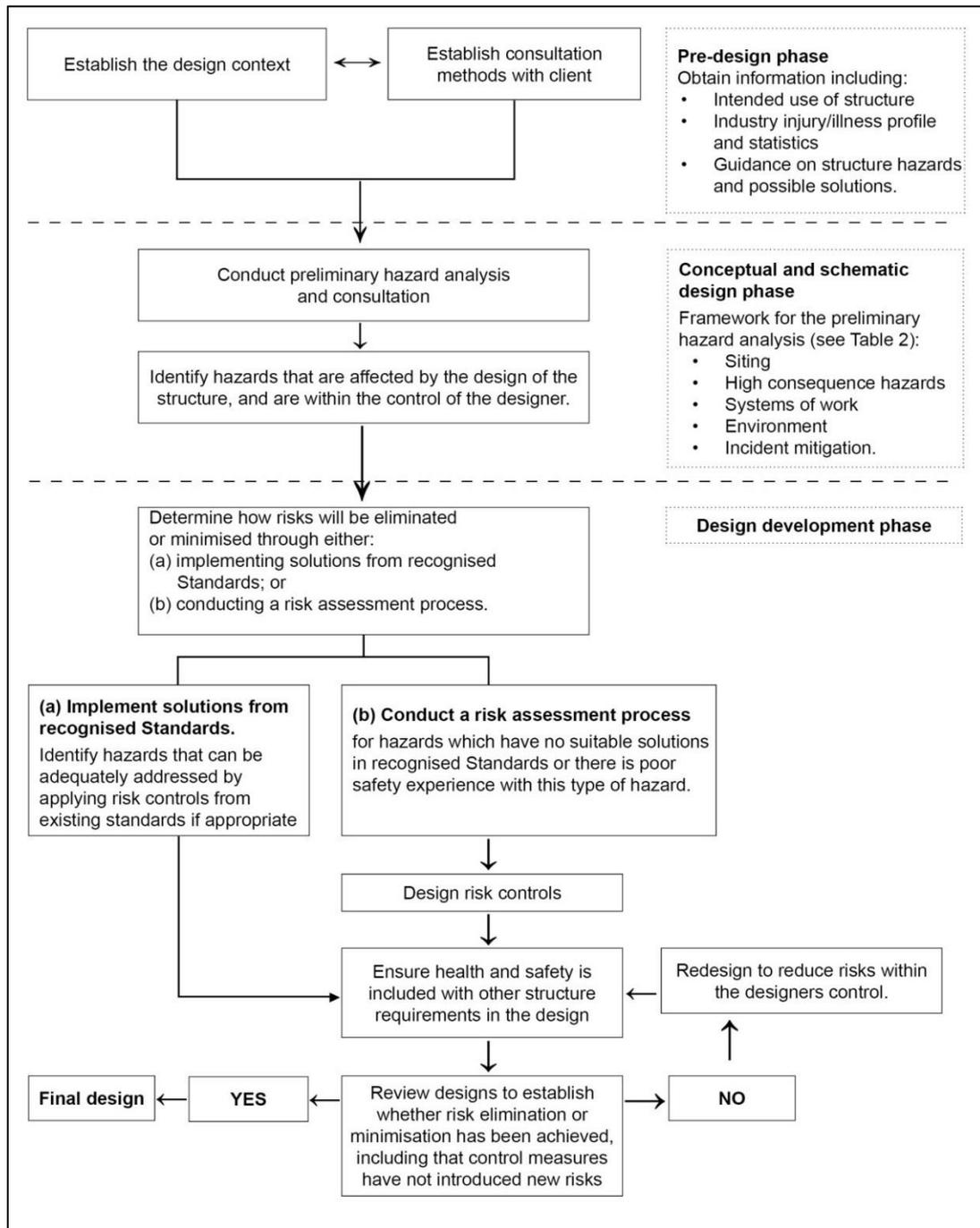


Figure 1: Safe design of structures. Code of practice (SafeWork Australia)

### 2.2.3 Review Process

The SiD review process throughout each stage of the project is defined in Figure 2.

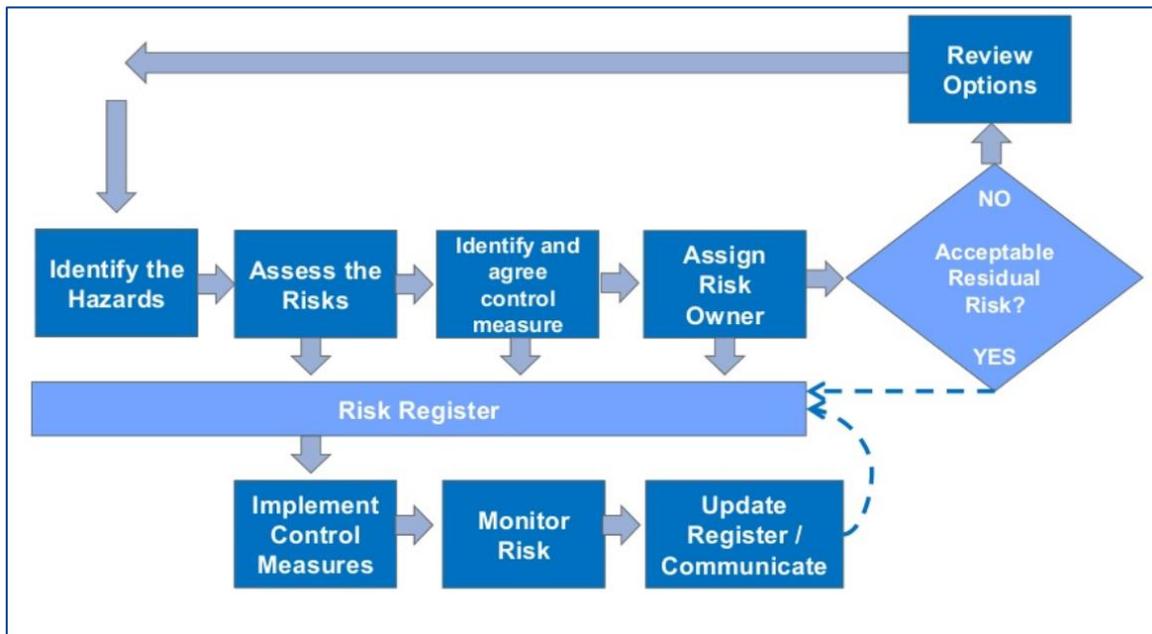


Figure 2: SiD review process (adapted from Hecker, 2011)

SiD reviews shall identify and control hazards and risks associated with the following:

- the range of work activities associated with the intended use of the building/structure as a workplace, including fixtures integral to its use as a workplace;
- any maintenance, repair, service and cleaning activities for the building/structure when it is in use; and
- the construction of the building/structure i.e. to make the design safer to build.

The designer shall identify and control hazards and risks associated with the above activities, and inform the University of any high risks in the University's design requirements, and recommend design alternatives that will eliminate or reduce risks arising from the original design.

Outputs from the SiD review shall include the following:

- A SiD review risk register for the design. The following information should be considered for inclusion (as appropriate):
  - design related hazards;
  - area/location of risk exposure; and
  - description of hazard and risk exposure, including existing design control measures;
- estimation of base risk i.e. risk level associated with the identified design-related hazard prior to the inclusion of any additional design control measures:
  - any additional design control measures;
- estimation of residual risk i.e. risk level associated with the identified design, including related hazards after the inclusion of any additional design control measures; and

- further actions.

The findings of the SiD review shall be provided to the University Project Manager, who will ensure that this information is provided to all relevant persons.

## 2.3 GENERAL

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### 2.3.1 *Space and General Physical Layout*

The design of space and general physical places shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code
- AS 1428 (series): Design for access and mobility
- AS 1428.1: Design for access and mobility. General requirements for access – New building work
- AS 1657: Fixed platforms, walkways, stairways and ladders. Design, construction and installation
- [Ergonomic principles and checklists for the selection of office furniture and equipment](#) (Safe Work Australia)
- [Officewise – A guide for health and safety in the office](#) (WorkSafe Vic)
- [Compliance Code: Hazardous Manual Handling](#) (Worksafe Vic)

When designing for any workspace, it is critical to understand the scope of tasks undertaken in the workspace, the requirement for furniture, equipment and materials, and the way the users operate within their work environment.

