

Education facilities design standards

This is a mandated standard under the [asset management policy](#).

Overview

The education facilities design standards (the design standards) have been developed to assist architects, designers, builders, contractors, schools and preschools in creating high quality learning environments that optimise the participation of all children and young people. This document also provides reference information for the development of project facilities briefs, detailed planning and technical information for the design of education facilities.

Scope

The standards provide mandatory requirements for all employees and contractors for capital works, medium works, minor works, site funded and maintenance projects at education facilities. The design standards are not retrospective and the current version only applies to projects in the planning and concept phase that have not yet commenced detailed design.

Facilities for school age children must comply with this standard. The early childhood facilities design standard is a separate document that informs the planning and design of new or refurbished early childhood facilities. These facilities may include preschool, long day care, occasional care, integrated services and children's services.

The [outdoor learning environments](#) (OLEs) standard is a separate document that details the minimum and recommended standards for creating and maintaining an OLE for schools and preschools that provides children with optimal learning and play opportunities. OLEs include but are not limited to nature play spaces, outdoor classrooms and playgrounds intended for use by children, young people and the community.

Special education facilities, including special needs classes and disability units, will have additional requirements above the general requirements listed in this document. A portable telephone must be provided in all disability units in line with ICT's [provision of mobile communication devices procedure](#). These additional requirements will be briefed separately on a project specific basis.

Conformity

All other current Statutory Acts, Codes, Standards, Guidelines and Specifications complement this document and must be adhered to. Where products are selected and used it is the responsibility of the manufacturer, design teams, contractors and facility providers to ensure the products used are fit for purpose, compliant to all relevant Australian Standards, robust to complement the environment they are used in, be selected to minimise ongoing service and maintenance and offer value for money.



To meet the requirements of the Industry Advocate use local products and services before selections of foreign products.

All product changes or deviations to the standard made during the design, tender and construction process must be approved in writing by the department.

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Detail

Relevant Legislation, Acts and Regulations

This document has been developed in collaboration with the Department of Planning, Transport and Infrastructure (DPTI) to specify requirements of the department in the design, construction and maintenance of all education facilities.

Education facilities are required to comply with all relevant Acts, Codes and Government Legislation including, but not limited to, the National Construction Code (NCC) (Class 9b buildings and other areas as applicable), referenced and mandatory Australian Standards, the *Environment Protection Act 1993* and the *Disability Discrimination Act 1992*. The department may specify to a higher standard where it is mandatory to comply with specific details for safety, security, maintenance or performance reasons as outlined in this standard. Mandatory requirements are identified by the word “must”.

In line with the NCC and referenced Australian Standards, the design standards are not retrospective and the current version only applies to projects in the planning and concept phase that have not yet commenced detailed design.

[See here](#) for links to the legislation, acts and regulations listed below.

National Construction Code (NCC)

The NCC, incorporating the Building Code of Australia Volumes 1 and 2, and Volume 3 Plumbing Code of Australia, is a mandatory requirement for all design, construction work and facility maintenance work and must be adhered to in all major, medium and minor works, and site managed facility work being undertaken at education facilities.

Individuals can register for free access to the digital NCC by completing a [registration form](#).

Australian Standards

Where Australian Standards have been referenced in the following document, it is expected that the current version is adhered to, as the Australian Standard referenced in this document may be superseded. Australian Standards have not been referenced where they are mandatory as per the NCC. In some circumstances the department's requirements are above those stated in the Australian Standards which will be specifically outlined by the word “must”.

Disability access

Disability Discrimination Act 1992

The [Disability Discrimination Act 1992](#) (DDA) includes obligations for building owners and designers to ensure that as far as reasonable there is no discrimination against people with any disability. In regards to access, the main objective is to provide safe, equitable and dignified access to buildings, services and

education facilities. It is the intention of the DDA that all buildings will eventually comply with the requirements of non-discriminatory access.

The DDA is a Federal Act which overrides the NCC and Australian Standards, and compliance with the NCC and Australian Standards can still leave the building owners liable under the DDA to a complaint of discrimination. Being complaint based legislation, it is not possible to provide information that will guarantee that no complaint of discrimination will be made and the DDA makes no distinction between new, old or heritage buildings.

Disability (Access to Premises – Buildings) Standards 2010

The Disability (Access to [Premises – Buildings](#)) Standards 2010 provide guidance in the design, construction, certification and management of buildings to provide equitable and dignified access to new buildings and when existing facilities are redeveloped. The Premises Standards provide a single set of design and construction requirements and have been developed to work in conjunction with the NCC, and must be complied with for all projects undertaken at education facilities.

Disability Standards for Education 2005

The [Disability Standards for Education 2005](#) is an Australian Government standard that clarifies the obligations of education and training providers and seek to ensure that students with disability can access and participate in education on the same basis as other students. They must be adhered to for all facilities works that impact the accessibility of education services at education facilities for a student/s with disability.

NCC and Australian Standards

New buildings are required to provide access to people with disability in accordance with the NCC and referenced standards including the latest version of AS 1428(Set).

The NCC states where access must be provided (eg to which areas in a school), and the Australian Standard says how it is to be provided.

While the NCC and AS 1428.1 are the legislative requirements, where possible and not cost prohibitive, designs must aim to meet the requirements of AS 1428.2 Design for access and mobility - enhanced and additional requirements – buildings and facilities.

Planning, Development and Infrastructure Act 2016

The [Planning, Development and Infrastructure Act 2016](#) provides for matters that are relevant to the use, development and management of land and buildings, including by providing a planning system to regulate development within the state, rules with respect to the design, construction and use of buildings and other initiatives to facilitate the development of infrastructure, facilities and environments that will benefit the community.

Planning, Development and Infrastructure (Transitional Provisions) Regulations 2017

The [Planning, Development and Infrastructure \(Transitional Provisions\) Regulations 2017](#) set out the requirements for approval of developments in South Australia. Development Approval comprises 2 consents: Provisional Development Plan Consent and Building Rules Consent. Provisional Development Plan Consent (or an exemption given) and Building Rules Consent must be in place before any construction works commences.

Under the Planning, Development and Infrastructure (Transitional Provisions) Regulations 2017, all building construction work must be certified by an Independent Private Certifier for Building Rules Compliance.

Development Approval applications are to be lodged with the State Commission Assessment Panel. Refer to the [Guide for Applicants](#).

Environment Protection Act 1993

The [Environment Protect Act 1993](#) must be complied with for all projects. The objective of the Act is to ensure the development and protection of the environment is managed in a way that will enable people and communities to provide for their economic, social and physical well-being while sustaining the potential of natural and physical resources for current and future generations.

Safety in Design (SiD)

Work, Health and Safety (WH&S) Legislation requires the consideration of potential risks during the life of a design to ensure that it is safe to build, operate, maintain and demolish. SiD principles and guidelines aim to ensure, as far as is reasonably practical, that any risk to the health and safety of all relevant persons involved in every stage of a project are properly managed, minimised and eliminated.

SiD principles and guidelines must be applied throughout the project lifecycle. Risks in design are to be clearly identified, registered and controlled by designers at every project stage including concept development, detailed design, construction and post construction. A SiD register is to be prepared as part of the concept phase and updated for each project phase. The Residual Risk document must be handed to the department at closure/handover of any project works.

Refer DPTI Guidenote G125, Principles of Safe Design for Building Projects.

Earthquake actions in Australia AS 1170.4

The requirements of Australian Standard AS 1170 Structural Design Actions, Ministers Specification 'Upgrading Health and Safety of Existing Buildings' and [DPTI Guidenote P045](#) 'Strengthening Existing Buildings for Earthquakes'. This policy requires seismic assessment and, if necessary, earthquake mitigation works be included in any significant alteration proposed to an existing government building/asset. Additional support and information can be provided by DPTI Manager Professional and Advisory Services.

South Australian Urban Design Charter

The South Australia Urban Design Charter must be considered in all major capital works and redevelopments that incorporate urban design or have the capacity to influence the quality of urban design outcomes. Refer to the [Urban Design Charter](#).

Design Principles

The following design principles describe priority considerations in the planning and design of contemporary learning environments to ensure education facilities are connected to their community, safe, accessible, inclusive and environmentally responsive. These principles must guide the planning and decisions for new building work and refurbishment projects.

Community and context

Education facilities provide a positive contribution to the community as a civic heart that fosters a sense of belonging, ownership and pride, inspires learning and teaching and continues to provide broader public benefits over time. Design solutions must:

- Respond to, integrate with and enhance the positive qualities of the local context, including built form, character and materiality, landscape and heritage (including Aboriginal cultural heritage).
- Use site conditions such as topography, orientation, landscape character assessments, view corridors and climate to inform the design of buildings, their spatial organisation and the spaces created in between.
- Ensure the school is complementary to its community and broadly considers demographics, future growth, history and culture.
- Integrate with adjoining community developments and facilities where possible so the potential for shared facilities may be identified and maximised. Consider opportunities to stimulate the local economy and encourage investment through good, safe connectivity to local centres.
- Inform and respond to any current or future structure planning or strategic visioning being undertaken on adjacent land by Council or other authorities through the master planning process.
- Prioritise intuitive, logical wayfinding for all users (including after-hours community users) across the site and between buildings through clear and legible spatial organisation and movement hierarchy. Prioritise the integration of secure lines with the overall built form.
- Reflect the culture, educational model and vision for the school through the experience of the built environment and foster a sense of belonging, ownership and pride in the buildings and grounds.
- Communicate with families and the community through verbal and written messages that create a visibility of curriculum and an open invitation of involvement.
- Consider the landscape design as an integral part of the project, providing amenity and comfort, contributing to the streetscape and connecting the site into its immediate context. Maximise opportunities for external spaces to provide learning environments as well as opportunities for play.

- Consider key walking and cycling routes to and from the school to support local access and safe journeys with a focus on nearby public transport, public facilities, services, open space and local centres.
- Minimise the lineal extent of car parking that interfaces with streets and provide a landscaped buffer where parking is required.
- Maximise passive surveillance from the buildings, particularly to communal areas and clearly define access for after-hours use. Prioritise safety through the use of [Crime Prevention through Environmental Design principles](#).
- Reduce the impact from adjacent noise sources, as well as considering the impact of noise generating facilities on neighbouring properties.
- Explore opportunities to integrate public art for interest and cultural meaning.

Site analysis

All projects which involve the construction of new facilities or redevelopments must undertake a site analysis to determine the feasibility of the project and identify any major cost considerations. The size of the project will determine the extent of the site analysis which is required, however the following must be considered:

- Heritage Buildings.
- Bushfire Protection Areas and relevant Building Requirements.
- Climatic conditions as per environmentally sustainable design principles.
- Disability access and the learning and participation needs of children and students with a disability.
- Infrastructure and services – water supply, power supply, sewerage, telecommunications, stormwater and stormwater treatment.
- Power supply – large projects may require an infrastructure upgrade for the sites transformer or main switch board which can increase costs significantly.
- Native flora and fauna including significant trees.
- Soil type and the presence of rock, deep uncontrolled filling or other problematic conditions in the soil which may affect building footings and structure.
- Soil contamination which may require management, containment and clean-up as per the *Environment Protection Act 1993*.
- Indigenous heritage and native title.
- European heritage sites of local and state heritage significance.
- Watercourses within or adjacent the project area.
- Noise and vibration impacts to any historical structures, existing buildings, neighbouring properties and any nearby operations that would be adversely affected by noise and vibration.

- Short and long term impacts on air quality.
- Vegetation.
- Fauna.
- Phytophthora (plant damaging pathogen impacting crops).
- Acid sulphate soils.
- 100 year flood levels and minimum building floor levels.
- Site assessment for contamination including a site history analysis and testing where earthworks volume >100t and/or site history assessment identifies a contamination risk.
- Removal and decommissioning of existing underground oil storage tanks.
- Site hazardous materials register.
- Site access and traffic management (to be negotiated with the local council)

The following Guidenotes must be referred to:

- G37 – Site Contamination.
- G96 – EPA Environmental Information.
- G100 – Selection of Site Contamination Consultant.
- G101 – Using a Site Contamination Auditor.
- G103 – Development Proposals for Heritage Assets.
- G125 – Principles of Safe Design.

Heritage places

Prior to any work being undertaken at an education facility, the Australian Heritage Places Inventory, [SA Heritage Register](#) and Local Heritage Register must be checked to confirm if education facilities are Heritage listed and require development approval.

The DDA intention for all buildings receiving upgrade works to comply may not always be possible for heritage places where the cultural significance stands to be unacceptably harmed.

Advice from a suitably qualified heritage advisor may be required where a heritage place is affected by works. Advice is also available from the [Department of Environment and Water, Heritage SA on matters relating to conservation approach and development approvals for heritage places](#).

Refer DPTI Guidenote G103 – Development Proposals for Heritage Assets.

Disaster resilience in assets and facilities

The department's [Emergency management policy](#) provides details of the requirements in relation to disaster resilience in assets and facilities and outlines the requirements for new and existing builds in designated

bushfire prone areas. Contact the [Security and Emergency Management team](#) to obtain a copy of the current policy.

All new buildings, structures and refurbishment projects commissioned, funded or approved by the department must comply with the relevant sections of the Building Code of Australia (BCA), current Australian Standards, Ministerial Building Standard MBS 008 Designated bushfire prone areas - additional requirements and Department for Infrastructure and Transport (DIT) requirements including 'Seismic Restraint of Engineering Services' (DIT Guidenote G172) and 'Strengthening Existing Buildings For Earthquakes (DIT Policy PO45). Refer [building or developing in bushfire areas](#) for more information.

New buildings and structures commissioned, funded or approved by the department for construction in designated bushfire prone areas must comply with the provisions of AS 3959-2009 in respect of the bushfire attack level (BAL) attributed to the site, or to a minimum standard of BAL 12.5 (whichever is the higher).

Bushfire prone areas are identified in the bushfire hazard [overlays](#) to the [Planning and Design Code](#). Schools and preschools located in Hazard (bushfire – outback), Hazards (bushfire – regional) and Hazards (bushfire – urban interface) areas must also be protected from bushfire (including ember attack) in accordance with the above departmental requirements.

The department applies a bushfire risk rating category to all sites based on their bushfire attack level (BAL). Categories applied are referred to as R1 (extreme or high risk), R2 (high risk), R3 (medium or low risk) or NR (negligible risk). These categories are used to determine the appropriate level of bushfire mitigation and asset protection measures required for individual locations. All sites and services located in a designated bushfire prone area and having a BAL of 19 or higher must have a designated bushfire shelter.

The designated bushfire shelter for a relevant site or service may be located at that site or any other suitable off-site location. Where the designated bushfire shelter is a building or part of a building, it must be constructed or adapted to meet the provisions of AS 3959-2009 for the applicable BAL. An off-site bushfire shelter must not be situated more than 800 metres from an educational site or service.

A designated bushfire shelter is not required for sites and services with a BAL of 12.5 or lower.

For further information on bushfire mitigation and asset protection measures refer to the [Emergency management policy](#) or contact the [Security and Emergency Management team](#).

Design for participation and learning

Due to the specialised nature of education facilities, greater consideration must be given to the design of schools to ensure they are accessible for and optimise the learning and participation of all children, including children with disability, as well as provide access to the community.

The design and construction of new facilities and the redevelopment of existing facilities must consider the principles of Universal Design and meet the requirements of the NCC, the Premises Standards, Disability Standards for Education, and referenced Australian Standards to ensure equitable access.

Universal Design

Consider and incorporate the following principles of Universal Design:

- Provide for equitable use; privacy, security, access and safety are equally available for all users.

- Design elements accommodate a range of individual preferences and abilities.
- Space is intuitive and easily understandable regardless of user's experience, knowledge, language skills and cognitive capacity.
- Necessary information about the use of space is communicated effectively regardless of ambient conditions and user's sensory abilities.
- Design minimises hazards and adverse consequences of accidental or intended actions.
- Spaces can be used efficiently, comfortably and with a minimum of fatigue.
- Appropriate size and space is provided for approach, reach, manipulation and use regardless of user's body size, posture or mobility.

Universal Design and accessibility requirements have been incorporated into relevant sections of the standards. The following sections include specific requirements which must be adhered to:

- [Acoustics](#)
- [Doors](#)
- [Lifts](#)
- [Information and communications technology \(AV solutions, hearing augmentation\)](#)
- [Tapware \(drinking troughs/fountains\)](#)
- [Joinery](#)
- [Site access \(site access, building access and ramps\)](#)
- [Parking](#)
- Please also refer to DPTI Guidenote G119 Disability Access Checklist for general government building requirements.

Further information on Universal Design principles are available [here](#).

Disability access in existing schools

Due to the nature of school infrastructure, it is unlikely that an entire school campus will be accessible unless the school was recently designed and built with full disability access provisions. However, building standards including the NCC, Australian Standards and the Premises Standards are continually under review and as such even if a school was designed to the latest standards at the time of construction, this does not mean that the school will comply with the current version of the standard. Disability access standards are not intended to be applied retrospectively.

A site or corporately managed funded refurbishment project, enrolment of a new student with disability or change in needs of an existing student may initiate an upgrade or new disability access provisions in existing facilities.

Where alteration works are to be carried out to only part of a building, compliance with disability access requirements may only be applicable to the area being altered however current and future student needs must be considered and options provided. Where works are carried out and include site works, appropriate

site access requirements must be considered. Refer also to Minister's Specification 'Upgrading Health and Safety of Existing Buildings'.

Advice must be sought from a qualified disability access consultant when undertaking any refurbishments or new building works to ensure disability access solutions optimise the learning and participation of all children and young people.

Minimum facility upgrades

The needs of the student/s will ultimately guide what infrastructure solutions are required to enable the school to be accessible. However the following facilities upgrades must be met as a minimum to provide equitable access for students with disability:

- **Pedestrian Access:** Students must be able to access the site from the principal pedestrian entrance. Refer to the section [Site access](#). This does not always imply that the main entrance is the principal pedestrian entrance. In some cases an alternative entrance is the main entrance used by students and as such the student must be able to access both entrances along with their peers.
- **Accessible Parking:** A disability access park must be provided as per section [Parking](#).
- **Accessible Education Services:** Students must be able to access appropriate learning programs at the education facility.
- **Accessible outdoor learning:** Students with disability must have equitable access outdoor learning environments that support their health and well-being. This does not imply that every part of the school's outdoor learning environments (OLE) must be accessible; however the school's OLEs must incorporate reasonable accessibility provisions to enable all users to access OLEs in an inclusive manner and are able to access education services. Refer to the [Outdoor learning environments standard](#) for more information.
- **Student movement:** Consultation with the student and/or parent/caregiver must occur where fencing or a facility upgrade is proposed to improve the safety of the site and impacts the accessibility of education services for students. Where multiple students are impacted consultation must occur with each student or parent/caregiver as per the Disability Standards for Education 2005.