Workplace design and layout should enable workstations to be accommodated in the safest configuration.

Space requirements should be based on an assessment that takes into account: the task, the physical actions needed to perform the task, the need to move around while working, whether the task is to be performed from a sitting or standing position, access to and egress from the workstation, the equipment to be handled and personal protective equipment that might have to be used.

The minimum clear circulation space for users to move and work safely between plant, equipment, structures and materials shall be 800 mm.

Work processes and the ergonomics of materials or manual handling tasks may justify clearance around workstation spaces to be increased.

Aisles, passageways and access to cupboards, storage or doors need to be in addition to the calculated clear workstation space. A clear space of 1000 mm is required in front of a cupboard or filing cabinet.

Minimum corridor widths shall comply with the National Construction Code and AS 1428.1 and generally requires:

- main spine corridors between buildings: 2400 to 2700 mm;
- primary corridors in buildings (main corridor linking rooms on a level): 1800 mm; and
- secondary internal corridors linking groups of rooms in a section of a level: 1500 mm.

Minimum recommended widths for disabled access ways is an unobstructed width of 1000 mm as outlined in AS 1428.1.

Lifts must be available and of an appropriate design and dimensions for transporting any required items between floors

Stairways and walkways must be designed in accordance with AS/NZ 1657.

### **2.3.2 Wall Fitments and Shelving**

All wall-mounted fitments shall be designed to prevent personal injuries from failure of components. Where shelf units have weight limitations that can readily be exceeded, a maximum loading label shall be displayed.

Glass display cabinets, including glass doors, track and locking mechanisms, shall comply with all safety standards.

More detailed requirements for wall fitments and shelving is outlined in Section 2.6.7 and Section 2.6.8.

Refer to the Design Standard Section 1, *Planning and Architecture* for additional requirements.

### **2.3.3 Chemicals**

All areas where chemicals (including hazardous substances, dangerous goods and scheduled poisons) are stored, handled and/or used shall comply with relevant Legislation, Standards and Codes including but not limited to:

- Occupational Health and Safety Act 2004 (Vic)
- Occupational Health and Safety Regulations 2017 (Vic)
- Dangerous Goods (Storage and Handling) Regulations 2012 (Vic)
- Drugs, Poisons and Controlled Substances Regulations 2017 (Vic)
- AS/NZS 1020: The control of undesirable static electricity
- AS 1345: Identification of the contents of pipes, conduits and ducts
- AS/NZS 1596: The storage and handling of LP Gas
- AS 1894: The storage and handling of non-flammable cryogenic and refrigerated liquids
- AS 1940: The storage and handling of flammable and combustible liquids
- AS/NZS 2022: Anhydrous ammonia - Storage and handling
- AS/NZS 2243.2: Safety in laboratories – Chemical aspects
- AS/NZS 2243.10: Safety in laboratories – Storage of chemicals
- AS 2507: The storage and handling of agricultural and veterinary chemicals
- AS 2714: The storage and handling of organic peroxides
- AS/NZS 2927: The storage and handling of liquefied chlorine gas
- AS 3780: The storage and handling of corrosive substances
- AS/NZS 3833: The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers
- AS 3961: The storage and handling of liquefied natural gas
- AS/NZS 4081: The storage and handling of liquid and liquefied polyfunctional isocyanates

- AS 4326: The storage and handling of oxidizing agents
- AS 4332: The storage and handling of gases in cylinders
- AS/NZS 4452: The storage and handling of toxic substances
- AS/NZS 4681: The storage and handling of Class 9 (miscellaneous) dangerous goods and articles
- AS/NZS 4757: Handling and destruction of drugs
- AS/NZS 5026: The storage and handling of Class 4 dangerous goods
- AS 4840: Low pressure regulators for use in industrial compressed gas reticulation systems
- [Compliance code. Hazardous substances](#) (Worksafe Vic)

In general, where chemicals are stored on shelves the following shall apply:

- the shelf height of shelves over benches shall not be more than 1.5 metres from the floor;
- the shelving systems shall include finishes that are compatible with the chemicals to be stored, or shall be suitably protected from them;
- the shelving systems shall be designed for the maximum holding capacity of the chemical packages.

#### **2.3.4 Dangerous Goods Stores**

##### **Flammable Liquid Stores**

Construction of the flammable liquid stores, including segregation requirements shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS 1940: The storage and handling of flammable and combustible liquids
- AS/NZS 2243.2: Safety in laboratories – Chemical aspects
- AS/NZS 2243.10: Safety in laboratories – Storage of chemicals
- AS 4326: The storage and handling of oxidizing agents

Where the use of flammable liquid indoor storage cabinets has been specified, attention is drawn to the provision within the AS 1940 and AS/NZS 2243.10 with respect to cabinet separation and ventilation, together with ignition source requirements.

An appropriate automatic fire extinguishing flood system shall be provided in accordance with current practice. Refer to Design Standard, Section 8, *Fire Protection and Detection Services* for further requirements.

##### **Gas Cylinder Storage and Use**

The construction of areas built for storage and handling shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS 4332: The storage and handling of gases in cylinders
- AS 4840: Low pressure regulators for use in industrial compressed gas reticulation systems
- AS 4289: Oxygen and acetylene gas reticulation systems
- AS 4603: Flashback arresters. Safety devices for use with fuel gases and oxygen or compressed air

- AS 4706: Pressure gauges for regulators used with compressed gas cylinders

Where reasonably practicable gas cylinders are stored outdoors with one or more sides, or a roof, open to the atmosphere. Storage shall be provided with the necessary segregation of gases as determined by AS 4332.

A means of securing cylinders against falling shall be provided.

Where stored in loading bay or other similar location where external damage from motor vehicles could occur, suitable protection of the structure and stored cylinders shall be provided (eg impact rated bollards).

Protection from sunlight shall be provided.

Where practicable, gas cylinders that are connected to consuming apparatus (such as a reticulated system) shall be located outside the building in accordance with AS 4332.

### **2.3.5 Portable Fire Extinguishers and Fire Blankets**

The correct number and location of appropriate fire extinguishers and fire blankets shall be determined and documented and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 1841.1: Portable fire extinguishers. General requirements; and
- AS 2444: Portable fire extinguishers and fire blankets. Selection and location

The selection of fire extinguishers and fire blankets shall be guided by the Standards referenced above.

Health and safety factors and human factors as outlined in AS 2444 shall be considered.

The design consultant shall ensure that the supply and fixing of all extinguishers is documented in the main contract.

### **2.3.6 Safety Showers**

These devices, and their actuating mechanisms, shall be located so that the approach to them is unobstructed and comply with AS 4775: Emergency eyewash and shower equipment. This shall include the following.

At least one safety shower shall be installed where chemical, corrosive or flammable substances are used. There shall be not more than 10 seconds to reach such devices from any point where the substance is used.

Note: This may be a drench-type shower, a hand-held spray, or other type as appropriate to the hazards of the laboratory.

### **2.3.7 Emergency Eye-Wash Stations**

These devices, shall be located so that the approach to them is unobstructed and comply with AS 4775: Emergency eyewash and shower equipment. This shall include the following.

An eye-wash facility of appropriate type shall be installed in each room where chemical, corrosive, or flammable substances are used or handled. There shall be not more than 10 seconds to reach such devices from any point where the substance is used.

A permanently fixed aerated type, which can be operated without using hands, is preferred. Provision shall be made to drain or restrain any excess water from these devices.

### **2.3.8 Safety Signs**

All safety equipment and facilities shall be clearly sign-posted and shall comply with relevant Legislation, Standards and Codes.

Where safety signs are required they shall conform to AS 1319: Safety signs for the occupational environment.

There should be provision of a notice board for highlighting safety issues.

Refer to the Design Standard Section 1, *Planning and Architecture* for additional requirements.

### **2.3.9 Asbestos and Hazardous Materials**

Prior to commencing building works on any area of the campus the design team, or person sponsoring the work shall reference any existing, relevant asbestos/hazard audit information for the building or area by:

- referring to the University of Melbourne asbestos register (available through Infrastructure Services and the Hazardous Building Materials online compliance database; and
- using an auditable process, determined by WorkSafe Victoria, to verify the presence of asbestos-containing material (Occupational Health and Safety Regulations 2017[Vic]).

Generally, any known asbestos removal work shall occur prior to the letting of the construction contract, alternatively the works may be detailed and included in the contractor's tender. Options are at the University's Project Manager's discretion.

### **2.3.10 Heights**

The design of internal and external locations where working at heights (or there is an opportunity to fall) shall comply with relevant Legislation, Standards and Codes including but not limited to:

- Occupational Health and Safety Regulations 2017
- National Construction Code
- AS/NZS 1891 (series): Industrial fall arrest systems and devices
- AS 5203: Protection of openable windows/fall prevention. Test sequence and compliance method

Access to roofs shall be restricted and available for authorised entry only.

It is preferable that fall prevention is included in all new designs (and refurbishments) that eliminate the requirement for passive fall prevention devices and/or fall arrest systems.

Where passive fall prevention devices are required, the layout and design incorporate suitable access for those devices.

Refer to the Design Standard, Section 5, *Building Fabric* for additional requirements.

### **2.3.11 Plant**

The design of installations, commissioning and maintenance of plant shall comply with relevant Legislation, Standards and Codes including but not limited to:

- Occupational Health and Safety Regulations 2017
- AS/NZS 2243.6: Safety in laboratories. Plant and equipment aspects
- AS/NZS 4024.1601: Safety of machinery. Design of controls, interlocks and guarding – Guards – General requirements for the design and construction of fixed and movable guards
- AS/NZS 4024.1602: Safety of machinery. Interlocking devices associated with guards – Principles for design and selection

- AS 4024.1603: Safety of machinery. Design of controls, interlocks and guards – Prevention of unexpected start-up
- AS/NZS 4024.1604: Safety of machinery. Design of controls, interlocks and guarding – Emergency stop – Principles for design
- AS 4024.2601: Safety of machinery. Design of controls, interlocks and guarding – Two-hand control devices – Functional aspects and design principles
- AS/NZS IEC 60825.4: Safety of laser products. Laser guards

Refer to the Design Standard, Section 9, *Mechanical Services* for requirements.

## 2.4 IONISING RADIATION

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### 2.4.1 *Ionising Radiation Control*

The design and subsequent working procedures within buildings shall comply with relevant Legislation, Standards and Codes including but not limited to:

- Radiation Act 2005 (Vic)
- Radiation Regulations 2017 (Vic)
- Radiation Protection Series 10. Code of Practice and Safety Guide - Radiation Protection in Dentistry
- Radiation Protection Series 11. Code of Practice for the Security of Radioactive Sources
- Radiation Protection Series 14. Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation
- Radiation Protection Series 17. Code of Practice & Safety Guide for Radiation Protection in Veterinary Medicine
- Radiation Protection Series 19. Code of Practice for Radiation Protection in the Application of Ionizing Radiation by Chiropractors
- AS 2243.4: Safety in laboratories. Ionizing radiations

All facilities containing radioactive sources shall be identified by the appropriate signage outlined in the relevant Radiation Protection Series Code of Practice.

Appropriate shielding shall be provided that complies with the exposure limits (dose limits) as listed in the Radiation Regulations 2017 (Vic) and the University of Melbourne [ionising radiation management plan](#).

The University Services, Health & Safety team shall be consulted during the preparatory planning stages.

All radioactive sources shall be purchased and/or acquired after permission for their possession and use are included on the University of Melbourne Radiation Management Licence.

## 2.5 LABORATORIES

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### 2.5.1 *General*

The design and subsequent use of laboratories shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 2982: Laboratory design and construction
- AS/NZS 2243.1: Safety in laboratories. Planning

- AS/NZS 1680.1: Interior and workplace lighting. General principles and recommendations
- AS/NZS 2243 (series) Safety in laboratories
- AS 61010 (Series): Safety requirements for electrical equipment for measurement, control and laboratory use

A wide range of different laboratories exist in which a range of functions are carried out including research, quality control, testing, teaching and/or analysis. Whilst certain common design principles apply to all, the design and layout should be developed from a knowledge of the processes to be carried out, the space needed for each, and the desired work flow.

Consultants will work to specific briefs based on the functions to be accommodated - an array of physical sciences, computing, electronic and robotics in the case of dry laboratories; and biology, chemistry, biomedical and some engineering and materials science in the case of wet laboratories.

In all situations the functional needs of the user group must be considered. This can only be done by engaging the user group and undertaking a formal planning brief. AS/NZS 2982:1 outlines the requirement for a planning brief.

In teaching laboratories, a clear view of the lecturer, screens, boards, presentation materials and equipment should be possible from each workstation without the student having to adopt awkward or twisted postures.

Direct lighting must be adequate for the tasks being undertaken and achieve the level of illumination as specified in AS/NZS 1680.1. Generally, 300 to 600 lux is appropriate for laboratory applications.

Task lighting may need to be installed under shelves to supplement the ceiling lighting system.

Temperature, humidity and air quality should be designed to suit the requirements of the laboratory processes and instrumentation, or, in the absence of any special requirements, to provide acceptable user comfort and safety. Room ventilation should be in accordance with AS/NZS 2243.1 and AS/NZS 2243.3.

Where required, break out rest areas should be provided outside laboratories.

Laboratory workstations should be designed to accommodate the various equipment and materials used at them and permit optimal work postures during task performance. The appropriate height for a workbench therefore depends on the person's work posture (sitting/standing), the work activity (precision/light/heavy), the size/height of the materials and tools used and the elbow height of the individual. Adjustable height work surfaces should be considered for certain activities. Consultation with the user group should be undertaken to determine the nature of the work and the bench heights designed accordingly.

Figure 3 demonstrates the height level for bench work dependent on the activity. These heights are intended to accommodate most users in a standing posture however an adjustable height stool (and high footrest) should be provided to enable a seated option.

If an adjustable height work bench is supplied it should include the height range of 650 to 1200 mm above floor level.

**Precision work**, where elbow support is needed to reduce neck and shoulder muscle strain. Elbow height only be up to 50 mm above bench top.

**Light work**, such as pipetting, use of computer keyboard and mouse for data entry. Elbow height up to 100 mm above bench top.

**Heavy work.** requiring demanding downward forces or where large items of equipment/tools are used. Elbow height between 150 to 400 mm above bench top

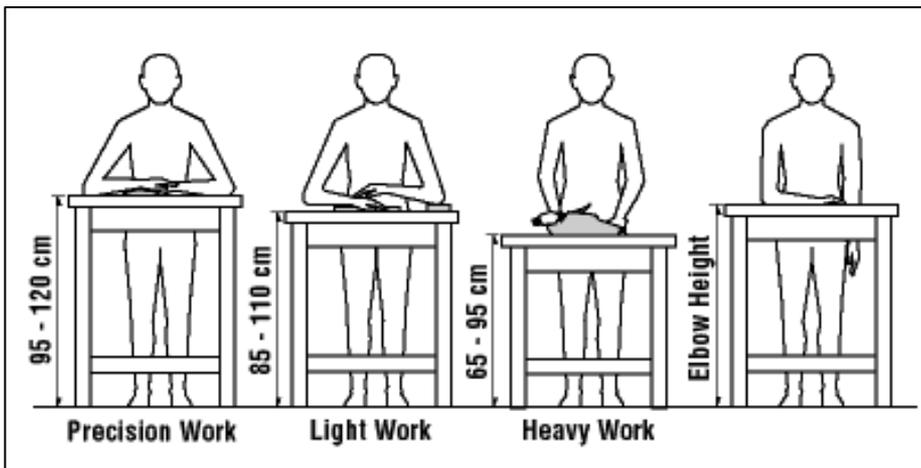


Figure 3: Bench height dependent on type of work

Workstations should be designed without fixed structures underneath to enable seated users to get their legs under and to enable cleaning

### 2.5.2 Wet Laboratories

In addition to the requirements listed in Section 2.5.1 the design and subsequent use of wet laboratories shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 2243.3: Safety in laboratories. Microbiological safety and containment
- AS/NZS 2982: Laboratory design and construction
- AS/NZ 4586: Slip resistance classification of new pedestrian surface materials
- DAWR Approved arrangements biosecurity containment requirements

Wet laboratories may involve the use of hazardous materials and organisms and flammable substances that will require appropriate containment.