Diversity and choice

Contemporary learning spaces empower and enable students to take greater responsibility for their own learning through choice and control over what they do, where they do it and with whom they engage.

Contemporary learning space design recognises that the physical setting is integral to the learning process and enriches the student experience through the physical form and the composition of its buildings, its internal setting and its external environment.

The design of a learning community generates a sense of journey for educators, students and visitors as they move between internal and external settings of various scale and purpose, but which are shaped by an overriding intention to build community, invite occupation and use, and to promote curiosity about the activity of other. The learning environments within are able to be modified to form and shape the learning, research, projects and experiences of children, young people and adults.

Contemporary learning spaces provide a diversity of learning settings that support the development of critical thinking and problem solving, analytic capabilities, curiosity and imagination.

These learning settings include:

- Specialist disciplinary areas to investigate and deeply engage with specific curriculum areas
- Interdisciplinary learning, thinking and working which draws upon several disciplines to identify a problem and develop new and innovative solutions in order to solve a problem.
- Practical hands-on areas for learners to experiment, use new technologies, test ideas, make and create innovative solutions to real and complex problems.
- Personalised, individual or small group areas for inquiry based learning and critical and creative thinking.
- Communal areas for cross fertilisation of ideas and socialisation.

Durability and adaptability

Education facilities need the capacity to adapt to new teaching and learning approaches over the design life of the building:

- The scope to undertake diverse tasks in spaces that offer students diversity and choice about their place in the learning setting.
- This include spaces for collaboration and interaction amongst students and educators and to serve as a stimulus for conversations on common interests.
- The ability to manipulate space to suit different group sizes, activities, communication tools and presentation modes is critical to maximise the flexibility of learning spaces.
- This includes the use of flexible walling systems, the creation of zones within a larger space, 3D use of space using vertical wall surfaces, writable wall surfaces, moveable joinery, wireless technology, AV systems and the ability to easily re-arrange loose furniture.
- Incorporate structural systems that enable cost effective internal refurbishments
- Use durable materials and careful detailing that will weather well in exposed conditions, endure the rigors of school environments and be easily maintained.
- Design for future potential expansion or contraction.
- Consider future-proofing and allow for technological advances.
- Prioritise materials with good whole of lifecycle costs.

Indoor/outdoor learning

- Outdoor learning environments are equally as important as indoor learning environments.
- Outdoor learning areas should provide seamless, connected learning spaces that operate as an extension of the internal space.

- Consider ways to use level changes and transition between external ground and internal floor levels to create interest and useable space for outdoor activities.
- Provide shade cover and verandahs over external spaces where possible.
- Outdoor learning environments can include landscape areas and transition zones between existing outdoor areas.
- Refer to the departments [Outdoor learning environments standard](#) for more information.

Environment and sustainability

Environment, context and sustainability are integral components in the design and construction of education facilities. Buildings and landscape provide the opportunity to demonstrate sustainability in action and can be used as learning tools for the benefit of the whole community.

Environmental sustainability principles have been incorporated into relevant sections of the standards to ensure education facilities create learning environments that promote social, environmental and economic sustainability and work towards improving the environmental performance of education facilities to reduce operation costs and load on the electricity network.

Site design

- Consider the placement of buildings to minimise issues of overshadowing, including to key external spaces.
- Consider site configuration that encourages healthy habits, active travel and incidental activity and prioritise pedestrian movement.
- Minimise earthworks and work with existing topography as much as possible.
- Provide covered areas for protection from sun, rain and wind.
- Integrate landscape, planting and water sensitive urban design to enhance amenity and building performance.
- Maximise retention of existing vegetation on site.
- In order to reduce the solar reflectance and heat island effect of the site, a minimum 50% of the total project site area for new schools must comprise of landscaping elements, including vegetation, green roofs, hard-scaping elements shaded by overhanging vegetation, water bodies and/or water courses. Where this is not reasonably practicable, written approval must be gained from the department.

Site infrastructure

- Consider on-site storm/grey water treatment, reclamation and re-use systems.
- Optimise waste management systems.
- Consider using renewable energy sources.

Building design

- Maximise opportunities for connections to nature through physical connection with outdoors, external outlook and use of natural materials, textures and colours.
- Design the building according to the climate zone where it will be located. Refer to the [Your home](#) website for more information:
- Building orientation is important to maximise access to natural daylight and control solar access.
- Position buildings with the long axis running east/west to maximise natural daylight from the north and south where possible.
- Maximise winter sun inside the buildings and minimise summer sun.
- Maximise glazing on north and south facades and provide shading devices for solar control to the northern façade and glare control to the south. Minimise windows on east and west facades to control glare and heat loads.
- Provide passive solutions to minimise use of large mechanical cooling. Air movement is the most important element of passive cooling. It cools people by increasing evaporation and requires both breeze capture and fans for back-up in still conditions.
- Natural ventilation has measurable improvements in alertness and engagement. Provide opportunities for user control over external openings for fresh air. All windows to learning areas and occupied spaces (ie break-out areas, teacher prep etc) are to have openable sashes.
- Provide CO₂ monitoring linked to mechanical ventilation as part of heating, ventilation and cooling systems.
- Maximise energy and water efficiency through the appropriate selection and programming of equipment and fixtures.
- Incorporate water capture for re-use in toilet flushing or irrigation.
- Provide the appropriate level and type of insulation. Establish whether the insulation is predominantly needed to keep heat out or in (or both). Insulation must cater for seasonal as well as daily variations in temperature.
- Take a whole-of-lifecycle approach when considering cost, including operational, and consider wider public benefits over time.
- Incorporate initiatives to reduce carbon footprint through materials selection, manufacture and on-site construction activities.
- Where possible use sustainably sourced products, recyclable materials and consider material lifecycles.
- Maximise the use of prefinished, robust materials to reduce on-going maintenance.
- Refer to [materials and finishes](#) in this document for further information.

Building performance

All new and substantially refurbished buildings must undergo energy efficiency assessment during the design phase using a tool that satisfies the Australian Building Code Board's Protocol for Building Energy Analysis Software and provide this documentation to the department for review.

The following minimum building performance standards apply to all new buildings:

- Building façade performance: must be minimum 10% better than NCC deemed to satisfy minimum energy efficiency requirements.
- Greenhouse Gas Emissions: must be minimum 10% improvement when compared to the deemed to satisfy minimum energy efficiency requirements in the NCC, with a preference for 30% improvement.

Achievement of these performance requirements must be proven by undertaking computer simulation modelling following the NCC JV3 methodology for energy efficiency, and the Green Building Council Australia Green Star Guidelines for Greenhouse Gas Emissions modelling. Provide the performance assessments and appropriate supporting evidence as part of the concept design report.

Green star accreditation

All new schools and major new builds valued at \$4 million and over must target initiatives that would achieve a minimum 5 star green star design and as built rating, with a preference for 6 star rating, on a self-assessed basis. The project brief will confirm if green star certification is required and the rating that is being targeted. Details on targeted initiatives and self-assessed ratings are to be provided as part of the concept report.

All refurbishments must target the following green star points however a formal green star assessment and rating is not required unless identified in the project brief:

- [Site Design – heat island effect](#)
- [Acoustics](#)
- [Flooring – VOC emission limits](#)
- [Windows – daylight, views](#)
- [Toilet Provisions – WELS ratings](#)
- [Materials and finishes – life cycle analysis, VOC emission limits](#)
- [Heating, ventilation and cooling \(HVAC\) – indoor air quality](#)
- [Mechanical exhaust systems – indoor air quality](#)
- [Power and gas supply – metering and monitoring](#)
- [Internal lighting – lighting comfort](#)
- [External lighting – light pollution](#)
- [Curtains and blinds – glare reduction](#)

- [Tap ware – WELS ratings](#)
- [Toilet amenity fittings – WELS ratings](#)
- [Showers – WELS ratings](#)
- [Car parking and bike provisions](#)
- [Landscaping - irrigation](#)
- [Stormwater and sewerage – flood management](#)

Design specifications

This section of the document provides details on the performance criteria of building elements, building services, finishes, fixtures and fittings and site infrastructure. Departures from these requirements are to have written approval from the department.

DPTI Guidenotes and Drawings

DPTI's Guidenotes and Drawings are referred to throughout the document and can be accessed through [DPTI's bpims library](#).

Additional resources can be sought from DPTI Manager Professional and Advisory Services.

Note: To search for Guidenotes and Drawings, use the referenced identifier (eg DG44) to search for the document or drawing. For a full list of DPTI Standard Drawings please search for DG04 – DPTI Standard Drawing index. A list of [education specific Guidenotes and Drawings](#) is available in the supporting information.

Roof and roof plumbing

- Large roofs facing north, northeast and northwest must be designed to structurally support current and/or future solar PV system installations.
- Roof sheeting must be 'Zincalume' or 'Colorbond' 0.48mm BMT steel or equivalent. Avoid 'Zincalume' where reflected glare may cause problems to neighbours or to upper floors of adjoining buildings.
- Box gutter systems, and any gutter that could overflow internally into the building, must not be provided in any new buildings. Where box gutters are the only solution in the refurbishment or extension of an existing building, or need to be replaced in existing buildings, written approval must be sought from the department. Where refurbishment or extension involves replacement of an existing box gutter opportunities to increase box gutter capacity and improve the design to provide adequate overflows must be investigated. Where new box gutters are approved as part of a refurbishment or extension box gutters must not be able to overflow internally into the building and must be open ended to a rain head with unrestricted overflow.

- Roofs to new buildings must be installed at a minimum of 5 degrees to reduce the likelihood of leaks and water damage. Where roof pitches lower than 5 degrees are the only solution due to existing conditions written approval must be sought from the department.
- Thermal insulation must be provided to all roofs/ceilings which form part of the building envelope. Provide at least 10% higher combined roof and ceiling insulation R-Value than the NCC minimum total R-Value requirement.
- Consideration must be given to heat reflective coatings to reduce heat gain. A lifecycle analysis comparing the heating and cooling load compared to increasing insulation and/or heat reflective coatings is to be included in concept reports for consideration by the department.
- Roof colour must be light in colour to reduce summer heat load, unless inappropriate for the local environment eg glare or cultural/heritage requirements.
- Glazed roofs are not accepted.
- Gutter height must be a minimum 2400mm to restrict access by individuals to the roof and damage to gutters.
- Keep valleys to a minimum in bushfire protection areas to prevent the build-up of debris and/or the trapping of embers.
- Insect and bird proofing to roof sheeting must be provided.
- Continuous tray flashing extending from the ridge of the roof must be provided for all roof penetrations.

Skylights and solar tubes

Skylights or solar tubes may be used to provide additional natural daylight in rooms with limited window area or to reduce the need for artificial lighting. Skylights or solar tubes must not exceed 5% of the floor area of the room or space served and have transparent or translucent elements that comply with NCC Section J Solar Heat Gain Coefficient and conductivity value (U-Value).

Solar tubes are preferred over skylights as:

- There is reduced heat load compared to traditional skylights.
- Reflective tubing allows system to be located around obstacles and services in and on the roof.
- Diffuser systems spread light more evenly throughout the room.

It is recommended that solar tubes:

- Are dimmable when low light levels are required for example during audio visual presentations.
- Include options for additional insulation to improve thermal performance.

The following must be adhered to:

- Skylights and solar tubes must be installed to manufacturer's specifications, flashed back to the roof ridge and must be oriented and designed to avoid direct sun shining into learning areas.

- All solar tubes and skylights must have safety mesh conforming to AS/NZS 4389 – Safety mesh or engineered weld mesh installed.
- Clear roof sheets can be used to introduce light into large areas such as activity halls. Clear or translucent sheeting must be of webglass fibreglass material. Wire mesh must be installed underneath all clear and translucent sheeting conforming to AS/NZS 4389 - Safety mesh.
- Ensure purlin centres are compatible with skylight sheeting material.
- Skylights and solar tubes must not be located directly above ceiling fans to avoid potential strobing effects.
- Skylights and solar tubes must not be provided in facilities located in bushfire protection areas.

Downpipes

- Downpipes may be Zincalume steel or PVC. Where Zincalume steel downpipes are used, they must be a minimum of 1mm thick up to 2000mm above ground level to reduce the likelihood of damage. Where PVC downpipes are used they must be minimum 100mm sewer grade, paint finish.
- Single storey downpipes do not require cleaning eye as they can be cleaned from the gutter.
- Double storey downpipes require a cleaning eye and are to be made vandal proof with Tek screws.
- Internal downpipes must not be provided.
- Downpipes must be fixed at the top and bottom for each storey of building as close as practical to the building or post face to reduce the likelihood of damage and to avoid them being used to climb on to roofs.
- Avoid use of offsets at the base of downpipes. Run downpipes directly into PVC stormwater riser which must finish a minimum of 75mm above paving level.
- Downpipes must consider the location of adjacent buildings and services such as rainwater tanks to restrict access to roofs.
- 100mm minimum diameter or appropriately sized square downpipes must be provided to all buildings to prevent tennis balls being lodged in them.
- Wet systems must be avoided wherever possible.
- In reactive soils construct flexible joins and expansion joints for stormwater at the building line. The type of joint required will depend on soil conditions.
- Domed ball guards must be provided to all downpipe gutter outlets.

Ceilings

- All ceiling linings must meet the fire hazard properties detailed in Specification C1.10 of the NCC Volume 1.
- The minimum ceiling height in learning areas must be 2700mm.

- Ceiling finishes in a light colour are preferred to maximise light reflectivity and reduce reliance on artificial lighting.
- Insulation in ceilings must be fire resistant polyester. Glass wool or mineral fibre type products must not be used in ceilings.
- Where new services are installed at the same time as new ceiling linings an integrated and coordinated ceiling plan must be prepared showing all ceiling access hatches, HVAC equipment, light fittings, security, AV, data and other fixtures. Provide coordinated ceiling plans for approval by the department prior to contractor procurement.
- Ceiling spaces must be appropriately sized and fully accessible to allow for services to be installed and modified, especially data services. Ensure that adequate access is also available between wall cavities and ceiling spaces for service modifications.
- Special attention must be given to acoustic requirements of areas where separation is required and where significant noise can be generated, such as workshops and laboratories.
- Avoid exposed roof trusses and ledges at ceiling level which collect dust, due to cleaning maintenance limitations and concerns about allergies.

Walls

External walls

- External cladding must meet the requirements for AS 5113 - 2016.
- External cladding must be non-combustible in accordance with the NCC C1.9 (e) regardless of the type of construction required by NCC Table C1.1.
- The preference is for materials that are pre-finished and very durable, do not require additional coatings to reduce the effects of damage and have minimal maintenance requirements.
- Sheet materials or painted surfaces are preferred to be in small sections for ease of replacement in case of damage.
- Compressed fibre cement sheet and cladding systems must be minimum 9mm thick.
- Sheet materials that have a surface coating that can be scratched or damaged and cannot be repaired on site must not be used at low level.
- Aluminium composite cladding must not be used.
- External feature timber wall cladding must only be installed in small sections and where completely protected from the weather.
- Any timber or wood composite product fixed externally or abutting a building (including floor decking) must:
 - meet the requirements of AS 5113 - 2016, or

- be tested and certified to withstand exposure up to a minimum BAL-29 in accordance with AS 3959 - 2009 Construction of Buildings in bushfire-prone areas regardless of the bushfire risk rating of the school. For schools located in bushfire protection areas requiring construction above BAL-29 comply with the requirements of the relevant bushfire attack level of that site.
- Consider the finish and colour of metal sheet cladding to reduce the possibility of glare.
- Corrugated sheet metal must not be specified horizontally as this increases cleaning, maintenance and weatherproofing requirements and can create a safety hazard for finger entrapment at junctions and flashings.
- In situations where new or refurbished buildings have a precast concrete façade, are in areas that are exposed to public access, or are approved by the department for specific vandalism prone areas, it is recommended anti-graffiti protection be applied at installation. Only semi-sacrificial or non-sacrificial coatings are preferred in these areas and coatings must be maintained to manufacturer specifications. Sacrificial coatings must not be specified due to issues with ongoing maintenance.

Internal walls

- All internal wall linings must comply with the fire hazard properties detailed in Specification C1.10 of the NCC Volume 1.
- General learning areas, circulation spaces and high impact zones must have 13mm high impact sheeting as a minimum unless approved in writing by the department.
- Internal linings must be of a single thickness for the full height of the wall to allow for ease of installation, maintenance and replacement.
- Wall finishes in a light colour are preferred to maximise light reflectivity and reduce reliance on artificial lighting.
- Provide movement joints between any dissimilar materials.
- All stud walls and noggings must be designed and constructed to meet the manufacturer's required installation specifications for internal linings. Provide deflection heads to steel studwork. All areas must have noggings at 150mm above floor level (AFL) to support skirtings and 1350mm maximum centres, or at changes in wall linings, AFL. All metal noggings must have proprietary (>32mm) holes for services pre-punched in them to facilitate new and future services being run.
- Refer to the separate section on [acoustics](#) for internal wall acoustic treatments.

Toilet amenities

- Extensive refurbishment projects (ie reconfiguration of toilets including movement of toilet fixtures) and new toilet facilities are to provide full height stud framing, acoustic insulation and moisture resistant wall linings extending from floor level to the underside of the ceiling.
- Internal wall linings to stud frames in student amenities must be fibre reinforced cement, minimum 9mm, with control joints.

- Partition systems to form fully enclosed toilet cubicles are only acceptable in minor toilet refurbishment projects where existing fixtures and partitions are being replaced in their current location. The use of partition systems instead of full height stud framing must be approved by the department. Partition systems must be 30mm fibre cement sheet construction and all wall panels, frontals and doors must extend from floor level to the underside of ceilings.
- 13mm compact laminate partition systems are only accepted in toilet facilities for reception to year 2 students. These partition systems are acceptable at 1800mm height up to a maximum 2100mm height. Doors, frontals and partition walls must extend from floor level.

Wet area splashbacks

- Provide minimum 300mm high splashback to all walls above bench tops that contain sinks. 3mm to 5mm caulked gaps are required to all benchtop splashbacks, floor and wall junctions in wet areas.
- Preferred materials for splashbacks in student areas are flush sheet materials such as laminated panels, stainless steel, aluminium or acrylic sheet for ease of cleaning. Glass splashbacks are not accepted.
- Glass splashbacks may be used in staff areas. Do not install electrical accessories on any glass splashbacks.
- Provide resilient finish extending from floor to minimum 1200mm AFL behind washing machines and ovens.

Acoustics

Context

Contemporary pedagogy is supported by flexible learning environments which may use operable systems such as sliding doors and operable walls to create different arrangements and connections between learning spaces.

Contemporary and flexible learning environments can provide for a level of acoustic separation however typical learning activity will always be audible and intelligible across an operable or open system even where an acoustic rating is specified.