Floor surfaces must be stable, firm, smooth, impervious, easy to clean and be resistant to chemicals as well as have high slip resistance in accordance with AS/NZ 4586. Joins in slabs and/or openings in floors shall be avoided or designed and constructed in such a way that they are sealed against penetration by hazardous materials.

Wet laboratories generally require:

- Adjacency to apparatus, preparation and safe stores.
- Room configuration to suit layout of laboratory benches and related ancillary and research work spaces.
- All bench surfaces to be chemically resistant, with laminate to the underside and bullnose leading edges.
- Services combined and aligned vertically for efficient deployment.
- Wet activities as required, including biological and chemical agents.
- Sinks with integral drainers of high grade stainless steel at the end of bench runs.
- Suitable bench heights, with access for disabled staff and students. Adjustable, where possible, are to be considered.

- Under and over bench shelving and storage for chemicals, apparatus and equipment.
- Adjustable ergonomic laboratory stools and chairs with wet and chemical resistant impervious material (e.g. vinyl or rubber).
- Minimum of one single sided fume cupboard per wet laboratory. The final number and arrangement of fume cupboards shall be determined by project/users.
- Door entry mats or shoe bath facilities as required by laboratory PC rating.
- Magnetic or glass white boards, pin boards, smart boards as required.
- Projection screens, lecterns or other points of delivery, flexible equipment stations, as required.
- Blinds provided to external windows for brown-out as required.
- Splashback behind basins.
- Floor finish for industrial wet and corrosion resistance, with integral coving.
- Accessible, non-combustible, sealed ceiling grid for services.
- Observation window panels viewing in, out and between laboratory spaces, preparation rooms and so on.

At least one safety shower and emergency eye-wash station shall be installed where chemical, corrosive or flammable substances are used. See Section 2.3.6 and Section 2.3.7 for requirements.

Additional shower and emergency eye wash station requirements may apply in biocontainment facilities; the University Project Manager will advise.

Additional requirements must be considered when designing wet biological laboratories including:

- most biological laboratories will require Physical Containment Level 1 (PC1) as per AS/NZS 2243.3;
- more advanced laboratories may require Physical Containment Level 2 (PC2), Physical Containment Level 3 (PC3) or Physical Containment Level 4 (PC4) as per AS/NZS 2243.3; and
- where required, wet laboratories should be suitable for registration under the Office of Gene Technology (OGTR) and the Department of Agriculture and Water Resources (DAWR) such that the faculty/University can satisfy these regulators.

### **2.5.3 Dry Laboratories**

Dry laboratories are general purpose spaces for practical teaching and learning. Dry laboratories generally do require plumbing, but on occasions may require a single plumbed service point for general use, preferably located adjacent to entry point.

Dry laboratories generally require:

- Direct adjacency to preparation and apparatus rooms and safe stores.
- Electrical services to island tables and benches is to be achieved where possible either through shallow ducts on floors or dropper ducts from the ceiling
- Robust benches constructed from inert material.
- Suitable and adjustable table and bench heights and/or stool and chair heights accessible for disabled staff and students.

- Sufficient storage, shelf space and cupboards for exhibits, samples, tools and partially completed Projects.
- Magnetic or glass white boards, pin boards, smart boards as required.
- Projection screens, lecterns or other points of delivery, flexible instruction stations as required.
- Blinds provided to external windows for brown-out as required.
- Accessible, non-combustible, ceiling grid for services.

#### **2.5.4 Biological Safety Cabinets, Cytotoxic Drug Safety Cabinets and Fume Hoods**

Where biological safety cabinets, cytotoxic drug safety cabinets and fume hoods are provided they shall be designed, sited, constructed and installed and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS 2252.4: Controlled environments. Biological safety cabinets Classes I and II – Installation and use
- AS 2252 (Series): Biological safety cabinets
- AS 2252.5: Controlled environments – Cytotoxic drug safety cabinets (CDSC) – Design, construction, installation, testing and use
- AS/NZS 2243.1: Safety in laboratories. Planning
- AS/NZS 2243.3: Safety in laboratories. Microbiological safety and containment
- AS/NZS 2243.8: Safety in laboratories. Fume cupboards

Biological Safety Cabinets, cytotoxic drug safety cabinets and fume hoods should be designed and installed at an appropriate height so that so that the user can adopt optimal work postures and movements during task performance. There should be no fixed panels or cupboards underneath preventing the user getting close to the work when sitting or standing.

Consider installing an adjustable height table rather than a fixed cabinet.

#### **2.5.5 Microscope Workstations**

Where microscopes are installed consider cut-out work tables which provide an area for supporting the forearms while using adjustment knobs. The microscope should be elevated and angled appropriately to enable the user to look directly into the eyepiece whilst maintaining an optimal posture.

Microscope workstations should be designed and installed at an appropriate height so that so that the user can adopt optimal work postures during task performance. There should be no fixed panels or cupboards underneath preventing the user getting close to/legs under the work when sitting at the microscope.

## **2.6 HUMAN FACTORS AND ERGONOMICS**

### **2.6.1 Background**

This section provides details of minimum requirements for human factors and ergonomic design in interior environments and shall be considered an adjunct to all relevant statutory regulations.

Incorporating ergonomics and human factors into the design of buildings, structures and internal fit outs and all aspects of the worker/work interface ensures the physical and psychosocial needs of a broad range of users including those with special needs are

comfortably accommodated and injury risk is minimised. Ergonomic principles should be applied in the early stages of design and not just when a building is being outfitted.

This section has been prepared with consideration to:

- relevant Australian Standards, industry standards, codes and publications;
- scientific data e.g. human body dimensions data (anthropometry) and biomechanics; and
- evidence based research and best practice

As each project will present a range of different design challenges, and some projects will have unique and specialised requirements it is not possible to cover all specifications for all scenarios. The designer is expected to produce their own specification incorporating the elements of the following information and submit all designs to the University for review prior to any tendering or works commencing on site.

Consultation with University Services, Health & Safety team and the client/user group shall occur to determine their specific work requirements to ensure that optimum design and usability outcomes are achieved.

It is expected that all furniture, fittings and equipment are sourced from the University's panel of preferred suppliers.

The University of Melbourne will endeavour to make any reasonable adjustments to accommodate users with special needs.

## **2.6.2 Space and General Physical Layout**

The design of space and general physical shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code
- AS 1428 (series): Design for access and mobility
- AS 1428.1: Design for access and mobility. General requirements for access – New building work
- AS 1657: Fixed platforms, walkways, stairways and ladders. Design, construction and installation
- [Ergonomic principles and checklists for the selection of office furniture and equipment](#) (Safe Work Australia)
- [OfficeWise – A guide for health and safety in the office](#) (WorkSafe Vic)
- [Compliance code: Hazardous manual handling](#) (Worksafe Vic)

When designing for any workspace, it is critical to understand the scope of tasks undertaken in the workspace, the requirement for furniture, equipment and materials, and the way the users operate within their work environment.

Workplace design and layout should enable workstations to be accommodated in the safest configuration.

Space requirements should be based on an assessment that takes into account: the task, the physical actions needed to perform the task, the need to move around while working, whether the task is to be performed from a sitting or standing position, access to and egress from the workstation, the equipment to be handled and personal protective equipment that might have to be used.

The minimum clear circulation space for users to move and work safely between plant, equipment, structures and materials shall be 800 mm.