The general approach for acoustics in a contemporary teaching environment is to:

- Ensure the reverberation time in the space is as low as is practicable as this reduces the potential for sound to build up in common spaces, increases speech intelligibility and provides learning benefits for children.
- Optimise the performance of any operable system between spaces where it is identified by the school that flexibility in the use of the space is more important than acoustic separation between spaces.
- Pursue a fixed partition and multiple door separation arrangement for a space where it is identified by the school that acoustic separation is more important than flexibility in the use of that space.

- Ensure the end users understand and acknowledge the acoustic limitations of using an operable system between spaces.

The design of education facilities must, as a minimum, take into account the following acoustic issues:

- Reverberation (ensuring the build-up of sound does not affect the usability of each space).
- Acoustic separation (ensuring the noise transfer between different areas is appropriate for the end user).
- Internal noise levels from mechanical services (ensuring the noise from the air conditioning systems is at a satisfactory level within each space).

In specific circumstances, the following acoustic issues must also be taken into account:

- The appropriate environment for specific music tuition and performances.
- Satisfactory internal noise levels from traffic.
- Satisfactory internal noise levels from rain.
- Satisfactory external noise levels in designated outdoor learning areas.
- Reasonable environmental noise levels from a school to a residential area, as might occur with a music centre, new outdoor area or school gymnasium.
- Mechanical plant and extraction systems.
- Impact isolation for a gym or performance space located above a noise sensitive area.

Where these specific circumstances arise, they must be addressed by an acoustic engineer and due to their specific and bespoke nature, are outside the scope of these design standards.

The acoustics section must also be read in conjunction with:

- ICT & communications; for information relating to hearing augmentation systems.
- Doors; for information relating to operable systems between spaces.
- Flooring; for information relating to the preferred floor surface.

General requirements

The following must be complied with:

- Specialist acoustic advice must be sought from a certified acoustic engineer for all new buildings and significant redevelopment/refurbishment works to provide quality advice on the most appropriate design, details and materials to ensure that the required objective performance requirements for reverberation times, acoustic separation and design sound levels are met.
- Acoustic treatments must consider the needs of students with Autism Spectrum Disorder and Foetal Alcohol Spectrum Disorder who may be affected by poor acoustic performance. Obtain advice from the department's Disability Policy and Programs team for specific information to support special needs students.

- Where acoustic separation is more important than flexibility between spaces:
 - the internal walls which separate general learning and/or office areas must extend past the ceiling to the underside of the roof or floor structure above.
 - the walls must not incorporate operable elements.
 - the walls must achieve the rating in this design standard.
- Where flexibility between spaces is more important than acoustic separation:
 - the internal walls which separate general learning and/or office areas must extend past the ceiling to the underside of the roof or floor structure above.
 - the walls can incorporate operable elements provided the operable elements achieve the rating in this standard and incorporate airtight seals.
 - the overall wall and door system must achieve the rating in this design standard.
- Noise generating spaces such as design and technology workshops and music studios must not be located adjacent to noise sensitive spaces such as general learning areas and offices, without specialist acoustic advice.
- Interdisciplinary and open plan learning spaces must have a high level of acoustic absorption through the specific selection of ceiling finishes and wall panels in order for the space to be functional for multiple uses.
- In the absence of a specific requirement in this design standard, learning and support spaces must take all reasonable and practicable steps to achieve the [Association of Australasian Acoustical Consultants \(AAAC\) Guidelines](#) for reverberation times, or internal noise levels or acoustic separation as relevant. The AAAC is the Association of Australian Acoustical Consultants, a not for profit peak body representing professional Member firms with acoustic expertise.

Reverberation

Reverberation time is a measurable quantity and represents the time taken for sound to decay within a space. The longer the reverberation time, the greater the “build up” of sound will be within the space. For school environments, a short reverberation time is required to assist with speech intelligibility and minimise the build-up of noise.

Reverberation time is dependent on both the surface finishes, and the size of a space. A smaller space with “soft” surface finishes that absorb noise (such as acoustic ceilings and carpet) will have a short reverberation time; whilst a larger space with “hard” surface finishes that reflect noise (such as plasterboard, vinyl and glass) will have a long reverberation time.

A feature of a contemporary pedagogical environment is the flexibility to open up spaces with multiple concurrent activities. A lower reverberation time is essential for learning outcomes in such an environment. It is important that both the acoustic engineer and architect co-ordinate to deliver the appropriate extent of absorption to a space, as both the ceiling system and a portion of the wall surface will need to be dedicated to specific acoustic treatment in many cases.

The following standards for the reverberation time will require an extensive and specifically designed amount of acoustic absorption. The standards have been developed based on the Australian Standard and the AAAC Guidelines for Educational Facilities Acoustics:

Reverberation time

Type of occupancy/activity	Reverberation time (seconds)
Gymnasium	2.0
Multi-purpose halls	1.2
Workshops	1.0
Laboratories	0.8
Dance studios	0.8
Assembly spaces	0.8
Lobbies or corridors with lockers	0.6
Music and drama spaces	0.6
Open plan teaching environment with all doors open	0.6
Multimedia spaces	0.6
Staff Prep and offices	0.6
GLA secondary doors closed	0.6
GLA primary doors closed	0.4
Spaces for students with special learning needs.	0.4

Acoustic separation

To provide an objective measure of the acoustic separation provided by a partition, reference is made to the “Weighted Level Difference” (D_w) descriptor, which is a measurable quantity for an overall partition system.

The D_w is different to the “Airborne Noise Rating” (R_w), of a partition. The R_w relates to the partition construction alone and does not account for the weaknesses introduced by installation, such as the quality of the junctions or ceiling systems. In order for a partition system to achieve the required D_w , it will need to be supported by the appropriate detailing as provided by an acoustic engineer, documented by the architect and then implemented by the builder.

Weighted Level Difference (D_w)

Type of spaces	Minimum weighted level difference (D_w)
Any two spaces separated by a standard door arrangement	25
Internal walls separating GLAs, open learning areas and teacher preparation areas, and between indoor learning areas and external learning areas, where it is identified by the school that flexibility in the use of space is more important than acoustic separation between spaces.	30

Internal walls separating GLA's, open learning areas, teacher preparation areas and office areas where acoustic separation is more important than flexibility.	40
Internal walls separating GLA's, open learning areas, teacher preparation areas and office areas from workshops and music spaces. Acoustic requirements for these walls must be specifically determined by an acoustic engineer.	45
Internal walls separating music spaces; acoustic requirements must be specifically determined by an acoustic engineer.	45

Acoustic requirements in specialist spaces including design and technology workshops, performing arts, music, drama and assembly halls, and all other specific combinations of walls between noise sensitive spaces, must be designed by an acoustic engineer with reference to the AAAC Guidelines.

To assist the school in understanding the final expected performance and in selecting the desired performance for spaces which are not listed above, the following table provides a subjective description for a range of D_w ratings, and indicates where the standards are achieved:

Type of noise source	D_w value					
	25	30	35	40	45	50
Normal speech	Clearly Audible	Clearly Audible	Audible Some words intelligible	Just Audible	Not Audible	Not Audible
Raised speech (eg teachers voice)	Clearly Audible	Clearly Audible	Clearly Audible Some words intelligible	Audible Some words intelligible	Just Audible	Not Audible
Shouting	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible Some words intelligible	Audible Some words intelligible	Just Audible
audio-visual displays	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible	Clearly Audible	Audible Some words intelligible
Achieves the Education Standard for a standard door	Y	Y	Y	Y	Y	Y
Achieves the Education Standard for a partition with an operable system	N	Y	Y	Y	Y	Y
Achieves the Education Standard for a partition without an operable system	N	N	N	Y	Y	Y
Achieves the Education Standard for a partition to a	N	N	N	N	Y	Y

music space or workshop						
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Wet areas or areas where impacts might occur

The D_w rating of a partition system does not provide an indication of its ability to adequately reduce noise from the use of toilets, basins, wet areas and the like. Where partitions separate wet areas, workshop areas, amenities, or areas where pipework or impact might occur on or in the wall from a noise sensitive area such as a general learning space, isolated (double without connection) studwork rows must be used in the construction.

Partition examples

The following example partition and door constructions and their relative acoustic performance are provided below to assist designers. The acoustic integrity of these partitions must be maintained by appropriate detailing as provided by an acoustic engineer.

In circumstances where an open ceiling is selected to provide appropriate reverberation control, the partition must extend through to the underside of the roof or floor structure above the ceiling line, regardless of the partition type.

Partition Type 1 (PT1) – D_w 30 (with appropriate detailing)

Partition 1 (PT1) is recommended for partitions where acoustic separation between 2 adjacent areas is not important, or for partitions with doors in them, due to the inherent acoustic weakness of the door. Normal speech will be clearly audible and intelligible across the partition. This partition does not achieve the design standards for partitions between general learning areas, open areas and office areas:

- Minimum 92mm thick studwork
- 1 layer of 13mm thick plasterboard on both sides of the studwork
- 50mm thick insulation with a minimum density of 11kg/m³ installed within the cavity
- Partition to extend to the underside of the ceiling and
- If glazing is incorporated, it must be of type 6.38mm thick (minimum) laminated glass.

Partition Type 2 (PT2) - D_w 35 to 40 (where partition does note incorporate a door)

Partition 2 (PT2) is recommended for any partition where some level of acoustic separation is required. Acoustic separation will be reduced as the extent of glass increases above 20% of the wall area. This partition can just achieve the design standard for partitions between general learning areas, open areas and office areas subject to careful detailing. Where the partition does not incorporate a door, normal speech will be audible at times across the partition but will be mostly unintelligible. Raised voices will be clearly audible and intelligible across the partition.

- Minimum 92mm thick studwork
- 1 layer of 13mm thick plasterboard on one side of the partition

- 2 layers of 13mm thick plasterboard on the other side of the partition
- 50mm thick insulation with a minimum density of 11kg/m³ installed within the cavity
- Partition to penetrate the ceiling and extend full height and be sealed to the underside of slab or roof deck above
- If glazing is incorporated into PT2, it must be of a limited extent comprising 10.38mm thick laminated glass.

Partition Type 3 (PT3) – D_w 45

PT3 is recommended for any partition where there is no door and a good level of separation is required. This partition achieves the design standard for partitions between general learning areas, open areas and office areas. This partition just achieves the design standard for partitions between a noise sensitive area and a design and technology workshop but an improvement can be achieved by modifying the partition to incorporate a double isolated stud system. Normal speech will not be audible across the partition. Raised voice would be audible but most raised words would not be intelligible:

- Minimum 92mm thick studwork
- 2 layers of 13mm thick fire-rated plasterboard on the both sides of the partition
- 50mm thick insulation with a minimum density of 11kg/m³ installed within the cavity
- Partition to penetrate the ceiling and extend full height and be sealed to the underside of slab or roof deck above
- Any glazing must be constructed from a layer of 10.38mm thick laminated glass and a layer of 6mm thick glass separated by a minimum of 100mm. Where a large extent of glass is installed, it will not be practicable to maintain the acoustic performance of the partition construction, and a diminished level of acoustic separation must be expected.

Acoustic requirements for doors

Standard doors

The acoustic performance of doors are dependent on the wall system in which they are housed.

All internal doors must be constructed as follows:

- 43mm thick filled core hinged doors, comprising 9mm thick lining on both sides of 25mm thick acoustic insulation with a density of 32kg/m³
- seals are installed and adjusted to seal the door airtight when closed. Examples of suitable acoustic door seals are Raven “RP10” (doorframe), “RP8” (door bottom). Where an astragal seal is required, examples of suitable seals are Raven “RP 16si”
- air relief systems, such as grilles or undercuts, must not be incorporated in the doors where acoustic separation is important.

Where doors have glazing then the insert must be 10.38mm thick laminated glass.

Operable systems - sliding doors between learning areas

The use of sliding doors between learning areas is intended to provide a compromise between a flexible space and an acoustically separated space.

The acoustic performance offered by a sliding door is dependent on the rated performance of the selected door. It is recommended that a proprietary acoustic sliding door and associated seal system are used to maximise the level of acoustic separation that can be achieved.

If a standard sliding door system is used, the acoustic performance could be noticeably lower than that of a proprietary system. Notwithstanding this, a 10.38mm thick laminated glass door with acoustic seals could achieve compliance with the design standard subject to its ability to seal airtight at all junctions when closed.

Sliding doors that are constructed from specific solid panels (in lieu of glass) can provide a higher acoustic separation between spaces.

For sliding doors installed in existing buildings, incorporate a drop down rubber seal at the threshold in lieu of a fixed rubber or brush seal. A drop down seal can provide a better seal to an undulating slab.

It must also be noted that the maximum opening height of an acoustically rated door is often limited to 2400mm.

Operable systems – larger openings

In circumstances where larger openings between spaces are desired than can be delivered by a sliding door arrangement, or where the school prefers to use a different operable system, the preferred system must be designed by the acoustic engineer in conjunction with the architect with reference to the separate section on doors in this design standard.

It is noted that there are operable wall systems with higher acoustic performance available. In order to successfully implement these systems, specific detailing and specification is required which will require the input of an acoustic engineer and architect. The limitations of a system (even those with higher acoustic ratings) must be specifically discussed with the school.

Internal noise levels

Satisfactory internal noise levels are important in supporting a contemporary teaching environment. A space with the appropriately designed reverberation times will not achieve the desired speech intelligibility if the noise level from the air conditioning system is too high.

The following design sound levels in a space must be pursued. Any variations from the following must be discussed with the school and the department.

Recommended noise levels

Type of occupancy/activity	Recommended noise level (dB(A))
Gymnasium	50

Workshops	50
Lobbies or corridors with lockers	45
GLA primary entry doors closed	40
GLA secondary doors closed	40
Multi-purpose halls	40
Laboratories	40
Dance studios	40
Assembly spaces	40
Music and drama spaces – teaching	40
Open plan teaching environment with all doors open	40
Multimedia spaces	40
Staff Prep and offices	40
GLA secondary doors closed	40
Assembly spaces larger than 250 seats	35
Music and drama spaces – performance	35
Spaces for students with special learning needs.	35

A space with a recommended noise level of 35 dB(A) will require the following elements in order to achieve a satisfactory outcome:

- Co-ordination between the acoustic engineer, architect and mechanical services engineer
- Use of a fully ducted system using large runs of acoustically insulated sheet metal ductwork and potentially in-duct attenuators
- Specific location of the fan coil unit, energy recovery unit, outside air fan and the condensing unit (as relevant) away from the space it is serving. That is, the equipment is unlikely to be able to be located directly above the space it is serving and specific areas, such as adjacent amenities areas, corridors or specific remote plant areas will need to be used for the location of noise generating equipment. Alternatively, subject to the noise level data for the fan coil unit, energy recovery unit and/or outside air fan, it might be possible to install these systems above the space whilst incorporating high density polyester insulation underneath with a solid ceiling for a certain distance in all directions from the systems
- Careful selection of air diffusion equipment to support the acoustic treatments in the ductwork systems.

Flooring

Schools are subject to high traffic, wear and tear and require durable and appropriate flooring to reduce maintenance and the need for early replacement.

All flooring and mats (wet and dry) must meet the testing requirements of AS/NZS 4586 - 2013 - Slip resistance classification of new pedestrian surface materials and HB198:2014 Guide to the specification and testing of slip resistance of pedestrian surfaces. Slip resistance of all steps, treads, nosings and ramps to NCC requirements.

General requirements

- Minimise the number of different floor finishes in any building, and on any site, to simplify the cleaning and maintenance requirements.
- Carpet tiles are preferred in teaching and learning areas including seminar/withdrawal rooms, music and drama areas, resource centres, offices and staff work areas to improve acoustic performance. Alternative floor finishes including vinyl, linoleum and rubber may be proposed as long as the maintenance and cleaning requirements, volatile compound (VOC) content and acoustic performance are considered and with approval from the department.
- Resilient flooring materials such as slip resistant sheet vinyl, ceramic tiles or epoxy coatings must be provided in wet areas, toilet amenities, practical activity, science, art, design and technology areas, home economics and early childhood activity areas.
- Consider the use of the area, relationship to external areas, acoustic requirements for noise reduction and types of furniture likely to be used in the space before making flooring selections. Linoleum is a softer product than vinyl and is vulnerable to damage from chair and table legs.
- Select colour and patterning to reduce visual impact of dirt and wear. Avoid plain colours.
- All floor finishes must be easily cleanable without requiring specialised chemicals, methods or equipment.
- Maintenance instructions must be provided to the site for the floor materials installed upon completion of the project. The installation contractors must also allow time to satisfactorily demonstrate the required cleaning method for all new/replaced floor finishes to the end users.
- The total VOC emissions of floor finishes must be less than 0.5mg/m² per hour.
- Floor finishes must have low toxicity and be phthalate free and formaldehyde free.
- Low allergy finishes must be considered in all locations.
- Provide coved skirtings to all serviced and specialist learning areas and toilet amenities.
- All floor finishes to comply with requirements of the NCC C1.10a Fire Hazard Properties.
- Comply with Australian Standards for installation of floor finishes including moisture and pH tests of the floor surface on which the floor finish is to be installed.
- Ensure all floor coverings are protected during construction/refurbishment from potential damage and debris.
- Ensure a complete clean to flooring manufacturer's requirements as per the maintenance instructions for initial clean is undertaken prior to handover of new/refurbished spaces.

Carpets and flocked flooring

- All carpets must meet the Australian Carpet Classification Scheme (ACCS) 'Contract Extra Heavy Duty' grade (or similar with approval from the department).
- All carpets weight should be 48oz, ideally 80/20 wool/nylon.
- All carpets and flocked flooring must meet the NCC Specification C1.10 Fire hazard properties and AS/NZS 2111.18 - 1997 Textile floor coverings – Tests and measurements Burning behaviour.
- All carpets and flocked flooring must meet proper installation and maintenance requirements to comply with the products warranty and AS 2455 Textile Floor Coverings – Installation Practice - General.
- Selected carpet flooring must have a minimum product warranty of 20 years.
- Consider the type of textile flooring best suited to the application, including the requirement for underlay (ie amount of time students may spend in floor based activities).
- All carpets must meet the Total Volatile Compound limit of 0.5mg/m² per hour.
- Textile flooring must meet, and preferably exceed, the Carpet Institute of Australia's 'Environmental Certification Scheme' Level One certification (or equivalent).
- Medium strength colours with patterns (fleck or graphic) are preferred. (Light colours show marks and stains and dark colours show dust.)
- The preferred carpet blend is pure wool, wool/nylon blend, or nylon and not have a pile height greater than 5mm.
- Carpets or flocked flooring in tile format are preferred due to their ease of maintenance and replacement. Consideration must be given to areas of high traffic and areas with close proximity to wet areas (eg areas where the chance of spillage is increased).
- Underlay must be provided in the following circumstances:
 - Junior primary and primary general learning areas and withdrawal rooms where students spend time sitting on the floor.
 - Where flooring is being laid over existing timber or uneven floor surfaces.
 - Where improved acoustic performance is required.
- Provide the following underlay:
 - For wool/nylon carpet – needled underfelt.
 - For level loop or cut pile carpet – rubber.
 - Electrostatically flocked nylon - high density latex cushion type.
- Install underlays using the 'dual bond (double-bonded)' method to avoid re-stretching of carpet.
- Naplock and trims must be provided where carpet adjoins other floor finishes. Metal hammered naplock is preferred, or an appropriate transition trim as approved by the department.

Entrance flooring - mats

- Entrance mats must be provided to the inside of external doors as an entrance transition to all floor finishes. Mats must match the finished floor levels of the surrounding floor finishes.
- Entrance flooring must be a minimum of 1200mm wide and 1500mm deep.
- Entrance flooring must meet the requirements of AS 4586 - 2013 Slip resistant classification of new pedestrian surface materials and AS 1428.1 Design for access and mobility.
- Construction of textile must be multi-fibred and cut pile as they are the most effective in removing dirt and moisture or an engineered system incorporating bars and moisture absorbing strips.
- Entrance flooring must be easy to clean and from a suitable proprietary manufacturer.
- Mats must be removable to enable them to be cleaned and include appropriate edging to avoid trip hazards.
- Mat-wells recessed into concrete slabs must not be provided.
- Selected entrance mats must have a minimum product warranty of 10 years.

Resilient flooring (vinyl, linoleum and rubber)

Resilient flooring (vinyl, linoleum and rubber) selection and application must consider the types of activities in the space, maintenance and cleaning requirements, volatile compound (VOC) content, acoustic performance and slip resistance of the product.

Anti-fatigue flooring should be considered for locations where tasks involve standing for long periods.

All resilient flooring must comply with the following:

- Minimum thickness of 2mm.
- The general cleaning regime must require only sweeping, a damp mop and vacuum cleaning.
- There must be no requirement for sealing, waxing or polishing.
- Selected flooring is to have high resistance to staining and deterioration from chemicals.
- Coving is to be installed to all wet areas with risk of spills (including all specialist learning areas)
- Welded joints to be used for moisture resistance and prevention of dirt and bacteria build up in seams.
- Installed to manufacturer's instructions and in accordance with AS 1884 - 2012 (Floor coverings—Resilient sheet and tiles—Installation practices), AS 2455.1 - 2019 (Textile floor coverings—Installation practice—Part 1: General), AS 2455.2 - 2019 (Textile floor coverings—Installation practice—Part 2: Carpet Tiles).
- All primers, screeds and adhesives must be installed to manufacturer's instructions.
- Selected resilient flooring must have a minimum product warranty of 15 years.

Vinyl flooring is available in 2 types: heterogeneous and homogenous. Heterogeneous vinyls comprises multiple layers. A clear wear layer protects the décor (colour/pattern) layer; underneath is a separate backing layer. Where heterogeneous vinyl is selected it is to have a minimum wear layer thickness of 0.7mm and a high level of abrasion resistance. Homogeneous vinyl is a single layer through colour product of uniform structure and composition from top to bottom. Select homogeneous vinyls with a high level of abrasion resistance.

Linoleum is made from raw materials and can be composted in an appropriate composting facility where available. Linoleum is built up in 3 layers forming a homogeneous product as a result of material bonding during the curing process. The surface layer gives the design and colour, with a factory finish applied to protect the surface layer, an intermediate layer and a backing of woven jute. Moisture from slabs softens linoleum and can affect performance of this product. Linoleum products must only be specified for circulation areas and administration areas.

Rubber flooring is a heavy duty homogeneous finish flooring product that is available in a range of synthetic and rubber compositions.

Special care must be taken where resilient floors are installed on concrete which may contain moisture. The moisture content and pH level of new and existing concrete slabs must be tested prior to installation to meet Australian Standards and flooring manufacturer's instructions.

Where resilient safety floor coverings are required to achieve a sustainable P3 rating, the safety flooring must contain aggregate such as silicon carbide or aluminium oxide, quartz crystal or sustainable surface roughness. Products with embossed surfaces only are not accepted.

Initial published pendulum (P) slip rating tests results for resilient safety flooring must be guaranteed by the manufacturer for the warranted life of the product. A minimum 10 year product warranty is required.

Resilient safety floor coverings will be subject to testing in accordance with AS 4663 - 2013 throughout the warranted life of the product and initial published pendulum (P) slip rating must be achieved.

Slip resistance requirements as per HB198:2014

Area	R rating	P rating	Barefoot
Canteen – student area	R10	P3	
Canteen – serving area (no food preparation)	R11	P4	
Canteen – food preparation areas	R12	P5	
Change rooms/showers	R10	P3	A
Food Technology/Home Science/Home Economics	R10	P3	
Science laboratories – Wet	R10	P3	
Staff Kitchen Area	R10	P3	
Store rooms/Cleaners rooms	R10	P3	
Swimming Pool Change Rooms	R10	P3	A

Technology/Wood Work	R10	P3	
Toilets	R10	P3	

R rating = wet oil ramp test P rating = Pendulum test

Wet areas and amenities

- Impervious floor finishes must be provided in all wet areas and be coved up the wall to a minimum 150mm with impervious joints in corners.
- Toilet amenities must have durable, low maintenance and non-slip finishes to AS/NZS 4586 that can be easily cleaned such as ceramic tiles, vinyl or epoxy coatings. Ceramic floor tiles must be a maximum 200x200mm for ease of installation and to increase slip-resistance.
- Wet areas must meet the requirements of AS/NZS 4858 Wet Area Membranes.
- In rooms where wet areas may be confined to only part of the space, consideration can be given to providing a slip resistant resilient sheet strip to the floor of that part of the space.

Sports floor finishes

A range of sports floor finish materials are available and each product has particular characteristics, cost and maintenance implications. Prior to specifying sports floor finishes, it is recommended that a specialised sports floor consultant is engaged in collaboration with the school. This is to ensure that the appropriate floor finish is specified for the school's sporting requirements and also ensures the flooring finish allows for natural seasonal movement.

- Specialised sports floor finishes must be provided in primary school multipurpose general activity halls and secondary school gymnasiums. Finishes must be included in the building contract, and include line marking to the range of games required.
- The floor finish must be hard wearing, easy to maintain/refurbish and readily able to be line marked.
- To protect the sports floor finish from dust and grit it is desirable to provide floor finish to other adjoining rooms in the building, including store rooms.

Skirtings

- Skirting to carpet areas must be timber, aluminium or flat vinyl. Consider the type of wall lining when making final selections to ensure adequate adherence of sheet materials. Timber skirtings to be minimum 75mm height with bevelled edge profile. Aluminium or flat vinyl skirtings to be minimum 100mm height.
- Skirting to resilient finishes (vinyl, linoleum, rubber) to be feathered edge vinyl or coved. Coved skirtings are required to serviced or specialist learning areas and student and staff amenities and are to be minimum 150mm height. Feathered edge skirting to be 100mm height.
- Skirtings to tiled flooring to be ceramic tiles minimum 150mm height.

- Skirtings to timber flooring and timber sports flooring to be timber, minimum 75mm height with bevelled edge profile.

Doors

General

The below standards provide the department's mandated requirements for the design and specification of doors and door hardware. Where a project requires a deviation to improve the educational outcomes of a facility or space written approval must be obtained from the department.

- Commercial grade systems and door hardware must be used; residential frames and hardware are not accepted.
- All door leafs to be a minimum of 920mm wide and provide latch side clearances to meet minimum opening width and manoeuvring requirements under AS 1428.1.
- Door thickness must be 42mm.
- Mid-rails or transoms are required to all external doors to reduce glazing size and replacement costs.
- Frameless glass door systems are not accepted.
- All door thresholds must permit wheelchair access and manoeuvring, including doors to access outdoor learning areas.
- Aluminium door frames must have a minimum wall thickness of 2mm.
- Aluminium frames to be anodised finish; thickness to be ≥15 to 20 microns.
- Glazing in all doors, sidelights and fanlights to be minimum 6.3mm laminated safety glass or meet AS 1288 Glass in buildings – Selection and installation, whichever is greater.
- Door fixtures must be solid brass of commercial quality, Australian made from a reputable manufacturer of commercial furniture, and to Australian Standards.
- Door weights including the glass and frame must not exceed 150kg. Where multiple sliding doors are provided in a stacked system, this weight applies to the entire stacking system.
- The force required to operate a door with a door closer must not exceed 20N in accordance with AS 1428.1.
- The maximum height of doors is 2400mm generally and 2100mm height in primary schools and preschools. Written approval is required from the department for departures to these maximum heights.
- Recess all door hardware flush with door and frame edges.
- Flush bolts are not permitted on timber doors.
- Pivot doors must not be used in education facilities as they can cause severe injury to fingers.

- The inclusion of doors other than standard side hung doors such as bi-fold, sliding, operable and similar must be carefully considered by designers and schools, in particular with regards to maintenance, Work Health and Safety and shelter in place (evacuation) policy requirements. Written approval must be obtained from the department's [Security and Emergency Management team](#) for the installation of any external door openings other than side hung doors.
- Provide electronic access to all external doors in accordance with the department's Security and Emergency Management team requirements. For information on security specifications including door hardware, electronic access, keying systems and security systems contact Education.SecurityAndManagement@sa.gov.au.

External doors

- All external doors are to provide equitable access for students of all abilities.
- All external doors to occupied spaces must be heavy duty commercial series side hung aluminium doors with wide stiles or solid core timber for increased security and to improve maintenance and ease of use. Where a larger opening is required double doors with a 180 degree opening are preferred.
- Outward opening external doors must open 180 degrees where possible and be able to be held back securely in the open position when required.
- External doors must not be set back in deep building recesses as they can create concerns for surveillance.
- Bollards and buffers to protect doors must only be installed where required to prevent damage to the door and adjacent surfaces.
- Screen security doors must only be provided to openings where there is a specific requirement such as canteens, and must be lockable.
- Where aluminium doors are not appropriate/recommended, timber solid core doors may be used but must be protected from the weather by a minimum 2.4m verandah. External ply lining must be marine grade and paint finish must avoid dark colours to avoid fading when exposed to the sun. Heavy gauge door frames must be provided for timber solid core doors.
- External doors not protected from the weather eg via a 2.4m verandah, in exposed locations must have a full galvanised weatherproof metal cladding such as 0.6mm Colorbond or similar.
- Mid-rails or transoms are required to all external doors to reduce glazing size and costs of replacement. Replacement costs for damage caused during school hours is a site responsibility. Where a school has security fencing installed by the Security and Emergency Management team the requirement for midrails/transoms may be reviewed and any departure approved by both the school and the department.
- External doors to be sealed in accordance with NCC Section J3.4

The following specific requirements refer to the following applications:

- Main entrance: Where external doors are the main entrance to buildings they must have a minimum half-glazing or full height glazing.
- Standard entrance: Where external doors provide access to standard occupied areas (rooms including hallways) they must incorporate a glazed panel or viewing panel.
- Unoccupied entrance: Where external doors provide access to an unoccupied space eg store rooms, cleaner's rooms. Aluminium or pressed metal framed, external grade solid core doors (metal clad where required) side hung doors must be used.
- Automatic doors: The inclusion of automatic doors requires approval from the department's project officer assigned to the project.

Large flexible openings - external

Where an external door is intended to provide a large flexible opening (not a standard entrance/exit and where the opening could not be achieved by double doors with a 180 degree opening) to increase connectivity between internal and external learning environments the preferred option is a bi-fold door with a casement door which must be fully compliant with disability access provisions.

Although every entrance may not be required to be accessible under the NCC, the department's position is to provide fully accessible learning environments for all children and young people. If the flexible opening is the only door connecting the learning environments it is not equitable in an education setting for a student with a disability to use an alternative path/exit to what their peers are using.

External bi-fold doors must:

- Be heavy duty commercial series aluminium top hung bi-fold doors with an anodised finish.
- Be top hung with a lower guide.
- Incorporate a casement door fitted with door closers and dead latches. The [Security and Emergency Management team](#) must be contacted to confirm if additional security measures are required.
- Incorporate a bottom sill/track which is flush with the finished floor level with a stainless steel drainage system to ensure water does not pool in the track. This will ensure maintenance and cleaning (pressure clean/hoses) can be undertaken without water egress.
- Be reviewed and approved by the department's Security and Emergency Management team.

External sliding doors

Where a bi-fold door is not appropriate for a large flexible opening and the door is not a required exit or a principal point of access and egress, external sliding doors may be used to create a connection between internal and external learning environments. External sliding doors must meet the following requirements:

- Be heavy duty commercial series with heavy duty door stops, proprietary floor guides and hardware for a school environment. Industrial series sliding doors are preferred to ensure longevity in a school environment. Ensure that the operation of the door does not create a finger entrapment hazard. Residential grade sliding doors must not be used.

- Be protected from the weather, have self-draining door threshold and have threshold ramp complying with AS 1428.1 access requirements.
- Be top hung with twin rollers and a DDA compliant bottom guide only. The design must ensure that the door cannot fall off of the top track and must have a minimal gap between the floor and door to reduce sound transmission.
- Maximum weight per sliding door leaf of 150kg. Where multiple sliding doors are provided in a stacked system, this weight applies to the entire stacking system.
- The security alarm system must be able to detect whether the door is closed and prevent the system from arming if the door is not closed. Refer [Security and Emergency Management team](#).
- Be reviewed and approved by the Security and Emergency Management team.

External door hardware

Closers

- External doors must be fitted with heavy duty 180 degree opening type commercial door closers with soft close operation. Surface mounted types are preferred as they are easier to adjust and require less maintenance in a school environment. Closers must be mounted to allow for the full swing of the door opening capability.
- Ensure door top rail is deep enough to mount closer.
- Closers to external classroom doors and main building entrances must include hold open functions.

Handles

- Handles on external doors must be commercial quality handles or push/pull plates that comply with AS 1428.1. Handle type will depend on the locking/latching system to be used.
- Door handles must be fitted between 900mm and 1100mm AFL.
- D-Handles must not be used externally.
- Free egress lever handles must not cause finger entrapment where a D-Handle is fitted internally.
- Provide engraved “push/pull” signage where it is not obvious which way door is to be opened.

Hinges

- External doors must have fixed pin hinges, or security hinge bolts (1 per hinge) when on outward opening doors.
- Interfold hinges to aluminium doorframes.
- Four hinges per leaf are required on all side hung doors.
- Be made from minimum 304 stainless steel.

Grilles

- If required, ventilation grilles in external doors must be robust to ensure building security.

Door Seals

- Seals must be fitted to each edge of the door to restrict air infiltration.
- Brush strip seals are acceptable for bottom door seals.
- Ensure suitable tread-plate for electrically driven wheelchair access.

Internal doors

Heavy duty commercial series aluminium side hung doors with wide stiles and an anodised finish or solid doors as the principal point of access and egress to learning areas are preferred for ease of use and to reduce damage and maintenance issues due to heavy usage.

Internal doors to learning areas and other support spaces occupied by students are preferred to be fully glazed. Midrails are not required unless there has been previous issues with breakage of full height glazed panels at the school. As a minimum, all areas occupied by students are to have a glass viewing panel to provide passive supervision and reduce the hazard of doors opening without warning.

All internal doors, moveable panels or partitions that provide flexibility between general learning areas must aim for a minimum D_w rating of 25 to increase acoustic performance of spaces.

Door to chemical store to be 2 hour fire rated door and frame, opening outwards with closer. Mortice deadlock with free lever handle inside for escape, keyed separately.

Internal doors to all areas to comply with AS 1428.1.

Internal sliding doors

Where a door is not a required exit or a principal point of access and egress, internal sliding doors may be used to create a connection between internal learning environments. Internal sliding doors must meet the following requirements:

- Be heavy duty commercial series with heavy duty door stops top and bottom and hardware for a school environment. Ensure that the operation of the door does not create a finger entrapment hazard. Residential grade sliding doors must not be used.
- Be top hung with twin rollers and DDA compliant bottom guide only (no bottom track) to reduce maintenance requirements and provide a seamless transition between spaces. The design must ensure that the door cannot fall off of the top track and must have a minimal gap between the floor and door to reduce sound transmission.
- For standard width doors (920mm door leaf) sliding doors are not preferred unless the door swing of a hinged door negatively impacts circulation space.

- Maximum weight per sliding door leaf is 150kg. Where multiple sliding doors are provided in a stacked system, this weight applies to the entire stacking system.

Sliding panels

- Cavity sliding doors must be a proprietary system.
- Sliding wall panels are the preferred method of providing flexibility between general learning areas and can open up to 50% of a common wall.
- Sliding wall panels must be high quality commercial grade with appropriate door stops. Ensure that the operation of the door does not create a finger entrapment hazard.
- Cavity sliding doors must be a proprietary system with appropriate protection against finger entrapment.
- Maximum weight per sliding panel is 150kg.

Accordion doors

Accordion doors must only be specified with approval from the department and must be a proprietary system having a steel pantograph frame with continuous vinyl coated fabric on each side, hung from an overhead track.

Operable walls

Operable walls are not preferred due to the time and effort required to manoeuvre them. Where specified in the project brief to suit specific functions, operable walls must be a proprietary system having panels hinged in pairs, hung from an overhead track, manually operated, centre stack and able to be located at either side of the opening. They must have display board on both sides when dividing learning areas.

- Mechanical seals must be fitted.

Internal door hardware

Closers

- Internal doors do not require closers, except for doors leading into toilet areas or where required under the National Quality Standards for preschools and early childhood services. Where internal door closers are installed they must be soft close.

Handles

- Door handles must be return lever type for ease of use and safety. Round door knobs are not acceptable, as they are difficult to use, especially for children and those with limited hand strength and do not comply with AS 1428.1 - 2009.

Hinges

- Interfold hinges to aluminium doorframes.
- Morticed butt hinges mounted flush with the door and frame edges are required.
- Pivot hinges must not be used.
- Three hinges minimum per door are required.

Kick plates

- Kick plates must be provided on timber doors to learning areas and toilet doors.
- Kick plates are required to be securely and permanently screwed and glued to the door.

Door stopper

- If doors open to impact on walls, joinery or other protrusions then a door stop must be provided. Metal types with rubber buffers secured to floor or wall are required. Plastic types are not acceptable.
- Door stopper must not present a trip hazard when the door is closed.
- Door stopper must be located within the outer third of the door to avoid any lever action of the door putting stress on the hinges.
- Where hold open function is required on inward opening doors the preferred stop is a magnetic type.
- Chubb prison door stop, HEWI floor mounted stops, or Boyd DS433 stops fixed to floor with expanding bolts are acceptable.
- Walls must be protected from damage by door handles either by the door stop placement or some protective material on the wall.