Work processes and the ergonomics of materials or manual handling tasks may justify clearance around workstation spaces to be increased.

Aisles, passageways and access to cupboards, storage or doors need to be in addition to the calculated clear workstation space. A clear space of 1000 mm is required in front of a cupboard or filing cabinet.

Minimum corridor widths shall comply with the National Construction Code and AS 1428.1 and generally requires:

- main spine corridors between buildings: 2400 to 2700 mm;
- primary corridors in buildings (main corridor linking rooms on a level): 1800 mm; and
- secondary internal corridors linking groups of rooms in a section of a level: 1500 mm.

Minimum recommended widths for disabled access ways is an unobstructed width of 1000 mm as outlined in AS 1428.1.

Lifts must be available and of an appropriate design and dimensions for transporting any required items between floors

Stairways and walkways must be designed in accordance with AS/NZ 1657.

### 2.6.3 **Light and Lighting**

The type and placement of lighting shall consider the tasks being undertaken and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 1680.0: Interior lighting. Safe movement
- AS/NZS 1680.1: Interior and workplace lighting. General principles and recommendations
- AS/NZS 1680.2.1: Interior and workplace lighting. Specific applications – Circulation spaces and other general areas
- AS/NZS 1680.2.2: Interior and workplace lighting. Specific applications – Office and screen-based tasks
- AS/NZS 1680.2.3: Interior and workplace lighting. Specific applications – Educational and training facilities
- AS/NZS 1680.2.4: Interior lighting. Industrial tasks and processes
- AS/NZS 1680.2.5: Interior lighting. Hospital and medical tasks

Lighting must be adequate for the tasks being undertaken. Lighting installation should be installed at the appropriate distances to ensure evenness, comfortable visibility and no shadows at task viewing level.

AS/NZS 1680.1 provides specific guidance on recommended maintenance illumination levels for various workplaces, activities and interiors.

The key principals for lighting design include:

- **design for the task** which includes understanding the tasks and activities performed; and
- **select the appropriate** type and number of luminaires for the work being done including:
  - artificial lighting should most closely resemble natural light

- down lights if used should be fitted with baffle trims – sufficient numbers are required to ensure light is distributed evenly across the work surfaces
- batten lights fitted with diffusers are effective in delivering even illumination
- indirect or uplighting systems can be effective in workplaces as they direct all light to the ceiling eliminating shadow and glare
- fixtures should be designed so bare or exposed lamps should not be visible to the eye

Control direct lighting by using dimmers, glare filters, diffusers, baffles (to reduce, redirect, soften light sources).

Control external light sources using suitable blinds. Blinds should be selected according to the level of sunlight entering the window. The best solution is to combine a partially transparent sunscreen blind with a block-out blind. Ensure operating cords are accessible without having to climb or reach excessively and cords can be secured with either tie-downs (cleats) or tension devices that enclose cords and chain loops

Locate workstations or work points so that luminaires are parallel with the worker's line of sight and not in front of, or behind or directly overhead.

Change lighting levels gradually. Sudden contrasts in light levels e.g. coming out of a well-lit area into a dark area or vice versa can be a problem because it takes the eye several seconds to adapt to new lighting conditions.

Minimise glossy reflective surfaces. Sources of light 'bounce' and create sources of glare. This includes glossy display monitors, glass partitioning, windows with a privacy treatment applied (two-way glass), whiteboards, keyboards etc.

Walls should have 50 to 75% reflectance and a matte finish, ceilings should preferably be white reflecting approximately 80% of light. Avoid black ceilings with mounted lights as they create a high contrast which is fatiguing for the eyes

Portable desktop task lamps where used should have a flexible arm and head, cast light evenly over the length of the workspace, effective heat dispersion and dimming capability

Low hanging pendant or suspended lights should be generally avoided as they can create pools of direct light. With the move to sit/stand workstations greater proximity to the light source can result in a glare source in the visual field.

Refer to the Design Standard Section 7, *Electrical, Services* for emergency lighting requirements.

Refer to the Design Standard Section 5, *Building Fabric* for additional requirements.

#### **2.6.4 Noise**

Damaging noise and nuisance noise shall comply with relevant Legislation, Standards and Codes including but not limited to:

- Occupational Health and Safety Regulations 2017 (Vic)
- Compliance Code. Noise (Vic)
- AS/NZS 1269: Occupational noise management. Noise control management
- AS/NZS 2107: Acoustics. Recommended design sound levels and reverberation times for building interiors
- AS2822, Acoustics: Methods of assessing and predicting speech privacy and speech intelligibility

Where hard surfaces that reflect noise (e.g. timber and glass) are used extensively, consideration should be given to the installation of sound absorbing structures or materials.

Noisy printing or photocopying equipment should be isolated in separate rooms with adequate ventilation.

Refer to the Design Standard, Section 12, *Acoustics, Vibration and EMI* for additional noise requirements.

### **2.6.5 Thermal Comfort and Air Quality**

Temperature and air quality levels must be well controlled and/or regulated and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS 1668.2: The use of ventilation and air conditioning in buildings. Mechanical ventilation in buildings

The recommended ambient office temperature is 20 to 25°C. Perception of thermal comfort will vary between individuals.

Avoid locating workstations directly in front of or below air conditioning outlets.

For internal environments the following is recommended:

- control direct sunlight (radiant heat) with blinds;
- install air conditioning units with draught control technology providing flat air-flow directed along the ceiling;
- insulate/enclose hot processes and locate them away from people;
- install shields or barriers to reduce radiant heat from heat sources;
- install shade cloth to reduce radiant heat from the sun;
- minimise draughts between the head and feet (thermal gradients); and
- maintain an airflow rate between 0.1 and 0.2 metres per second.

Refer to the Design Standard, Section 10, *BAS and Controls* for additional requirements.

### **2.6.6 Flooring and Pedestrian Surfaces**

Flooring and pedestrian surfaces must be suited to the location and the work undertaken and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code
- AS 1428.2: Design for access and mobility. Enhanced and additional requirements - Buildings and facilities
- AS/NZS 4663.2004 Slip resistance measurement of existing pedestrian surfaces
- HB 197 An introductory guide to the slip resistance of pedestrian surface materials

In all circumstances the selection of floor coverings shall take the work processes into account. Some work processes create hazardous floor conditions, such as spillages, (e.g. grease, water, food, or body fluids or off-cuts of materials), which can create slip and trip risks.

Floor coverings also need to be selected for hygiene and for their lack of resistance to push/pull forces exerted by employees on mobile equipment.

Low slip resistant floors e.g. polished concrete, timber or tiles should not be selected for administrative areas where chairs with castors will be used.

Floor surfaces should be designed to minimise impact noise.

Refer to Design Standard, Section 5, *Building Fabric* for requirements on approved carpets.

Consideration should be given to supplying floor insulation at workstations where employees are required to stand on concrete, masonry or steel floors.

Anti-static vinyl/marmoleum shall be considered for wet, dry and electronic laboratories and information technology/communications rooms.

Entrance matting shall be provided to doors at the entrances to buildings and should be aluminium, and limit ingress of dirt, debris, water and mud and be of a light weight to enable easy removal and cleaning by one person.

All external surfaces around and between buildings should provide a consistent, even, slip resistant pathway, with suitable drainage and shelter/coverage where required. Rough, raised surfaces, uneven paving and changes in level should be avoided.

Surfaces that become slippery when wet – e.g. pebbles, tiles, some painted timbers, or affected by wet leaves, moss, sand or gravel should not be selected.

Refer to the Design Standard, Section 1, *Planning and Architecture* for additional requirements.

## **2.6.7 Storage Systems – Shelving, Racking and Compactus**

### **Shelving and Racking**

Storage shelves must be robust, stable and well secured. Bookcases should generally be no higher than 2100 mm however if higher must be fixed to the wall

Shelving should be designed so heavier and more frequently used items can be located within the optimal reach zone- shoulder to mid-thigh range. Only light items (easily lifted with one hand) should be stored above shoulder.