Roller doors

- Roller doors must be commercial grade roller doors with hard wired electronic operation.
- Roller doors must have a 50mm x 25mm x 4mm strengthening bar fixed/bolted to the bottom rail at 600mm centres.
- Roller door controls must be fixed wired. Remote controls must not be provided.
- External roller doors in student occupied areas must be provided with photoelectric beams.
- Fixed electric controls to roller doors must be lockable (momentary) manual press buttons consisting of the following:
 - UP – on pressing the UP button, the door opens fully to its pre-set maximum height (unless the STOP button is pressed which shall stop the travel of the door

- STOP – immediately shall stop all movement
- DOWN – this button shall be momentary only. Automatic or operation by rolled door remote fobs is not accepted.
- Manual chains shall also be provided to roller doors to permit manual operation in the event of a power outage. The operation of the chain shall be from ground level and not require a person to climb a ladder to engage the chain.
- Sectional panel lift doors must not be used unless briefed otherwise.

Windows

Natural light must be provided to all learning areas in schools and all activity areas in early childhood facilities.

Windows must be externally shaded from direct sun for the normally occupied time of the school day and year.

Daylight

- A minimum of 60% of the learning and teaching area floor area, with a target of 90%, must receive a minimum daylight factor of 2.5 as measured at the floor level under a uniform design sky.
- A minimum of 60% of the learning and teaching area floor area, with a target of 90%, must have a direct line of sight externally.
- A minimum of 60% of the learning and teaching area floor area, with a target of 90%, must have a clear line of sight to a high quality internal or external view.
- Special attention must be given to window design and locations in technology workshops, computer rooms and laboratories, as glare is a safety issue.
- Visual Art studios require high quality natural light.
- Design and placement of windows must ensure glare and uncomfortable brightness contrasts are avoided.

Window systems

- Window systems must be heavy duty commercial grade aluminium frames with anodised finish. Domestic suites and frameless sash systems are not accepted.
- Full height external windows are to have mid rails, transoms or other articulation of framing to reduce glazing size and costs of replacement. Replacement costs for damage caused during school hours is a site responsibility. Where a school has security fencing installed by the Security and Emergency Management team the requirement for midrails/transoms may be reviewed and any departure approved by both the school and the department.
- Full height internal windows do not require midrails unless there has been previous issues with breakage of full height glazed panels at the school.

- All external windows to learning areas and occupied spaces (ie breakout areas, teacher prep etc) must have opening sashes to provide natural ventilation. Sliding sashes can be a security risk and if used are to be a commercial suite with secure locking capability. Awning opening sashes can only be used if above head height (2100mm) where they open out on to an accessible area.
- Window winders must be located so as not to cause a hazard. Winders located higher than 1800mm AFL must be electronically operated.
- The conductivity measure (U Value) and solar admittance of the window system must be in accordance with NCC Section J requirements

Glazing

- The desirable maximum pane size for external glazing is in the order of 1200mm x 1200mm (or equivalent area) to reduce maintenance costs where window breakage occurs. Consider the articulation of window frames to reduce the size of individual glazing panels. .
- Glazing in new windows must be minimum 6.3mm laminated safety glass. Comply with the requirements of AS 1288 Glass in buildings – Selection and installation where these exceed the minimum 6.3mm laminated safety glass. Toughened safety glass is not accepted.
- Low level glazing to floor level may be used to promote internal/external connections, provide a view to the natural environment and increase the level of natural light within a room. However, specifying full height glazing for all external windows can increase both capital costs and increase heating/cooling load. Careful consideration must be given to assessing the benefits of providing full height glazing and how providing thermal mass will improve the performance of the building.
- Solar/safety film can be used on existing windows to provide sun shielding and protection against forced entry.
- Mirror reflective film is not acceptable as it causes discomfort from reflected glare externally.
- In situations where a high level of security (or anti-vandalism) is required, 9.5mm thick marr-resistant type of polycarbonate sheet must be used as the preferred glazing material. The size of polycarbonate sheet has limitations due to flexing. Consult with the department's [Security and Emergency Management team](#) for information on the level of security required.

Insect screens

- Insect screens have a high likelihood of being damaged in a school environment due to damage from balls, misuse or vandalism out of hours.
- Insect screens must only be provided to windows and doors in the following locations:
 - Food preparation (Canteen and Home Economics) areas.
 - Openings which will be used on a frequent basis for natural ventilation (classrooms and offices).
 - Riverland schools and preschools due to high incidence of Ross River Fever.

- Other regional/remote locations with high incidences of insects.
- Ensure screens installed in bushfire prone areas comply with AS 3959 - 2018 Construction of buildings in bushfire prone areas.
- Insect screens must be of metal mesh material permanently fixed within an aluminium frame with mechanical fixing to the window.
- Window units with integral insect screens are not to be specified due to issues with ongoing maintenance and replacement.

Window keying systems

- Contact the [Security and Emergency Management team](#) for Information on door hardware, keying systems, electronic access and security systems. Window locks must be heavy duty types.
- Where window keying systems are provided, all windows should be keyed alike.
- Plastic locks and plastic hinges are not acceptable.
- Operable high level windows that are not easily accessible must be provided with a remote winder system.

Building air leakage

All new buildings, and substantial refurbishments involving changes to the external building fabric, must be designed and constructed to minimise air leakage and to exceed the minimum standards required by the NCC.

It is a minimum requirement that at least 1 new building, which can be considered typical of the new school development, or part of a building of a minimum floor area of 2000sqm, is subject to an air permeability pressure test in accordance with AS/NZS ISO9972 - 2015, with the maximum air leakage rate being 20m³/hour/sqm at 50Pa. Results to be submitted to the department for validation.

Stairs, ramps, handrails, balustrades and barriers

All stairs, ramps, handrails, balustrades, landing and circulation spaces must comply with AS 1428.1 provisions.

Ramps must be provided at 1:16 gradient. Written approval is to be obtained from the department for any departure from this requirement.

Balustrade and handrail heights to stairs and ramps are to meet NCC requirements. Any internal balustrades to upper floor landings, circulation, learning spaces and breakout areas open to the storey or ground below must be a minimum 1500mm height above finished floor level. Any external balustrades to upper floor landings, circulation, outdoor learning areas, roof decks and play spaces must be a minimum 2100mm height above finished floor level.

Although balustrades are not required for landings under 1m above adjacent floor level in the NCC, the specification of balustrades must consider the use of the space/area and age group of students using the facility. For example:

- where outdoor learning decks are used for circulation and there are high levels of student movement incorporate tiered seating, steps, planter boxes, landscaping or other features to the perimeter of the deck to make the change in level obvious.
- where stairs, platforms or decks are adjacent spaces occupied by children aged 5 to 8 and landings are between 700-1000mm high, balustrades must be considered to reduce the possibility of children falling when stairs/landings are used inappropriately.

At all locations where there is a risk of fall of 1m or more from a floor, roof or through an opening or change in level a barrier must be provided for the full extent of the hazard in accordance with NCC Volume 1 D2.16. Any risk of fall from an openable window of 2m or more for preschools and early childhood facilities and 4m for all other situations a barrier or restricted opening device must also be provided in accordance with NCC Volume 1 D2.24.

Openings in barriers must not permit a 125mm sphere to pass through. Any element of the barrier between 150mm and 760mm AFL must not permit climbing. Any perforations in screens must not be between 8mm–25mm to prevent finger entrapment and be free of sharp edges and burrs.

Due to the high traffic and possibility of vandalism in schools, stairs, balustrades and barriers to prevent falls must be constructed of sturdy and vandal resistant materials. Glass balustrades must not be specified due to the possibility of damage, vandalism and scratches in a school environment.

Wire balustrades must not be specified due to climbing risk, possibility of damage and loss of tension in a school environment.

Stairs must have a maximum 180mm riser and minimum 270mm going. All stair risers must be enclosed as per AS 1428.1 provisions.

All stairs, ramps, handrails, balustrades and barriers must be included in the safety in design risk assessment to identify any additional safety issues due to their design.

Toilet provisions and design

The following standards for toilet amenities in schools have been developed based on recommendations from international research. These standards will help prevent bullying, reduce vandalism, and make the amenities more attractive and user friendly, cleaner and safer for student use. The standards are considered to reduce the need for time spent in toilet areas, and eliminate the opportunities provided by traditional areas where anti-social behaviour can take place.

- The following standards must be incorporated within all new schools, including new permanent building facilities, redevelopments and major upgrades of existing permanent buildings and facilities on school sites.
- Parts of existing schools that are not affected by a redevelopment or upgrade do not need to comply.

- It is not intended that this standard be applied to the provision of single or dual modular buildings on school sites, unless they are provided as part of larger teaching and support space complexes eg the modular building does not require a banks of toilets unless part of a larger complex which increases enrolments beyond existing toilet capacity. However, the specific design requirements (eg floor to ceiling partitions) must be met.
- Refer to the early childhood facilities design standards for specific requirements for early childhood facilities.

For existing schools with significant increases in school enrolment, the NCC must be used to assess toilet provisions and determine adequate provisions.

NCC and department specifications

The department's toilet amenity standards have referenced and interpreted the NCC requirements for toilet provisions. The following changes must be complied with:

- Male student and staff urinals must be converted to closet pans.
- For students an equal number of closet pans must be provided for both sexes. Staff requirements will be based on the NCC.
- Where fully enclosed unisex cubicles are provided for students, hand basins are to be included in the cubicle. This may result in an increase in wash basins compared to the NCC.
- Staff WC provisions must be self-contained cubicles with a closet pan, wash basin and space for a sanitary disposal unit. This may result in an increase in wash basins compared to the NCC.

Individuals can register for free access to the digital NCC by completing a [registration form](#). Further details on toilet provisions can be found in the *NCC 2019 BCA Volume One*, Section F Part F2.2-F2.3.

Design of student toilet amenities

- All student toilets are to be designed as fully enclosed toilet cubicles. Fully enclosed cubicles provide for complete privacy; provide floor to ceiling walls and a door extending to the floor.
- The minimum width of individual toilet cubicles is 850mm. Ambulant and accessible toilets to comply with AS 1428.1 requirements.
- Cubicles must be adequately ventilated by ventilation grilles in preference to door undercuts. If door undercuts are incorporated they are to be maximum 10mm.
- Student toilet cubicles may be provided in separate female and male toilet rooms where refurbishing existing toilets only or where change rooms are provided in gymsnasiums.
 - Where configured as separate toilet rooms, and female and male toilets/change rooms are in different locations within a building, provide at least 1 unisex cubicle/change room adjacent to the toilet room for each gender. This cubicle can be included in the total number of pans required for that gender.

- Alternatively, provide 1 unisex cubicle/change room accessed from a common area. This cubicle is in addition to the required total number of pans required for each gender.
 - Cubicles in separate female and male toilet rooms are to be fully enclosed with wash basins and hand drying facilities provided external to the cubicle in a common ablutions area within each separate toilet room. Incorporate passive supervision through the use of openings, glazed doors and viewing panels which provide a partial view in to the ablution area only. Wash basin provisions for students must meet the requirements of the NCC.
- Where fully enclosed cubicles are provided as unisex facilities they must contain a closet pan, hand basin, hand dryer and space for a sanitary disposal unit. Fully enclosed cubicles are to have individual floor wastes, floors adequately graded to wastes and exhaust fans.
- Extensive refurbishment projects (ie reconfiguration of toilets including movement of toilet fixtures) and new toilet facilities are to provide full height stud framing, acoustic insulation and moisture resistant wall linings extending from floor level to the underside of the ceiling.
- Partition systems to form fully enclosed toilet cubicles are only acceptable in minor toilet refurbishment projects where existing fixtures and partitions are being replaced in their current location. The use of partition systems instead of full height stud framing must be approved by the department. Partition systems must be 30mm fibre cement sheet construction and all wall panels, frontals and doors must extend from floor level to the underside of ceilings.
- 13mm compact laminate partition systems are only accepted in toilet facilities for reception to year 2 students. These partition systems are acceptable at 1800mm height up to a maximum 2100mm height. Doors, frontals and partition walls must extend from floor level.
- Doors to fully enclosed sanitary compartments must open outwards or be readily removable from the outside of the toilet compartment unless there is at least 1200mm between the front of the toilet pan and the doorway.
- Gaps between doors and partitions must be designed to ensure privacy eg students must not be able to easily see between gaps in to the toilet cubicle.
- Where student toilet amenities are accessed both internally and externally, they must have a lockable door to the external entrance of the toilet amenity and passive supervision must be possible both externally and internally.
- The numbers of toilets required will be determined by calculating the occupant capacity for all learning and support spaces within the building, in accordance with current departmental standards.
- Toilets are to be distributed equally across all floors in multi-storey buildings.
- For new buildings clusters of toilets for students must not exceed 6 individual unisex cubicles in any one location. Small blocks increase the opportunity for passive supervision, discourage anti-social behaviour and cut down curriculum time lost through pupils visiting toilets during lessons.
- Where the scale of provision requires more than 6 individual cubicles, create separate clusters that are located strategically to suit the needs of the occupants within the facility.

- Toilet amenity clusters can include student toilets, staff toilets, ambulant facilities and disability access facilities located adjacent to each other, however must be appropriately signed.
- One accessible unisex sanitary compartment is required with every cluster of student toilets and on every floor containing sanitary compartments. Where a floor contains more than 1 cluster of sanitary compartments containing female and male toilets, provide an accessible unisex sanitary compartment for at least 50% of these clusters.
- An accessible unisex sanitary compartment comprises a closet pan, a washbasin, shelf or benchtop, hand dryer, adequate means for the disposal of sanitary products and circulation, fixtures and fittings must comply with AS 1428.1.
- A minimum of 1 accessible unisex shower is required on site within an accessible unisex sanitary compartment.
- At each cluster of toilets where there is 1 or more toilets in addition to an accessible unisex sanitary compartment at that bank of toilets, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1 must be provided for use by males and females.
- Where male sanitary facilities are provided at a separate location to female sanitary facilities in existing buildings, accessible unisex facilities are only required at one of those locations.
- Where 2 or more of each type of accessible unisex sanitary facility are provided the number of left and right handed mirror image facilities must be provided as evenly as possible.
- A unisex facility required for people with a disability may be counted once for each gender.
- New schools must provide an accredited Changing Places facility with shower provision. A Changing Places facility allows students, staff and members of the school community with high support needs to fully participate in learning and school events. Refer to the [Changing Places design specification](#).
- Where fully assisted toilet facilities are briefed for inclusion in a new building, refurbishment project or in response to the needs of a student with disability the facility shall:
 - Have a minimum floor area of 14m² configured with minimum dimensions of 3200mm wide and 4360mm long.
 - Be configured to accommodate a student in a wheelchair or stretcher bed, 2 staff assisting the student, toilet pan, hand basin with integrated shelf, shower with heavy duty flushing floor waste, space for a pneumatic change table up to 1830mm long, space for portable lifter/mobility equipment, space for an incontinence product disposal unit, and storage for personal hygiene and sanitary supplies.
 - Locate the toilet pan to allow space for staff to assist on both sides of the toilet pan and wall mounted fold down grab rails to assist students who are able to self-transfer and self-manage toileting. Provide toilet paper dispenser incorporated with pull down grab rail.
 - Provide a wall mounted SSO in close proximity to the pneumatic change table location.
 - Include an emergency call button in accordance with AS1428.2.
 - Be approved by the department's project officer.

- Space for a laundry trough, washing machine and dryer is to be included in a fully assisted toilet facility provided in disability units. This will require additional floor area above the minimum of 14m².
- The inclusion of a ceiling hoist and automatic entry door with push button or access control in a fully assisted toilet is to be reviewed and approved by the department/s project officer.
- Drinking water amenities must not be located near toilet amenities eg drinking fountains must not be directly adjacent an entrance to a toilet and distances will be dependent upon site specific circumstances. Refer to tapware – drinking fountains/troughs for more information.
- All fittings must be vandalism resistant and provide a clean, maintenance free, aesthetic environment. Refer to tapware and toilet amenity fittings for further information.

Design of staff toilet amenities

- The preferred arrangement for staff toilet provisions is fully enclosed unisex cubicles. Staff toilets may be provided in separate female and male toilet rooms where refurbishing existing facilities only. Where separate female and male staff toilets are provided, include at least 1 unisex cubicle accessed from a common area in addition to the required toilet pans for each gender.
- Staff toilet cubicles must be self-contained suites with floor to ceiling walls and full sized doors. The cubicle will contain a closet pan, a wash basin, hand drying facilities, a space for a sanitary disposal unit and be adequately ventilated to prevent odours.
- Staff toilets must be dispersed across the site to ensure facilities are readily available for staff throughout the school day.
- Provide end of trip facilities including access to a shower and storage lockers for personal belongings.

Toilet amenity fittings

Please refer to [tapware](#) and [amenity fittings](#) sections for more information.

Toilet door fittings

Provide the following fittings and function to the outside of full height cubicle doors:

- Fixed pull handle with key and cylinder.
- Key retracts latch bolt and hold back.

Provide the following fittings and function to inside of full height cubicle doors:

- Fixed pull handle with through bolt fixing to the outside handle.
- Thumb turn retracts latch only for egress.
- All cubicle doors to have occupancy use indicator.

Materials and finishes

An analysis of life cycle impacts must be undertaken for building materials used in construction, with a preference for those with low embodied energy. Where possible materials must be:

- Sourced locally and preferably manufactured or produced in South Australia.
- Responsibly sourced.
- Reused, have recycled content, have environmental product declarations, third party certification or stewardship programs.
- Prefinished and proprietary finishes for durability, reduced on-going maintenance and ease of replacement.

The following materials are not accepted:

- Materials, exceeding the limits of those listed, in the Safe Work Australia Hazardous Chemical Information System (HCIS).
- Materials that use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) in the manufacturing process.
- Any tropical rainforest timbers including species Meranti, Merbau, Philippine Mahogany and Chengel.
- Medium density fibreboard (MDF).
- Timbers treated with arsenic containing preservatives (ie CCA).
- Aluminium composite panels.

Concrete

The environmental impact of any concrete used in construction is to be reduced by requiring the following methodology to be documented in the site environmental management plan:

- The mix water used for concrete is at minimum 50% captured or recycled water.
- At minimum, 40% of course aggregate used is crushed slag aggregate or at minimum 25% of fine sand aggregate inputs are manufactured sand.

Steel

- All steelwork fabrication must be carried out by companies certified in accordance with the [National Structural Steelwork Compliance Scheme](#). All structural steel is to be Construction Category 2.
- Ensure the compatibility of the protective paint coating to steel surfaces with the final specified paint system, all paint systems include a primer/undercoat as specified by the paint system manufacturer.
- ACRS Certification – SA Government Requirement: All reinforcement, structural steel and associated components and welding consumables must be manufactured by companies accredited to AS 9001

which hold a valid certificate of approval issued by the [Australian Certification Authority for Reinforcing and Structural Steels](#) (ACRS).