Higher shelving must accommodate a safe means of climbing to the required level of storage. ie. sufficient space to use (and store) an approved step ladder.

Where applicable (eg pallet racking) the specified safe working load (SWL) shall be clearly visible.

Refer to the Design Standard, Section 1, *Planning and Architecture* for additional requirements.

### **Compactus**

All compactus storage units shall be designed and supplied to minimise risk of entrapment between bays during operation. An effective engineering method of lock-out must be specified provided.

The minimum aisle width within the compactus system shall be 600 to 700 mm.

The compactus should not require significant operating force.

Large, multiple bay compactus models, electric motors with keypad controls shall be fitted to eliminate the manual effort of moving multiple bay stacks.

Small compactus units should have a large handle permitting a 2-handed grip positioned at approximately chest level. This reduces the risk of one hand being placed on the edge of the unit where it can become caught between units. It also reduces the likelihood of pulling the unit behind the shoulder which is a typical (and risky) practice when a small handle is fitted.

Medium size compactus units should have a drive wheel fitted to greater allow mechanical advantage.

The size and placement of winding mechanisms, handles or wheels to open and close compactus should not present an entrapment hazard for hands.

Compactus units shall not have raised platforms or rails which create a trip hazard or inhibit trolley movement, or, deep tracks which trap debris and affect movement of bays.

### **2.6.8 Storage Systems – Mobile and Standalone**

Mobile and standalone storage systems must be suited to the location and the work undertaken and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS 5079.1: Filing cabinets. Lateral filing cabinets
- AS 5079.2: Filing cabinets. Vertical filing cabinets
- AS 5079.3: Filing cabinets. Mobile pedestals

All small storage units shall be constructed of sturdy materials and positioned on a level floor to ensure that the drawers/doors open and close easily and do not tip when doors or drawers are open.

Stationery items and office supplies should be located in accessible and well-designed storage cupboard with provision for heavier items such as paper reams to be stored between chest and thigh zones.

#### **Filing Cabinets and Lockers**

Filing cabinets and lockers should not be located where they encroach into walkways.

Filing cabinets require approximately 1200 mm of space in front of them to enable the bottom drawer to be fully opened and accessed.

Filing cabinets must be on a level floor to ensure that the drawers open and close easily. They should be secured to the wall or floor to ensure that they do not tip when the top drawer is open.

The location of lockers should be decided according to the size and weight of the stored items and the frequency of use.

Mobile pedestal units and deep storage caddy units

Mobile pedestal units designed to sit under electric sit/stand desks shall be of a height that they do not impede the movement of the desk to its lowest height range of 650mm-measured from floor to top of desk.

Deep storage caddy units which extend out from under the desk with storage shelving located in the side of the unit (under the desk) should be avoided. They are often selected to provide a seated surface. These encourage the adoption of awkward body postures when accessing stored items.

### **2.6.9 Doors and Handles**

Doors and handles must be suited to the location/placement and consider the environment and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code
- AS 2047: Windows and external glazed doors in buildings
- AS 4145 (series): Locksets and hardware for doors and windows

- AS 5007: Powered door for pedestrian access and egress
- AS 6905: Smoke doors
- AS 1905: Components for the protection of openings in fire-resistant walls. Fire-resistant door sets

Refer to the Design Standard, Section 5 *Building Fabric* for additional requirements.

## Doors

Building entrance and high traffic doors shall be automated wherever possible preferably bi-parting sliding glass doors.

Doors shall not open directly into a primary or secondary path of travel. If a door is required to do so to meet fire egress or other Code requirements, an appropriate recess or protection shall be provided.

Force requirement to open and close any manual doors shall not exceed 2 kg/f or 20 N.

Inward opening swing doors should be installed where there is sufficient space.

Sliding doors should be installed where there is limited space.

Door closers shall be tensioned to provide time for individuals with mobility impairment to move through and not give rise to entrapment hazards.

Double doors may be required to enable installation or passage of large pieces of equipment, materials, artwork or instruments.

Doors through which trolleys move must have a means of being secured open.

Solid high traffic doors and entry doors including teaching, learning, research and meeting rooms shall be fitted with glazed viewing panels. Where there are double doors a glazing panel is to be installed in at least one door leaf. The size of the panel shall ensure visibility for everyone, including wheelchair users.

## Handles

“D” type lever door handles with a 30 to 50 mm circumference and 50 mm clearance (aperture) should be selected for all swing doors and located between 900 and 1100 mm above floor height.

A long vertically placed door handle with 30 to 50 mm circumference from approximately 700 to 1100 mm above floor height is acceptable on a sliding door

Avoid handles with square profile or sharp edges or other surface features, large circular or other unusual shapes.

Door handles should be positioned well away from door jambs to prevent trauma to the knuckles.

### 2.6.10 Desks – General Requirements

Desks must be suited to the location and the work undertaken and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 4442: Office desks
- AS/NZS 4443: Office panel systems. Workstations
- Relevant AFRDI Standards and certification

Certification to AFRDI (Australian Furniture, Research and Design Institute) should be requested from the manufacturer/supplier.

A range of desk designs are available including rectilinear, L shape or corner, curved 120-degree, round, kidney shape, or other versions. Both fixed height and adjustable are available. Manual height adjustable desks should be avoided. When selecting desks consideration shall be given to the purpose of the space, the intended user group, the tasks they undertake and equipment they require. In open plan offices and teaching spaces desks and tables are often arranged in clusters or pods.

**Depth:** 750 to 800 mm. This is necessary for appropriate monitor positioning in relation to focal distance and to enable sufficient space for a document holder between the keyboard and monitor should this be required

**Length:** Depends on desk design and tasks undertaken – Unless a need is established 1800 mm is preferred. Anything less will not comfortably accommodate 2 monitors or an under desk mobile pedestal unit. Lateral clearance under the desk to accommodate thigh width and leg/chair movement: 800 mm minimum (400 mm either side of navel). There should not be a frame or cable tray or other structure to encroach into this zone

**Desk top thickness:** Between 25 mm and 33 mm. This must be preserved to a depth of 450 mm minimum under desk at knee height and 600 mm minimum at feet level (120 mm above floor level). No frame or cable tray or other structure to encroach into this zone.

**Cable management** managed in cable tray and neatly loomed

**Soft wiring:** Desk top mounted power rail – power and data points -located at rear (either end) of desktop – a not in the centre which will interfere with monitor arm clamping.

**Modesty panel:** Fitted to rear of desk- commencing no higher than 400 mm above floor height

**Load tolerance:** Minimum 150 kg.

**Desk surface:** light colour, matte, non-reflective.

**Desk finish:** all desks should be free of sharp edges, corners, points or protrusions.

### 2.6.11 Desks – Sit/Stand

Sit/stand desks enable height variation and accommodate staff with special needs including staff in wheelchairs.

The height adjustment provides for the range of 650 to 1250 mm measured from floor level to finished desktop.

Sit/stand desks should be fitted with anti-collision technology.

Clearance (gap) between rear of desk and partition/screen: 25 mm across the length to accommodate flexible clamping of a monitor arm/s if required.

Clearance: minimum 30 mm between desks positioned side by side to eliminate risk of hand entrapment

Programmable height functionality feature: capacity to pre-set preferred sit/stand heights.

All other dimensions and features as specified in Section 2.6.10.

### 2.6.12 Desks – Fixed Height Seated

Height: 720 mm measured from floor level to finished desktop. A small level of height adjustment (manual/technician enabled) is preferable (650 to 735 mm).

All other dimensions and features as specified in Section 2.6.10.

### 2.6.13 **Fixed Height Standing**

Less preferred as fixed height standing desks offer limited flexibility for user size variation. They should be used in conjunction with a drafting stool as prolonged static standing is not recommended – refer to Section 2.7 for seating specifications.

Height: 1000 mm measured from floor level to finished desktop. A small level of height adjustment (manual/technician enabled) is preferable (900 to 1100 mm)

All other dimensions and features as specified in Section 2.6.10.

### 2.6.14 **Computers (PC), Laptops and Monitor Arms**

#### **Desktop Computer (PC)**

The hard drive should be located under (to one end) of the desk in a CPU holder. If a laptop is used it should be docked and secondary monitor(s) and computer peripherals (keyboard and mouse) made available.

#### **Laptop**

The laptop should be used with a suitable laptop riser and a separate keyboard and mouse. Purpose built docking stations should be used where the laptop is primarily used.

#### **Monitor Arms**

Monitor arms are preferred for flexibility of monitor positioning.

Single monitor arms clamped to the rear of the desk are recommended. Dual monitor capacity arms are not recommended as they do not permit use of monitors in a preferred primary and secondary configuration.

### 2.6.15 **Tables**

Tables-should be smooth, light in colour and a non-reflective, matt or satin finish.

Fixed height tables designed for sitting to engage in learning activities should have a height range of 720 mm measured from floor level to top of table.

Fixed height benches, bars designed for standing or sitting at a high drafting stool to work should have a height range of 900 to 1100 mm measured from floor level to top of bench.

All tables and benches should be a maximum of 33 mm thick and have no frame encroaching into the leg space to a depth of 450 mm.

Folding or flip tables must have instructions for folding, no entrapment points or sharp corners or edges and move easily

Castors on tables must be durable and lockable.

## 2.7 **SEATING SPECIFICATIONS**

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### 2.7.1 **Chairs – General Requirements**

The type and purpose of the chair and seating arrangements must be considered and shall comply with relevant Legislation, Standards and Codes including but not limited to:

- AS/NZS 4088.1: Specification for burning behaviour of upholstered furniture. Upholstery materials for domestic furniture - Smouldering ignitability
- AS/NZS 4438: Height adjustable swivel chairs
- AS 4688.2: Furniture. Fixed height chairs – Determination of strength and durability

- Relevant AFRDI Standards and certification
- [Ergonomic principles and checklists for the selection of office furniture and equipment](#) (Safe Work Australia)

General requirements for chairs/seating include:

- a stable base.
- a load rating to a minimum 100 kg.
- an underframe e.g legs, castors that does not protrude more than 120 mm beyond the outermost dimension of the chair seat (including arms if present) so as to cause a trip hazard.
- no sharp projections, or other features that constitute a risk to users. There should be no sharp edges, rough surfaces or features that may trap clothing or cause injury. The ends and feet of tubular metal components shall be capped or closed and finished smoothly.
- covering materials and filling materials that meet burning behaviour performance requirements as set out in AS/NZS 4088.1.
- permanently marked with the manufacturers /importers name and address and year of manufacture and care, flammability and summarised operating details
- certification to AFRDI (Australian Furniture, Research and Design Institute) shall be provided by the manufacturer/supplier.

### **2.7.2 Staff Computer Workstation Chairs**

Requirements for computer workstation chairs include:

- Five-star base with castors, swivel mechanism, waterfall edge design.
- Four-lever independent adjustment –seat height, back rest height, seat and back rest tilt, seat depth slide.
- Medium size seat base and backrest standard but options must be available to accommodate larger and smaller staff.
- Seat height adjustability range 400 to 550 mm. Options for alternative gas struts to be available.
- Back rest tilt range approximately 45 degrees.
- Arm rests (adjustable height) not routinely required but chair must have provision for arm rests.
- Meet the requirements of AS 4438 and AFRDI certified level 5 or 6.
- Smaller and larger, deeper seat pans shall be provided to accommodate smaller and larger users. Numbers shall be determined in consultation with the client department and the University Project Manager.

### **2.7.3 Student Task Chairs**

Requirements for student task chairs include:

- Where students are working on computers or other portable electronic devices:
- Two-lever independent adjustment – seat height and back rest height.
- Seat height adjustability range 400 to 550 mm.

- Medium size seat base and backrest.
- Arm rests optional.
- Meet the requirements of AS 4438 Functional classification Type 2 and AFRDI certified level 5 or 6.

#### **2.7.4 Meeting Room, Interview/Consulting Room Chairs**

Requirements for meeting room, interview/consulting room chairs include:

- Five-star base with castors, swivel mechanism, waterfall edge design.
- Back rest tilt adjustment.
- Seat height adjustable.
- Medium size seat base and backrest standard but options must be available to accommodate larger and smaller staff.
- Arm rests.
- Meet the requirements of AS 4688.1 and AFRDI certified level 4 or 5.

#### **2.7.5 Staff High Office Workstation/Counter Stools**

Requirements for staff high office workstation/counter stools include:

- Where staff are working on reception, customer service counters and library desk counters:
- Five-star base with castors, swivel mechanism, waterfall edge design.
- Glides or soft tyre (rubber) castors with pressure locks fitted to 2 to 3 castors.
- Four-lever independent adjustment – seat height, back rest height, seat and back rest tilt, seat depth slide.
- Height adjustability range 650 to 780 mm.
- Arm rests (adjustable height) preferred to assist transfer on/off.
- Meet the requirements of AS 4438 Functional classification Type 1 and AFRDI certified level 5 or 6.
- Smaller and larger, deeper seat pans shall be provided to accommodate smaller and larger users. Numbers shall be determined in consultation with the client department and the University Project Manager

#### **2.7.6 Student High Office Workstation/Counter Stools**

Requirements for student high office workstation/counter stools include:

- Where workstation height range is approximately 900 to 1000 mm:
- Five-star base with castors, swivel mechanism, waterfall edge design
- Two-lever independent adjustment – seat height, back rest height
- Seat height adjustability range 650 to 780 mm
- Glides or soft tyre (rubber) castors with pressure locks fitted to 2 to 3 castors.
- Arm rests (adjustable height) preferred to assist transfer on/off.
- Meet the requirements of AS 4438 and AFRDI certified level 5 or 6.

### **2.7.7 Wet Laboratory Chairs**

Requirements for wet laboratory chairs include:

- In wet laboratories for both staff and students with a workstation height range approximately 900 to 1000 mm:
- Five-star base with castors, swivel mechanism, waterfall edge design
- Four-lever independent adjustment –seat height, back rest height, seat and back rest tilt,
- Medium size seat base and backrest standard but options must be available to accommodate larger and smaller staff
- Height adjustability range 650 to 780mm
- Glides or soft tyre (rubber) castors fitted with castors with pressure locks fitted to 2-3 castors.
- Non-permeable (closed cell) upholstery.
- Arm rests (adjustable height) preferred to assist transfer on/off.
- Options for sit/stand or saddle stools for laboratory seating should be considered.
- Meet the requirements of AS 4438 1 and AFRDI certified level 5 or 6.

### **2.7.8 Examination Room/Seminar Room and Events Chairs**

Requirements for examination room/seminar room chairs include:

- For staff, students and others (eg general public):
- Non-adjustable, 4 legs, no arms
- Lightweight <10 kg for ease of moving
- Stackable and moveable with trolley
- Meet the requirements of AS 4688.1

### **2.7.9 Occasional Seating/Chairs**

Requirements for occasional seating/chairs include:

- Used for a wide range of applications such as public spaces, waiting rooms and cafes. Seating may include sofa's, arm chairs, stools, ottomans. Seating shall include the following:
- Stable with load rating to 100 kg
- No sharp edges, points or entrapment/pinch points
- Front edge of seat well rounded to avoid compression
- If the intention is to move the seating, a safe method of moving needs to be defined
- Consideration to seat height in relation to table height where it is to be used at a table or bench/bar. Seat height should ensure clearance for knees of largest users 250 mm gap is sufficient
- Options of seating with armrests for users with restricted mobility.
- The following features are also desirable:
- Cushioning on the seat, backrests and armrests (if present)

- No horizontal strut/leg between the front legs of the chair preventing placement of the feet beneath the centre of gravity
- Seat depth should allow users to get benefit from the back support without slouching
- approximately 400 to 450 mm
- Backrest (if present) angle and shape should offer lumbar support
- Seat height should be selected to minimize pressure under thighs- approximately 400 to 450 mm.
- Seat height at a high bench/bar should be approximately 675 to 725 mm and a foot bar should be fitted.