Timber

- Any timber or reconstituted timber product fixed externally or abutting a building (including floor decking) must:
 - meet the requirements of AS 5113, or
 - be tested and certified to withstand exposure up to a minimum BAL-29 in accordance with AS 3959 - 2018 Construction of Buildings in bushfire-prone areas. This applies to all buildings and not only schools in bushfire-prone areas. For schools located in bushfire zones requiring construction above BAL-29 comply with the requirements of the relevant bushfire attack level for that site.
- Any timber internally and externally which is to have a painted finish must be primed all around before fixing.
- Avoid large areas of internal timber wall surfaces with gloss finish, as this creates acoustic problems.
- Maximise use of natural timber and low emission manufactured board products to limit chemical emissions into learning environments.
- At least 95% of all engineered wood products used are to meet the formaldehyde limits stipulated in the AS/NZS 4266.1 - 2017 and EN120.
- If particleboard and/or MDF are specified, use only Australian-made as they are guaranteed to meet the E1 classification specified in AS 1859.2 - 2004 - Reconstituted wood-based panels – specifications.
- Rainforest timbers are not permitted.
- Materials used for the construction of outdoor play elements and outdoor decking must be durable, robust and require limited on-going maintenance. Eliminate sharp edges and corners and all timber must be chamfered and sanded to avoid splintering.
- Preservation treatment including termite treatment: All timber framing is to be chemically treated against termite attack and for exposure classification as applicable.
- Timber species are assigned a durability class to define timber durability and expected life in and above ground:
 - Durability Class 1 timbers are the most durable, with probable life expectancy in-ground of >25 years and probable above ground life expectancy of >40 years.
 - Durability Class 2 timbers have a probable life expectancy in-ground 15-25 years and probable above ground live expectancy of 15-40 years.
 - Durability Class 3 timbers have a probable life expectancy in-ground of 5-15 years and probable above ground life expectancy of 7-15 years.

- Durability Class 4 timbers have a probable life expectancy in-ground of 0-5 years and probably above ground life expectancy of 0-7 years.
- Timbers can be treated to increase their resistance to decay and termite attack and are assigned a Hazard Class in accordance with AS 1604 Specification for Preservative Treatment. The recommended Hazard Class for different installations are as follows:
 - Hazard Class 3 for exterior above ground timbers such as decking.
 - Hazard Class 4 for exterior in-ground timbers such as posts, stumps and landscaping features.
 - Hazard Class 5 for exterior in-ground timbers in contact with fresh water such as wetlands and water course installations
- Timber used externally must meet the Hazard Class ratings above and the following requirements:
 - Be durable, robust and require limited on-going maintenance.
 - Any timber which is to have a painted finish shall be primed all around before fixing.
 - Any structural timber to conform to AS 1684 Residential Timber Framed Construction.
 - Rainforest timbers are not permitted.
 - No timbers treated with arsenic containing preservatives are permitted.

Any timber or reconstituted timber product used as floor decking to an area that is attached to a building must be tested and achieve either a Group 1 rating in accordance with AS/NZS 3837, or be tested and certified to withstand exposure up to a minimum BAL-29 in accordance with AS 3959 - 2018 Construction of Buildings in bushfire-prone areas.

Timber preservative treatment

Copper chrome arsenate (CCA) treated timber must not be used at department sites.

If CCA is present in existing sites the [enHealth Council](#), (a Department of Health body) advocates as a suitable and simple precautionary measure that children and young people must wash their hands after playing on or near CCA treated structures.

Alternative choices for CCA preservative treated timber, eg Permapine includes:

- light organic solvent protection (LOSP) suitable for H1 (inside, above ground, dry), H2 (inside, above ground) and H3 (outside, above ground)
- Tanalised Ecowood or NatureWood suitable for H3 (outside, above ground), H4 (outside, in ground) and H5 (outside, in ground or fresh water).

Treated timber must comply with AS/NZS 1604 series and must bear a treatment brand (a label or ink stamp) generally on the end-grain.

Sites must seek the supplier's advice regarding the suitability of these products for their intended purpose and also a relevant safety data sheet.

Volatile organic compounds (VOC's)

Paints must be selected from the Australian Paint Approval Scheme as per DPTI NATSPEC specifications, to ensure paints have low VOCs. The maximum VOC content for paint, varnish, sealer and primer is specified in the table below.

Paint and adhesives VOC content

Product	Maximum TVOC content g/L of product
Paint product type	
Walls and ceilings - interior semi-gloss	16
Walls and ceilings - interior low sheen	16
Walls and ceilings - interior flat washable	16
Ceilings - interior flat	14
Trim - gloss, semi-gloss, satin, varnishes and wood stains	75
Timber and binding primers	30
Latex primer for galvanised iron and Zincalume	60
Interior latex undercoat	65
Interior sealer	65
One and two pack performance coatings for floors	140
Adhesive product type	
Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring and laminate adhesive	100
Rubber flooring adhesive	60
Sub-floor adhesive	50
Ceramic tile adhesive	65
Cove base adhesive	50
Dry wall and panel adhesive	50
Multipurpose construction adhesive	70
Structural glazing adhesive	100
Architectural sealants	250

Paint finishes

Paints must be selected from the Australian Paint Approval Scheme as per DPTI NATSPEC specifications. Light colours must be selected to increase natural light and to consider the needs of students with disability such as Autism Spectrum Disorder and Foetal Alcohol Spectrum Disorder who may be affected by bright colours.

The following finishes are recommended for education facilities. The preference is to maximise the use of pre-finished materials to reduce on-going maintenance.

Paint finishes

Substrate	Paint finish
External	
Concrete/cement render	satin acrylic
Fibre cement wall cladding	satin acrylic
Timber fascias, bargeboards, rafters	flat acrylic (A)
Steel beams, posts, handrails, balustrades, bag racks	System C & gloss enamel or galvanised finish (B)
Fibre cement soffits	low sheen acrylic
Timber doors & frames	full gloss enamel (C)
Timber window frames	full gloss enamel (C)
Internal	
Plaster & plasterboard walls	satin acrylic
Plasterboard ceilings & bulkheads	flat acrylic
Fibre cement toilet partitions	factory polyurethane
Timber doors & frames	full gloss enamel (C)
Timber windows	full gloss enamel
Timber sills, skirtings, & trim	full gloss enamel or clear finish
Timber joinery	full gloss enamel or clear finish or melamine surface
Steel columns & beams	full gloss enamel (B)

Notes: (A) – External timber subject to weather is best protected with oil based pink primer and flat acrylic finish coats.

(B) – Galvanising is the preferred finish to metal surfaces that take wear. Metal surfaces to be painted must first be treated with System C protection and not galvanising.

(C) – Full gloss enamel is the preferred finish to timber surfaces that receive any hand contact, internally and externally.

Covered ways

- Covered ways adjacent to buildings and between buildings must be designed to maximise protection from rain.
- Consider the particular site condition and exposure to wind and wind driven rain.
- Covered ways must include gutters and downpipes to connect to the site stormwater disposal system to protect the paving, building entrances and garden beds from water.
- Covered ways must be at an appropriate height and designed to restrict access to building roofs.
- The design and materials must be such as to avoid providing exposed roosting places for birds.

- Steel construction is preferred over timber to reduce maintenance.

Building services

Demand management

HVAC, lighting and ICT represent the largest electricity consumption and demand generated in schools. Facilities must be designed to reduce peak electricity load (kVA). The majority of schools with a peak demand tariff (large market electricity accounts) are on an SA Power Networks' (SAPN) Actual Demand (BD) tariff and a small number are on an Agreed Demand (LV) tariff. Refer to the [energy and water efficiency guideline](#) for further information on demand tariffs.

It is the preferred strategy to manage site energy requirements within existing electrical supply capacity by using building design, energy efficiency, renewable energy, and demand management technologies to minimise electrical load increases resulting from new builds or refurbishments.

Electrical supply capacity or transformer upgrades must be considered only after investigating opportunities to improve holistic site energy performance and use of energy efficiency improvements to reduce supply capacity.

The design and specification of HVAC systems must investigate centralised control systems which incorporate load shedding capabilities. The central control system must also be capable of monitoring temperature to ensure load shedding does not adversely impact upon indoor temperatures. The acceptable temperature thresholds are 21 degrees for heating and 25 degrees for cooling.

Where specified, Building Management Systems must incorporate load shedding technologies and be programmed to limit demand prior to hand over.

Alternative energy sources such as solar hot water must be investigated where large amounts of hot water are used during school hours.

Solar photovoltaic (PV) systems

All new schools and major refurbishments must include a solar photovoltaic (PV) grid-connected rooftop system to provide learning opportunities for renewable technologies and reduce electricity imported from the grid.

Installations must include the provision of safe roof access for cleaning and maintenance and capacity to extend the PV array in the future.

Solar PV system size

The following minimum system sizes must be installed and are to complement any existing systems. It is recommended the system size is increased where funding permits to further reduce electricity imported from the grid, operational costs and carbon emissions associated with school operations. The solar PV system does not need to be installed on the building undergoing works if installation on the building would be unsuitable/cost prohibitive. Solar PV installation must target roof areas with:

- Expected replacement dates 10 years or more after the planned installation date
- Predominantly north-facing aspects
- Minimal shading from adjacent trees and buildings or rooftop plant
- Suitable structural capacity and expected longevity as assessed by an engineer.

Where 100kW of solar PV systems are already at the site, the [Asset Planning, Standards and Environmental Sustainability team](#) must be contacted for confirmation of the required system size.

Note: This standard specifies system sizes in excess of the SA Government policy for a minimum 5kW to be installed in government funded building projects however this standard must be read in conjunction with DPTI Guide Note G140 - Solar Panels for Government Funded Building Projects.

Major refurbishments and new builds on existing sites

The following system sizes must be installed as part of major refurbishments or where an entire new building is constructed on an existing education site.

- Primary schools: minimum 20kW (recommended 30kW).
- High school/area school/R-12 school: minimum 50kW (recommended maximum 100kW).

Recommendations for removal of existing systems, including cost estimates, are to be provided where existing solar PV systems are either:

- non-functional
- operating at less than 90% efficiency
- have been in operation for more than 10 years and the location would interfere with installation of the new larger solar PV system, or
- would be cost prohibitive to incorporate into network protection for new systems over 30kW.

For information on existing solar PV installed at the school please contact the Asset Planning, Standards and Sustainability team.

New schools

New schools must have a minimum 100kW solar PV system.

Vertical schools

Multi-storey schools that have limited roof space are to aim for the maximum system size possible allowing for safe roof access and plant and equipment.

Solar PV analysis

The Asset Planning, Standards and Sustainability team must be contacted as early as possible when a solar PV installation is planned as part of building works. The team will provide advice and ongoing assistance regarding:

- Site electrical supply.
- Recommended locations for installation.
- System size recommendations.
- Quote evaluation.
- Small scale technology (STC) and large scale generation (LGC) credits.
- SAPN commissioning/small embedded generator (SEG) approval.
- Meter upgrades and sub-meter installations.
- Data loggers and web portals.

Generation Credits: STC's will be provided as a point of sale discount on the supply and installation costs of systems up to 100kW in size. STC's are to be transferred to the installation contractor upon completion of solar installation works and STC agreements are to be signed by the relevant project officer overseeing the solar installation project.

Solar system requirements

Orientation

To maximise benefit to the school, the solar PV system must be oriented to generate optimum electricity between school core operating hours (8am to 4pm) so that as much as possible of the electricity generated by the system is used at the site. Consideration must also be given to orienting the system to increase generation when air-conditioning peaks during summer in the early to mid-afternoon (12 to 4pm).

Structural requirements

For new builds the structural engineer engaged for the project must assess and certify the suitability of roof structure(s) for dead weight and wind loading.

For major refurbishments the builder/contractor is to:

- Engage a qualified structural engineer to undertake an on-site investigation, assess and certify suitability of roof structure(s) for dead weight and wind loading, and if necessary, provide recommendations on any bracing required. Any new building/strengthening work must be certified for Building Rules Compliance by an accredited professional.
- Obtain development approval from the State Planning Commission if required, and pay all applicable fees. In some instances additional development approvals may be required from the Local Government Authority.

- Assess existing safe roof access provisions and make recommendations for improvements to meet legislative requirements and to allow for safe roof access during installation and for ongoing preventative maintenance (PM) purposes (ie fall prevention devices, travel restraints, fall-arrest anchor points, ladder access points etc). The safe roof access provisions must ensure that all of the panels can be safely accessed for maintenance and cleaning.
- Solar PV modules are to be individually electro-luminescence tested and be defect free. Solar PV modules must meet Fire Safety Class C and can be used in both building and ground-mounted applications.
- Solar PV inverters must be an approved grid-connected inverter at date of installation (eg on the Clean Energy Council approved list) and the contractor must ensure the solar PV inverter meets the requirements of IEC 62109 as required by AS 5033 - 2016.
- Ideally, solar inverters must be installed inside in a communications or plant room near a distribution board. Areas where students or public have unsupervised access are to be avoided. If no suitable indoor locations are available, the inverter must be installed on a south or east facing wall, away from direct sunlight and under cover to provide protection from weather. Where inverters are installed in a location where students or public have unsupervised access (ie hallways, external ground level walls) a lockable cage is to be installed to limit access.

Solar system electrical infrastructure

For refurbishments the electrical engineering consultant is to assess the electrical infrastructure (switchboards, distribution boards, mains/sub mains cabling, etc) and design and document any required works to bring the infrastructure impacted by the solar PV system to compliance. The design must ensure that the entire site will be able to use the full solar PV system.

- For example, although the main building on which the system is installed will draw the electricity generated in the first instance, the system must be interconnected so that the full capacity of the solar PV system can be used.

Solar system monitoring

It is recommended that all solar PV systems incorporate a data logging system capable of wirelessly and automatically sending interval level inverter data to an online portal. The preferred monitoring system is Solar Analytics, however other platforms may be considered. All monitoring platforms must be registered against education.environment@sa.gov.au.

Data logging systems must include a minimum 5 year subscription to an online portal to allow for data download for analysis and to display solar PV generation, site electricity consumption, cost savings, and emissions reduction information visually. By providing an online portal, solar PV data will be accessible as a learning tool for students and teachers.

To ensure larger solar PV system operation and performance can be monitored all solar PV installations 10kW in size or larger must include:

- Supply and installation of devices to monitor solar PV generation as well as total consumption on the linked electrical supply (NMI).
- A minimum 5 year web portal subscription is to be purchased and included as part of the installation
- Registration of the web portal subscription to education.environment@sa.gov.au.
- Where Solar Analytics monitoring devices are installed, the system is to be added to the department's existing Solar Analytics web portal fleet for the Department for Education, South Australia.

Please contact the [Asset Planning, Standards and Sustainability team](#) for further information regarding monitoring platform requirements and registration.

Heating, ventilation and air-conditioning (HVAC)

The following describes the requirements for the provision of a HVAC system. The term 'air conditioning' is generally used to describe a HVAC mechanical plant that provides heating, ventilation and cooling in buildings. Air-conditioning in schools does not imply the tight control of temperature at a constant figure all year round and HVAC systems are provided in education facilities to alleviate extreme temperatures only. The type and extent of provisions for specific areas are scheduled in the [general requirements](#) section below.

It is expected that all new buildings and redevelopment projects must incorporate innovative passive building design principles and solutions that are complemented by mechanical systems to meet peak and extreme heating and cooling requirements. Innovative passive design solutions coupled with opening windows and vents must be capable of providing a comfortable environment without the need of operating the heating and cooling equipment during favourable ambient conditions.

Ventilation

The introduction of outside air is critical for the improvement of learning outcomes and the health and wellbeing of both staff and students. Natural ventilation has measurable improvements in alertness and engagement.

Provide opportunities for user control over external openings for fresh air. All windows to learning areas and occupied spaces (ie break-out areas, teacher prep etc) are to have openable sashes.

All new buildings must also comply with the NCC and AS 1668.2 requirements for the provision of outside air by means of mechanical equipment/systems.

Redevelopment of existing buildings, excluding simple replacement of individual units due to unit failure, must incorporate mechanical ventilation with operable windows used as a means to provide required ventilation as a last resort. Doors must not be included in the calculations for the provision of outside air as they may need to be closed to provide appropriate learning environments.

The following must be complied with:

- Where refrigerative/reverse cycle air-conditioning is specified ventilation must be provided by an energy recovery ventilation (ERV) system to condition the air before introducing it to occupied areas.

For efficiency and temperature control during extreme heat/cold, operable windows are to be left closed while the system is in operation and therefore mechanical ventilation is required.

- Where evaporative air-conditioning is specified, automatically opened air relief paths or windows and fixed vents electrically linked to the unit can be used for air relief. Ensure vermin and insect protection is provided.
- CO₂ sensors must be included in all occupied areas supplied by a new HVAC system and be capable of sending a signal to increase the provision of outside air when CO₂ rates exceed 800 parts per million (ppm) eg through an energy recovery system. Locations of CO₂ sensors will be dependent on the size/volume and design of the space. CO₂ sensors must not be placed near openable windows or doors which may impact the accuracy of the sensors.

Replacement of HVAC systems in existing facilities

Where HVAC systems are being replaced at an existing school through a corporate program, breakdown maintenance or as part of site funded works:

- The facility manager must be engaged and confirm the age and condition of existing air-conditioning. Where multiple systems are approaching their replacement date an asset performance assessment (APA) must be submitted by the facility manager to [Asset and Facility Services](#) for review.
- The electrical load must be taken into consideration to ensure the site does not exceed their electrical supply capacity. If a school installs HVAC without using their facility manager and exceed the capacity of their electricity supply, any remediation works will not be provided a higher priority and may be at the site's cost.
- The system must have a hard-wired variable 0-4 hour (initially set for 2 hours) push button timer with 'on' light and reset capability.
 - Temperature controls to be set to 21°C for heating and 25°C for cooling and must not be controllable via a standard individual remote.
 - If the AC system incorporates an HRV/ERV, a CO₂ sensor must be included to control and maintain the CO₂ level below 800ppm.

Energy efficiency

The design and specification of HVAC systems must investigate:

- Innovative air-conditioning systems that reduce energy consumption and improve indoor air quality eg mixed-mode air-conditioning, demand responsive systems, variable speed drives and energy recovery ventilation must be investigated.
- For new builds investigation into building thermal modelling must be undertaken to determine the most efficient building and system performance.

General requirements – new builds and major refurbishments

HVAC requirements for specific areas are to be provided as follows (where sites elect to provide heating and cooling in spaces that are not current standards requirements, they are to do so at their own cost and the proposal must be approved by the department's project officer). Refer to heating, ventilation and air conditioning (HVAC) for more information.

The following table is for new facilities or major refurbishments that include HVAC replacements and are not retrospective eg existing schools and facilities will not be upgraded in line with the latest version of this standard unless the area is undergoing a major refurbishment. Site funded projects must include the below HVAC provisions.