### **2.7.10 Lecture Theatre Seating**

Requirements for lecture theatre seating include:

- Seating shall include the following:
- Stable with load rating to 100 kg
- No sharp edges, points or entrapment/pinch points
- Front edge of seat well rounded to avoid compression
- Consideration should be given to seat height in relation to foldable tablet. Seat and tablet height should ensure clearance for knees of largest users. Tablet height from floor level between 650 to 700 mm
- Tablet arms should be fold down and easy to operate. They must be robust and be free of sharp projections, rough surfaces or features that could cause entrapment of clothing or body parts. They must be of sufficient dimensions to accommodate a tablet or lap top.
- Options of seating with armrests for users with restricted mobility.
- The following features are also desirable:
- Seat height should be selected to minimize pressure under thighs- approximately 400 to 450mm.
- Seat depth should allow users to get benefit from the back support without slouching approximately 400 to 450mm
- No horizontal strut/leg between the front legs of the chair preventing placement of the feet beneath the centre of gravity.
- Backrest angle and shape should offer lumbar support.

## **2.8 DESIGN AND LAYOUT OF COMMON AREAS**

The design and layout of common areas should consider the functions and activities of the area. The design and layout shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code
- AS1668.2: The use of ventilation and air-conditioning in buildings. Mechanical ventilation in buildings
- Officewise – A guide for health and safety in the office (WorkSafe Vic)

For each subsection below also refer to the Design Standard Section 1, *Planning and Architecture* for additional requirements.

### **2.8.1 Office Design and Layout**

Offices vary from multistorey open plan floor layouts to small rooms in terrace houses. Office design should incorporate flexibility of layout, environment, furniture and equipment to suit the functional needs of the users – i.e. tasks and equipment. Providing adequate space in an office for people to operate effectively is essential.

Three types of space need to be considered:

- Primary space- amenities, meeting rooms, lift lobbies and similar areas
- Secondary space- corridors and storage
- Tertiary space – space required in a workstation to accommodate a desk, chair, drawers, filing cabinet, and other necessary equipment

A functional analysis of the needs of workers in modern offices reveals a minimum of 6 square metres per person is required for tertiary space with additional space for secondary and primary purposes. AS 1668.2 recommends an overall 10 square metres per person for building ventilation purposes. In all situations the functional needs of the user –personal space, technology needs, requirement for other equipment and materials, visitors, meeting chairs etc. must be considered.

#### **Office Workstation Layout**

The design of office layout includes the following:

- Distance between heads: minimum 1500 mm to allow adequate functional, mobility and personal space requirements.
- Distance (clearance) between rows of linear desks: minimum 2000 mm measured between front edges of desks.
- Clearance above desks: A clear space of 700 mm above the height of the desktop must be preserved for unimpeded movement of monitor.

Fixed over desk cabinetry/joinery should be avoided.

Copy machines and equipment should recycle toner, use sealed toner cartridges and waste containers, filter exhaust air, emit minimal noise and automatically collate and staple. They should be in a well ventilated and accessible area – not in walkways or obstructing exits. Adequate space for operation and maintenance access must be available.

### **2.8.2 Meeting Rooms**

Meeting rooms vary greatly in size and design and should provide an effective environment for discussion and presentations with adequate acoustic privacy to protect confidentiality and minimise disturbance to surrounding spaces.

- Enough meeting rooms and sizes shall be supplied to allow for groups to conduct meetings.
- Materials used should facilitate dampening of noise. Extensive use of glass and hard surfaces should be avoided unless accompanied by sound absorbing mediums around them.
- Where activities such as hand writing and lap top use are undertaken at a fixed seated height meeting room table, the table height shall be 720 mm measured from floor level to top of table with a maximum desktop thickness of 33 mm and a light, non-reflective,

matte finish. All other dimensions (depth and length etc.) should be determined by the room size and function.

- Select meeting room chairs with features outlined in meeting room selection.

### 2.8.3 Reception Desks/Service Counters

Reception desks and service counters can vary from fixed joinery to adjustable height. In all situations the functional needs of the user group –tasks, equipment and materials, customers, visitors etc. must be considered. Counter design includes the traditional ‘across counter’ models and side by side models.

Counter design shall comply with the following:

- Have a minimum of 1000 mm circulation space behind the counter to allow users space to move, access drawers etc. This may be significantly greater in the case of library service counters where there may be a requirement to move and position trolleys in this space.
- Allow clearance for legs underneath for sitting.
- Avoid fixed cabinetry underneath which projects into the leg space area.

**Standing counter height – fixed:** There should be 1000 mm measured from floor to finished desktop.

**Standing counter height – adjustable:** There should be a range of 900 to 1200 mm measured from floor to finished desktop.

**Sit/stand counter height:** The sit stand range should be 650 to 1250 mm measured from floor to finished desktop.

**Sitting counter height – fixed:** The fixed height should be 720 mm measured from floor to finished desktop.

Counter hob (on patron side) if fitted should not rise more than 250 mm above height of counter measured from floor to finished counter hob.

Counter depth requirement may vary according to the functions of the counter. The minimum recommendation is 750 mm to accommodate all screen-based equipment, focal distance, required desk top items and for displaying and/or signing documents, placement of delivery items etc however the following must be considered:

- Comfortable reach distances across the counter for the user and customer. Maximum reach distance should not exceed 500 to 600 mm
- Consider incorporating a curved or cut out section in the centre of the desktop.
- Adequate depth to meet security requirements.

Workstations located behind the counter/reception must be have a clear sight line to the counter.

Where there is a regular requirement for the user and patron/student to simultaneously view a monitor screen consider back to back screens. If not possible a flexible monitor arm is required.

Recessing a monitor into the desk surface and covering with glass is not recommended as it involves an awkward neck posture and potential glare.

**Duress buttons** if required should be installed within comfortable reach (within 150 mm of the front edge of the desk and in the work zone).

### 2.8.4 **Teaching and Collaborative Learning Spaces, Lecture Theatres**

Teaching and collaborative learning spaces and lecture theatres shall comply with relevant Legislation, Standards and Codes including but not limited to:

- National Construction Code

Collaborative teaching areas should be multipurpose flexible student-centred spaces have a level floor and movable furniture which promote students working together. As such the clearances and space requirements are different from a staff office layout.

Floor plan and layouts shall be designed to maximise eye contact and sight lines between students, staff and visual/teaching aids It should be possible to configure seating to ensure that users do not have to adopt awkward or twisted postures

A solid stable writing surface shall be provided for each student, such as chairs with tablets or tables which may be mobile, flip tables, configurable to many layouts

Minimum clearances between tables should be 1700 mm to allow chair and pedestrian movement

Casual stools to be used at tables, benches, bars or counters should be stable and tip resistant and have a height range of 660 to 760 mm.

#### **Lecture Theatres**

Lecture theatres are generally single function didactic teaching spaces on a tiered or sloping floor surface with fixed seating that has provision for a laptop/notepad, generally without windows and well equipped for audio-visual communication. Multiple electronic screens may be provided to facilitate viewing from all seats

Spatial allowance of 1.1 to 1.3 square metres per student should be allowed for new theatres.

Aisles should be provided on either side of the theatre with a minimum width 1200 mm to enable prime viewing area at front for seats.

Tiered row spacings, distances of seats from aisles must comply to the National Construction Code.

Tiers or step riser should be a minimum of 150 mm. Adequate visual cues on tread and landing shall be provided to aid visibility in dimmed lighting conditions.

A clear view of the lecturer, screens, boards, presentation materials and equipment should be possible from each seated position of the theatre without the user having to adopt awkward postures.

Access to writing boards should be easy without interference from projection screens.

Refer to Design Standard, Section 8, *Fire Protection and Detection Services* for further requirements regarding escape routes, exit doors and exit and emergency lighting.

## 2.9 **DESIGN CHANGE AUTHORISATION**

The requirements and standards noted in the University Design Standards are to be complied with. Any request for change to the requirements of the Design standards must be made on the Modification Request Form.

No design work is to proceed on the basis of the proposed modification until the modification request has been approved in writing.