HVAC systems summary

	General learning areas and learning support*	Home economics room	Science laboratories	Administration	Design and technology workshops	Art studios	Gymnasium or activity halls***	Performance area (music and drama)	Toilets
Ventilation									
Meet the above requirements	•	•	•			•		•	
All exhaust systems ducted to the outside (this includes all typical cooking, staff and student kitchens, kitchenette exhaust hood facilities, art studios and fume cupboards)		•	•		•	•			•
Ventilation only by opening windows or vents**	•	•	•	•	•	•			
Natural ventilation must be by low and high level vents							•		
Heating									
Meet the above requirements	•	•	•	•		•		•	
Flued gas radiant heaters (vented externally to the atmosphere)					•		•		
No heating (excludes special schools)									•
Cooling									
Meet the above requirements	•	•	•	•		•	•	•	
No cooling					•				•
Other requirements									

No energy recovery ventilator equipment is to be provided		•			•		•		
Rangehoods must be provided above stoves in learning areas and staff areas	•	•		•					•
Exhaust fans to all fully enclosed toilet cubicles									•

* These include classrooms, withdrawal and seminar rooms, library resource centres, general activity spaces, multipurpose rooms and serviced learning areas. Modular buildings are to meet the same performance requirements.

** Applies to failed plant replacement.

*** Evaporative cooling may be provided in gyms /activity halls due to windows and doors often being open during operation.

Ducted and non-ducted systems

The design of a mechanical plant can be broadly classified into either ducted or non-ducted supply systems.

- Ducted supply systems are usually semi-commercial or commercial package units which can serve more than 1 room space from a single unit using ductwork to distribute the treated air to the spaces. These systems are capable of providing fresh air as an integral part of the mechanical plant which must meet the requirements of this document.
- Existing ductwork must only be reused if it is in good condition and can be integrated effectively with the new system. New insulation will be required to comply with the NCC Section J requirement.
- Non-ducted supply systems are generally considered to be package reverse cycle split systems, under ceiling, cassette or wall mounted units, recirculating the air within the space.
- Non-ducted supply systems may be used with the provision of adequate fresh air to the room either by:
 - Opening windows (excluding doors) in accordance with the standards stipulated in the NCC, ie open window space must be at least 5% of the room floor area served by the split system (this generally applies to existing buildings only). Windows may need to be modified to ensure compliance with NCC requirements or
 - in instances where sufficient opening window area cannot be achieved then fresh air must be mechanically introduced into the space using energy recovery technology to condition incoming air, or
 - a combination of opening windows and mechanical ventilation can be considered.
 - A sign indicating that the windows must be opened in order to provide fresh air must be mounted adjacent to the unit controls if operable windows is the source of outside air supply.

For non-ducted supply systems designers must ensure that the proposed system is capable of coping with the introduction of untempered outside air, as well as any mechanical exhausting required and indicated in General Requirements.

Heating and cooling

- Refer to the NCC for climate zones and temperature parameters.
- Temperature controls must be set to 21°C for heating and 25°C for cooling. This range provides both comfort and energy conservation. Proprietary air conditioner controllers are not to be accessible to staff or students within the space.
- Areas such as design and technology workshops, art studios and science laboratories are to have mechanical exhaust systems installed – refer to general requirements for details.
- Electrical isolator must be installed adjacent to the equipment within the vandal resistant cage and is not to be installed directly on any item of plant.

Noise

- Maximum room noise levels arising from the air-conditioning and ventilation equipment in learning and administration areas must meet AS 2107:2000 – Recommended design sound levels and reverberation times for building interiors.
- Individual non-ducted HVAC systems, such as ceiling or wall mounted split air-conditioning systems, may not be capable of meeting internal noise levels unless operated at lower speeds and therefore must only be recommended if there is no better practical solution.

Controls

- Provide independent switches for on/off and temperature control.
- The on/off control is to be located near the entry and incorporate timers to automatically turn off the units after a pre-set time.
- Individual classroom control provided via a variable 0-4 hour (initially set for 2 hours) push button timer with ‘on’ light and reset capability.
- The temperature setting controller must be located in a readily accessible lockable enclosure located in a secure area (ie store, cupboard, teacher preparation area or office) and must be independent of the on/off controller. Do not locate in ceiling spaces.

Plant location and maintenance

- All plant and equipment associated with new buildings is to be located on the ground in secure cage(s) or enclosure(s) where it is readily accessible for routine maintenance and eventual replacement. All electrical controls, isolators and associated controls for services must be located within the secure enclosure. Refer to DPTI Drawings DG24 and DG26 Plant Enclosure Details.
- Where roof mounted plant is unavoidable, written approval must be sought from the department’s Capital Projects Manager during the concept phase. If approved, plant must be installed on a structural plant platform, or in a dedicated plant room. Refer DPTI Guidenotes G189 Access for Maintenance and G190 Building Access and Safety Systems.

- Where roof mounted plant (new or relocated) is approved by the department for installation on an existing roof, the plant must be located on a structural plant platform. All existing roof sheeting must be replaced with new where it will be covered by the plant platform.
- Where a plant platform is to be constructed, a minimum gap of 1000mm clear access between roof sheet and the underside of the platform structure is to be provided to facilitate future roof replacement.

Plant room construction:

- The plant room must be designed to cater for adequate circulation (minimum 1000mm clearance between equipment), maintenance clearance(s) and required air-flows to and around all plant. The area must allow for a minimum additional 20% physical plant capacity as well as 20% additional space in boards and cabinets for equipment expansion.
- Louvred facades are acceptable. Consider acoustic requirements between any adjacent spaces or buildings.
- A dedicated plant room must include:
 - AS/NZS compliant lighting
 - Sealed concrete floor with non-slip finish
 - Potable cold water to tap with drain under for hose connection for cleaners and technicians
 - Floor waste
 - Non-combustible wall and ceiling linings
 - 1 x double switched socket outlet (SSO) for cleaning. Other power provisions as required for equipment
 - 1 x double data outlet; 1 port for equipment monitoring and 1 port for equipment testing
- Temperature sensitive equipment is to be located in a well-ventilated area as per manufacturer's requirements. All serviceable parts must be provided with safe and adequate access. Access to all fan coil units must meet requirements of AS/NZS 3666 and DPTI Guidenote G189.
- Access for maintenance to all fan coil units (including electrical and electronic control components) and filters etc must be demonstrated to the facilities manager, the department's Project Manager and/or DPTI by the installing contractor at the practical completion stage of each handed over portion of works.
- Documentation must be provided to the relevant facilities management provider and the site detailing the maintenance scheduling requirements for the installed equipment.
- Any cassette type air conditioning units, where installed above 4m AFL must incorporate a proprietary 'filter drop system' to facilitate filter maintenance.

Ceiling fans

Ceiling fans are an acceptable method of providing climate control to reduce HVAC load but the blades must not be installed lower than 2400mm and/or below any luminaires (to avoid strobing effects).

SA Government Buildings Energy (GBE) Strategy 2013-2020

New projects must aim to minimise whole-of-life costs and reduce greenhouse gas emissions in the operation of new government buildings (including privately owned buildings constructed for government use), and government occupied buildings, both owned and leased, that undergo major refurbishment.

The GBE Strategy requires that the construction of new buildings and major refurbishments of existing assets will include a life cycle approach to the design and specification of the project, to ensure cost effective energy saving options are incorporated from the design stage.

Baseline common data is to be used in undertaking the life cycle analysis of alternative systems as defined in below in lifecycle analysis.

Innovative system solutions must take into account capital cost, outside air ventilation, air quality, energy consumption, greenhouse gas emissions, maintenance access and expenditure, noise levels, availability of equipment and replacement parts.

Lifecycle analysis

Baseline common data to be used in life cycle analysis for a typical general learning area (GLA) located in the Greater Adelaide region. Local meteorological data is to be used for locations outside of the Greater Adelaide region.

Lifecycle analysis data

Classroom (GLA) floor area	54 square metres
Number of students per general area	25 to 30
Outside air requirements	300 litres/sec/GLA
Number of school days per annum	205 pa
School hours per day	7 hrs (8:30am to 3:30pm)
Annual school hours	1,450 hrs
Average Heating – full load hours pa for Adelaide (Bureau of Meteorology)	340 hrs
Average cooling – full load hours pa for Adelaide (Bureau of Meteorology)	100 hrs
Life cycle costing discount rate (set by treasury and may change)	6%
Inflation rate (set by treasury and may change)	2.5%
Present worth factor for 20 years life of equipment	14.3
Greenhouse gas (CO ₂) output per electrical kWh input (from the Australian Greenhouse Office)	1.186 kg
Maximum classroom noise levels (Australian Standard)	45 dBA

Adelaide ambient design temperatures Summer / winter (The Australian Institute of Refrigeration Air conditioning and Heating)	37°C / 6.5°C
Cooling temperature set point	25°C
Heating temperature set point	21°C

Cost analysis

Retailer rates and the most current [SAPN network tariffs](#) must be used for the lifecycle cost analysis. Please contact the Asset Planning, Standards and Sustainability team for assistance with electricity cost analysis.

Mechanical exhaust systems

- Areas such as technical studies workshops, art studios, photography darkrooms and science laboratories must have an exhaust system installed.
- Exhaust ventilation systems must meet noise exposure requirements of the Work Health and Safety Regulations 2012 – Chapter Four – Hazardous Work.
- The installation of exhaust ventilation systems must consider the proximity of other buildings and spaces to ensure adjacent services are not impacted by increased external noise.
- All exhaust ventilation systems must be vented externally to the atmosphere.
- Exhaust systems must meet the requirements of AS 1668.
- Dust extraction systems are not intended to remove large particles.
- Kitchen exhaust flues must be non-combustible.

Externally flued mechanical exhaust ventilation must be provided in areas where heat, odour, pollutant and fume build-up can be a problem such as:

- Stoves / kitchens
- Printing/copying machines
- Toilets
- Fume cupboards
- Chemical cupboards
- Art studios where sanding, fixatives and spraying is undertaken.

Mechanical exhaust systems vented to the atmosphere must be provided to extract dust, fumes and heat from hazardous areas and particular items of equipment as follows:

Stove and cooktops

- All stove and cooktops are to be provided with range hoods.
- All range hoods to be flued to the atmosphere not ceiling space.

- The range hood must be fitted within the distance range specified by the manufacturer.
- Range hoods need to operate at 800m³/hr or higher.
- Use range hoods wider than the stove or cooktop. 600mm wide range hoods are not accepted.

Woodwork machines

- The workplace exposure standard for airborne inhalable wood dust is 1 mg/m³ for hardwoods (including MDF) and 5 mg/m³ for softwoods. The average inhalable wood dust in the breathing zone of the worker must not exceed the workplace exposure standards (WES) over an 8 hour working shift. Formaldehyde exposure must be below the WES of 1ppm when averaged over an 8 hour day. Short term exposure must not exceed 2ppm.
- Local exhaust ventilation (LEV) involves locating the capture or receiving hood within 2 hood diameters of each identified source of dust, and having sufficient air velocity to draw dust away before it becomes airborne.
- General hood capture velocity – recommended 2.5 – 10m/s; general wood dust duct velocities – recommended 15m/s.
- Particle collectors: fabric bag filter unit.
- Reverse pulse dust extraction is preferred over shaker units for woodwork dust management.
- Where portable dust extraction units are approved by the department they must be 2-stage dust cyclones with ≤ 1 micron pleated filter and collection drum on wheels.

Welding equipment

- Electric welding processes: A minimum capture velocity of 0.5m/s, measured at the fume source is required for protection of the welder from particulate and ozone generated near the arc.
- A local exhaust system comprising of a hood for capturing welding fumes close to the point of generation. The hood must be structured and placed at the emission point so as to contain the emission, not draw contaminant into the breathing zone of the operator and not be positioned so that the operator causes an air-flow obstruction.
- The hood must be connected to a duct or ducting system which will effectively contain contaminants transported from the inlet and efficiently, with proper flow control, deliver the exhaust flow to the discharge (Rec. 10m/s). The ducting must be sized and oriented so that the flow within it is efficient, eg approaching laminar flow rather than turbulence. The rate must also be sufficient to allow the contaminant be transported and not deposited on the walls of the ducting.
- An air cleaning system to prevent pollution of the general atmosphere. It must be easily changed, cleaned and maintained without causing exposure to operations or maintenance staff.
- An air mover to provide air flow must provide a sufficient air-flow rate to efficiently extract the contaminant, including a sufficient in-duct velocity to transport the contaminant to the cleaning/filtering system and prevent flammable material, for example, depositing within the

ducting. The air mover must not provide a source of ignition. The air mover and its components must be impervious to corrosion/abrasion damage by the contaminants.

- Discharge ducting must be placed so that it does not affect any air-supply system. The air being exhausted must not be entrained and recirculated into the workplace through the air supply system.

Fume cupboards

- All fume cupboards to have separate flues vented to external atmosphere.
- On site testing of all fume cupboards is required to be carried out in compliance with AS/NZS 2243.8 - 2014 Safety in laboratories: Fume cupboards.

Flammable materials cabinets

- Constructed to comply with AS 1940 and vented to the atmosphere.

Vented corrosives cupboards

- Constructed as per DPTI Drawing DG03 – Vented Corrosives Cupboard.
- 2 x 100mm diameter UPVC vent ducts vented to the atmosphere.

Kilns

- Fume extraction system to be exhausted to the outside atmosphere. Ensure extraction system is operating before, during and after firing to prevent inhalation of kiln emissions. Note corrosion of metal fittings outside a kiln enclosure may indicate an ineffective ventilation system.
- Ensure the extraction system operates effectively at all times during the firing cycle, and vents outside the building, away from populated areas such as walkways and areas where staff and students may congregate.

Spray booths

Spray booths to comply with the following Australian Standards:

- Ventilation design - AS 1482 – 1985 & AS/NZS 4114 - 2020.
- Hoods or enclosure - AS 1482 – 1985, 0.5 – 1.0 m/s.
- Exterior hoods - AS 1482 – 1985 (Table A2), $Q = Vx(10X2 + A)$.
- Duct work – AS/NZS 4114 - 2020.

Fire protection

- Fire services must be designed to comply with the NCC, relevant standards and to the SA Fire Services requirements.

- Where mains water supply is not available or inadequate, fire water storage tank and fire pump sets are required to provide adequate water source in accordance with NCC requirements. Discussion with SA Fire Services is required during concept development to agree a fire protection solution. Ensure flow and water tests are carried out to identify any such need.
- Hose reels must only be provided in education buildings that are designated for community use and which have a floor area greater than 500m². This would normally only apply to large activity halls, gymnasiums and community libraries. Hose reels must be installed so as not to create a hazard.
- All above ground water supply pipes must be galvanised steel.
- External fire hydrants and fire hose reels must be provided in accordance with the NCC and its referenced standards.
- Fire blankets must be provided in science and home economics rooms, canteens, technology workshops, staff kitchens and early childhood facilities kitchens.
- Fire detection must be integrated with security detection systems (PSSD Control Room monitoring).
- Contact the [Security and Emergency Management team](#) for information on security system specifications.

Fire extinguishers

- Fire extinguishers must be provided to all education facilities in line with all relevant legislative and regulatory references.
- Generally fire extinguishers must be ABE Dry Chemical Powder with associated signage, of nominal 4.5kg capacity, however the specification of fire extinguishers must consider adjacent services eg electrical equipment, to ensure the appropriate fire extinguisher is specified.
- The extinguisher must be mounted in accordance with the Australian Standard, and where new extinguishers are provided they must be enclosed within a heavy duty plastic bag.
- The fire extinguisher safety pin must be a 100mm extended travel type. The pin is to be inserted such that it can only be removed once the extinguisher is removed from its mounting and the plastic bag.
- Consider providing a recess in the wall to house each fire extinguisher for protection.
- Where a fire source feature dictates a requirement for a special purpose fire extinguisher, a suitable unit for that circumstance in line with the Australian Standard must be provided.
- Extinguishers must be located in occupied spaces (eg general learning areas) rather than corridors.

Plumbing

Plumbing waste systems must include the following specific requirements:

- Science laboratory waste pipes preferred to be enclosed in service ducts with removable access panels.

- Provide acid resistant high density polyethylene pipework to be used for laboratory waste pipes.
- Laboratory waste system to include a waste treatment pit sized to suit the particular requirements of the site.
- Laboratory safety showers to be provided with floor traps, draining to the laboratory waste treatment system.
- Floor trap grates in vinyl floor areas must be fitted with a damp type fitting as “Blucher” or equivalent.
- Internal surface inspection openings (SIO) must be chrome plated brass inserts.
- External surface inspection openings must be cast iron and concrete ring.
- Sewer vents through metal roofs must be flashed with an up-stand of similar material to the roof and fitted with a PVC weathering cone.
- The tops of gully trap grates in paved areas must finish 12mm above surrounding paving.
- Paving is to ramp up to the top of the grates.
- In reactive soils construct flexible joins and expansion joints for sewer at the building line. Type of joint required will depend on soil conditions.

Trade waste discharge

Education facilities are considered by SA Water to be trade waste generators under the *Water Industry Act 2012*. Specific curriculum activities generating trade waste in an education facility may include canteens, food technology, home economics, commercial kitchens, art, out of school hours care (OSHC), agricultural studies, preschools/early childhood facilities and community child care centres, design and technology (including wood, metal, electronics, automotive and electro technology).

Pre-treatment units (grease arresters) may be required wherever there is waste liquid being discharged into the main sewer system. Examples include: dishwasher waste, kitchen sinks, art sinks and any other sink discharging waste products like paint or sand/clay/plaster particles.

Prior to installation or replacement of any new plumbing fixture (excluding sanitary fixtures), or making changes to existing plumbing, SA Water must be advised (or the Local Council authority if in a regional area outside of SA Water’s jurisdiction).

SA Water will require the completion and lodgement of a trade waste discharge application to determine whether a grease arrester is required and the conditions on which a trade waste discharge permit will be issued. The form must be completed by the school site, detailing the types of activities proposed to be carried out.

If SA Water determines that a grease arrester is required following a compliance audit or through the trade waste discharge application process, the school is responsible to action.

Trade waste officers (SA Water) conduct compliance audits of sites to ensure permit requirements are met. If there are any changes to activities at the site within the period of a current permit, it is the responsibility of the site to advise SA Water as soon as possible.

Ongoing maintenance and cleaning of grease arresters is mandated and must be undertaken on a regular basis and must be included in the site's corporately funded preventative maintenance schedule.

Water services

- Potable and non-potable water services are to be strictly separated.
- Provide potable water to safety shower and shower/eye wash unit in laboratories and preparation/store rooms, sinks and troughs to all other learning areas.
- Recycled water (rainwater) may be used for toilet flushing.
- Non-potable water must be used for all other laboratory water services from separately piped water reticulation circuit. Provide approved backflow prevention device on the water supply to each laboratory, testable double check. Locate in an accessible position with a label. Provide signs in each laboratory indicating "Caution – water not for drinking" in accordance with AS/NZS 3500.1
- Provide isolation of the water supply to a laboratory or group of laboratories with an isolation valve positioned in an accessible location. If the valve is external to the building locate in a secure enclosure.
- Press (crimp) type copper fittings must not be used.

Water temperatures

- Cold water is to be provided in general student toilet hand basins, sinks and hand basins in general learning areas.
- In laboratories potable and non-potable water services are to be separated. Provide potable water for safety shower and shower/eye wash unit. Non-potable water must be used for all other laboratory water services.
- Heated water must be provided in accordance with AS 3500 Plumbing and drainage Part 4 – Heated water services.
- Water at a maximum 45°C is to be provided to the following 'general areas' (locations not listed must only be serviced by cold water):
 - Staff and Student disabled access toilet hand basins
 - Staff and Student showers
 - Staff toilet hand basins
 - Sick room hand basins
 - Staff room hand basins
 - Canteen hand basins
 - High school home economics hand basins and sinks
 - High school VET hand basins

- High school student common room sinks
- Science staff preparation area sink (1 hot water outlet only)
- Art learning area sink (1 hot water outlet only)
- Stephanie Alexander Kitchen Garden kitchen sinks
- Nappy change hand basins
- Baths and showers in early childhood centres
- Early childhood kitchen hand basins and sinks
- Staff materials clean up trough in early childhood centres
- Laundry troughs.
- Hot water at 60-65°C (via mixer taps) can be provided to the following areas:
 - Design and technology – metalwork, automotive etc (1 per workshop)
 - VET Commercial kitchens (sinks only)
 - Canteen sinks (provided they are not accessible by children)
 - Staff room sinks (provided they are not accessible by children)
 - Sluice sinks
 - Cleaners sinks/troughs (provided they are not freely accessible by children)
 - Washing machine outlets.

Hot water services

- Locations to receive water at a maximum of 45°C must have a Thermostatic Mixing Valve (TMV) conforming with AS 4032.1 and adjusted to an outlet temperature not exceeding 45°C at each outlet supplied from the TMV or a thermostatically controlled tap conforming with AS 4032.4 and adjusted to an outlet temperature not exceeding 45°C at each outlet.
- Electric Instantaneous hot water units are not to be installed or hot water supplied to student accessible spaces.
- All electric instantaneous units are to be installed within a lockable vented cabinet preferably away from student accessible spaces.
- Only proprietary electric instantaneous hot water units with the ability to revert back to its pre-set temperatures automatically after tampering or modification must be installed.
- Tempering valves are not to be used under any circumstance.
- Continuous flow gas and electric hot water heaters are preferred over storage heaters in most situations to reduce energy consumption. Electric continuous flow hot water services can provide an energy efficient option where long pipe-runs are required (subject to AS/NZS 3500). Storage water heaters must be set at 60-65°C in accordance with AS 3500.4 to avoid the likelihood of the growth of Legionella bacteria.

- All pipe work joins to be brazed or welded. Press fittings must not be used.
- Mains pressure storage hot water services must not be located in cabinetry inside buildings where they could compromise occupied areas, fixtures or fittings through flooding due to leakage or malfunction.
- Where no alternative exists and mains pressure storage hot water systems must be installed inside, it must be located to ensure flooding is directed outside of the building or flooding is contained within waterproofed and bunded areas eg wet areas with impervious floors graded to a drainage outlet.

Food preparation areas and specialist equipment

Hot water supplied to kitchen sinks at education facilities is not suitable to sanitise food contact areas, utensils and specialist equipment. Where required to meet sanitising requirements for food preparation areas and sanitisation, sites may install a dishwasher to wash the dishes/utensils above 65°C and/or use a food grade sanitiser to wash benches/utensils etc.

Dishwashers and food grade sanitisers must meet [Food Safety Standards](#). Refer to [SA Health Food Standards information](#).

Refer to the [Healthy Eating Guidelines for Schools](#) (Healthy Eating Guidelines) for food safety legislation requirements under the *Food Act 2001* and regulations under that Act.

Where stove/ranges are installed an exhaust hood must be provided. These must be flued to atmosphere (externally beyond the building envelope).

Power and gas supply

Cabling

- Overhead catenary cables must not be specified between buildings and facilities. Cabling must be trenched as per the relevant Australian Standard and the requirements of DPTI amended NATSPEC. Allow for a spare 100mm conduit to be installed for each power and comms/data cable run with draw wire and ends capped inside a cable pit.
- Cables are to be supported where possible. Unsupported cables resting on ceilings are not acceptable.
- Provide propriety cable tray system for all consumer mains and sub-mains cabling over 70mm².
- External cabling is to be concealed in minimum 3mm galvanised steel cover (powdercoat finish or painted). Exposed cables are not permitted.
- Cables in PVC conduit on roof tops is not acceptable. Cables under verandahs or similar areas without a ceiling can be in UPVC conduit.
- Cables in inaccessible concealed spaces to be in UPVC conduit or tied to catenary systems.

- All data and communications cabling in stud walls must be re-wireable and installed in PVC conduit. All light and power cabling can be run within the stud wall in compliance to AS/NZS 3000 and AS/NZS 3008. All cabling must be protected with PVC conduit at locations where cabling is in contact with unbushed metal studwork.
- Under no circumstances will any unprotected cabling be accepted, where it is run in the gap located/former where metal studwork meets metal noggins, metal floor/bottom-track, metal head/top-track and the like.
- Plant rooms, storerooms, or any area without ceiling linings: All cables below 2100mm AFL must be in earthed steel conduit. All other cabling must be in heavy duty UPVC conduit, or on cable tray or in a suitable duct.
- All roof penetrations to be certified and warranted by the roofing contractor for new installations.
- Make any penetrations through a high point on the roofing material profile. Penetrations through low point or pan of the roofing materials will not be accepted and will require replacement of the roof sheet and re-wiring.
- For penetrations <50mm use a proprietary penetration flashing (eg Dektite or similar). Only one cable or conduit allowed to maintain seal.
- Penetrations >50mm to be through an upstand and overflashing as per DPTI Standard Detail DG50.
- Provide spare conduits in underground conduit runs. These are to be left unused with draw-cords. Perform mandrel testing to prove suitability and then seal all ends with proprietary PVC type caps. Include test results in the operation and maintenance (O&M) manuals.

Underground cable markers

- Accurately record the routes of underground cables including digital photographic records before backfilling. Include on the as built record drawings and in the operation and maintenance manual.
- Marker tape for underground wiring: provide a 150mm wide marker tape bearing the words '*WARNING – electric cable buried below*', laid in the trench 150mm below ground level.
- Marker tape to be orange for electrical, and/or white for data/comms/security and the like.
- Accurately mark the location of underground cables with route markers consisting of a metal marker plate complete with securely fixed direction arrows indicating distance to next marker, set flush in a concrete base. Marker plates and/or their fixings must not be a trip hazard and must be finished flush with adjacent surfaces.
- Markers must be placed at, building entry/exit points, in-ground cable joints, route junction, change of direction, termination and building entry point and in straight runs at intervals of not more than 100m.
- Marker bases to be 200mm diameter x 200mm deep, minimum concrete.
- Plates: Brass, aluminium or mild steel hot-dipped galvanized, minimum size 75 x 75 x 2mm thick, fixed with waterproof adhesive and secure stainless steel fixings.

Sub-metering

- Sub-metering of buildings must be included where appropriate to facilitate the monitoring of energy use. Sites which include co-located facilities which will operate independently, such as preschools and children's centres, must have a sub-meter for both electricity and water.

Switchboards

- All external switchboards must be provided with additional full weather/sun protection to enable 24/7 maintenance access at all times. Switchboards must have covering to a minimum of 1000mm past the open door of the front of the switchboard and typically 500mm to each other side of the switchboard. Install an AS 2293 compliant emergency lighting luminaire in of the front of the board to provide adequate lighting in emergency conditions.
- All external switchboards, and switchboards within plant rooms to be IP56 minimum. IP rating for all internal switchboards to be IP43 minimum. Cable entries, must not compromise the IP rating of the switchboard. On external switchboards, cable entry only from the bottom.
- Provide lockable doors with a circuit card holder unless enclosed in cupboards or in an area which is not readily accessible to the public. Keying of switchboards to be to the department's [Security and Emergency Management team's](#) requirements.
- Switchboards to be metallic coated sheet steel, minimum thickness 1.5mm. Thicker material to be considered in vandal-prone locations. Minimum width of all switchboards must be >700mm per section.
- Provide ≥30% spare poles for boards smaller than 30 poles; ≥ 20% for boards larger than 30 poles.
- Make provision for the connection of the communications earth terminal at switchboard earth bar to AS/CA S009.
- Switchboard location must cater for and allow for switchboard doors to be fitted and openable to 90 degrees and 600mm clearance, as per AS/NZS 3000. Under no circumstance will it be acceptable for outer of switchboards doors to be left off, or for it to be assumed that ongoing maintenance personnel be expected to 'lift-off' doors, as a result of poor coordination in building works.
- Door construction: Provide single right angle return on all sides and fit suitable resilient sealing rubber to provide the documented IP rating and prevent damage to paintwork. Minimum IP rating > IP42 (internal) and > IP56 (externally).
- Hinges: Provide corrosion-resistant pintle hinges or integrally constructed hinges to support doors. For removable doors, provide staggered pin lengths to achieve progressive engagement as doors are fitted. Provide 3 hinges for doors higher than 1000mm. Provide restraining devices and opposed hinges for non-lift-off doors.
- Door hardware: Provide corrosion resistant lever-type handles, operating a latching system with latching bar and guides strong enough to withstand explosive force resulting from fault conditions within the assembly. Dual, edge mounted, corrosion resistant T handles with provision for key locking cylinder. Captive, corrosion resistant knurled thumb screws.

- Combined Circuit Breaker/Residual Current Devices (RCD) must be installed in switchboards to protect each circuit. For any renovations or alterations which affect outlet circuits RCD protection must be provided

Distribution boards

- Distribution board to be all metal construction with lockable door. Lock to be flushed with a 604 key. Separate escutcheon panel is to be hinged-fixed and removable.
- Fitted with an appropriately sized 3- phase main switch (100A non-automatic circuit breaker minimum).
- Minimum 12-pole board with miniature single pole miniature circuit breaker/RCD to all individual circuits. kVA rating to be minimum 6kVA.
- Distribution boards must be sized to ensure there are a minimum of 6 spare ways or 30% spare capacity, whichever is the greater.
- Provide appropriately sized conduits in the wall to areas accessible at the switchboard and communications cabinet with draw wires for electrical and data connection. Minimum access conduit sizes to be 50mm.
- Completion of electrical and data connections to be undertaken following delivery.

Power outlets, switches and controls

- Provide dedicated power circuits for special applications and equipment (including dishwashers, microwaves, hot water systems and the like). Provide sufficient socket outlets to service all equipment expected to be used in a particular situation.
- RCDs are required to all 3-phase switched socket outlets, regardless of current rating.
- RCDs must either be located at the local electrical distribution board supplying the final sub-circuit in question, or may also be located at the switched socket outlet (SSO). Adequate allowances in switchboard chassis sizing must be made to account for the additional poles that 3-phase RCD take up.
- Refer to the ICT section for power supply requirements for ICT equipment.
- All general purpose outlets must be double switched socket outlets.
- In general learning areas provide a minimum of 3 double switched socket outlets.
- In laboratories provide a minimum of 1 double switched socket outlet per student work space.
- Installation of floor boxes is not permitted.
- Power requirements for technical studies workshops must be briefed separately with approval from the department.
- Final decisions re quantities and locations for all switched socket outlets must be thoroughly understood and agreed to by the site representative.

- Minimum cable (multi-strand conductors) size must be 2.5mm² for power and lighting circuits. All outlets to be provided with proprietary electrical shrouding to all locations.
- Internal SSO's in preschools and early learning areas (including for computers) to be mounted >1200mm AFL.
- Laptop charging stations: provide a minimum of two 15A sockets on individual dedicated circuits.
- SSO in a disability access toilet: mount between 600-1100mm AFL vertically and minimum 500mm horizontally from an adjacent internal corner wall.
- Spacing from adjacent horizontal surface: ≥ 150 mm to the centre of accessory socket. No outlets are permitted to rest solely on the surface of benches. SSO installed with their respective outlets are facing directly upwards are not permitted.
- Switches and controls to be located 1000mm to the centre of the faceplate/primary switch mechanism. No control or switch mechanism may be installed outside the AS 1428.1 requirement of between 900mm AFL and 1100mm AFL, without approval from the department.
- Internal switches for lights, air conditioning: 15A rocker mechanism switches (Clipsal 30USM or approved equivalent) screw fixed to mounting plate. Push buttons (when require) to be Clipsal 30MBPR mechanism or approved equivalent, screw fixed to mounting plate.
- Do not install any electrical accessories across junctions of wall finishes. Coordinate electrical accessories where proposed/documentated to be installed on pin board type wall finishes and obtain approval from the department's Project Manager.
- Mount external SSO's mount in a lockable weather proof enclosure at high level. Where external SSO's are protected by verandah > 2m: IP53 or greater, IP56 if exposed or verandah <2m or in a plant area. Where the number of accessories, in particular switches, is large, consider specifying a stainless steel or powder coat paint finished plate as an alternative to plastic.
- All electrical outlets in proximity to gas outlets are to be mounted a minimum of 300mm above gas outlets on bench tops.
- All electrical outlets in proximity to sinks with a capacity of 40L or less are to be mounted a minimum of 400mm in the vertical plane and 150mm in the horizontal away from the sink. For sinks with a capacity greater than 40L, outlets are to be located a minimum 1000mm in the vertical plane and 500m in the horizontal plane away from the sink.
- Locate outlets a minimum 1800mm horizontally from a safety shower. Safety eyewash to be treated as >40L sink as above.

Appliances and hard wired equipment

- Provide all appliances internally wired and complete with control switches, controllers and connecting links.
- Unless stated otherwise provide an isolating switch adjacent to all direct connected appliances and equipment. The Isolation device, must not be immediately behind the equipment or on the equipment itself, but be readily accessible adjacent to it.

- Connect each 3-phase appliance with a separate full size neutral and earth.
- Install the final connection to any equipment installed away from, but within 600mm of, a wall or column in flexible PVC conduit. PVC clad flexible steel conduit must be used for machinery and in workshop type environments.
- Where any equipment is located at greater than 600mm from the wall, where possible, conceal the cabling. Where it is not practical to conceal the cabling, surface-mounted proprietary aluminium skirting ducting, in-floor ducting cast into the slab/flooring or by securely fixed metallic service pole (minimum 3mm thickness) is acceptable.
- Due consideration will be required for the environment of the installation to include but not be limited to:
 - Chemical/corrosive resistance may be important in commercial kitchen and laundry environments.
 - Plastic-coated flexible metal conduits, eg “Anaconda” or similar, where mechanical damage is likely.
 - Type of environment/product selected to provide a longevity of in-service installation.
- Cross check immediately all equipment arriving on site for its electrical loading and phase connections. Advise the department’s Project Manager where equipment is found/deemed to be unsuitable for connection to the documented/designated building supply.
- Ovens and hot plates: for single-phase provide a minimum 20amp isolator, for 3-phase provide minimum 32amp isolator.
- Isolator switch for ovens and hot plates to be labelled, installed mounted above bench and a minimum of 300mm sideways clearance from the appliance, not immediately behind it, to ensure it can be accessed in the event of an emergency with that appliance.
- Outlets that are dedicated for individual appliances, eg fridge, dishwasher, microwave, rangehood, water boiling units and hot water service etc, must be installed on individual dedicated circuits, separate from other general purpose outlets in the area.

Ceiling mounted accessories

- All equipment must be adequately supported, considering its own weight the capacity of what it is installed into and also the environment it is in.
- Connections for appliances: Flush mounted outlets on the ceiling next to support brackets. The installation must be fully electrically insulated above the ceiling, in accordance with AS/NZS 3000.
- Mount appliances independent of ceiling tiles and suspended ceiling suspension system. Fix directly to concrete slab or to structure above ceiling. Installation of surface-mounted equipment using only “wall mate” or toggle bolts into plasterboard without additional bracing is not acceptable.
- Lightweight ceilings, acoustic flush plasterboard ceilings, metallic and acoustic ceiling tiles: Ceiling mounted electrical accessories and/or luminaire fixtures installed on such ceilings, must be provided

with additional backing boards to fully transfer the weight of the accessory to the primary ceiling rail system.

- Plaster board and ceiling tiles: As a minimum, items up to 1000grams are to be fixed to a sheet of 13mm plasterboard or 6mm ply-wood above the ceiling tile, spanning the full width of the tile to the primary ceiling rails, acting as additional bracing.
- For equipment and appliances heavier than 5kg, provide support through the suspended ceiling to the building structure. Brace appliances that have excessive bending moments, are heavy or vibrate, to prevent horizontal movement.
- Heavier items will need to be suspended from a concrete slab above or fixed directly into the ceiling structural supports. Seek advice from a qualified structural engineer to determine the appropriate mounting methods.
- No loose items such as junction boxes, transformers, remote switchgear or battery packs, are to solely rest on top of removable ceiling tiles, but are to be securely fixed to ceiling structural supports.
- Pendant outlets: Refer to refer to DPTI standard detail Drawing DG54 for installation requirements. Proprietary SSO suspensions systems to be used consisting of insulated stainless steel support wire, secured to the building structure (not the ceiling system). All outlets to be independently switched. Where 3-phase SSO's are proposed, RCD may be remotely located or be installed within/on the final sub-circuits' originating switchboard. Cable must be heavy duty (PVC) flex and typically orange for power.

Emergency isolation switches

- Provide individual and functional emergency isolation switches to cut supply of electricity and/or gas in each science laboratory, home economics rooms and design and technology workshops (40mm button, push to isolate, key operation to reset). A separate isolation switch is to be provided for the electrical switched socket outlets and also the gas supply for each room.
- Isolation switches must be located in a prominent location free of equipment and fixtures. The preferred location of the isolation switch is adjacent to the teacher/demonstration bench to reduce student interference and allow for quick activation.
- Where not feasible, the isolation switch must be located adjacent to the main exit of the room.
- The isolation switch will only isolate the electrical switched socket outlets and/or gas to that room, not the whole area or building.
- The electrical service to fume cupboards must not be controlled by the room emergency switch.
- Where an opening or an operable wall may exist between 2 typical spaces/rooms (science laboratory, home economics room and design technology workshops) that are able to be opened into 1 space, the methodology for such control of electrical and gas supplies to these areas need to be thoroughly worked through and understood by the design team and also the user group. In such instances consideration for the splitting off of the 'functional switching' component from the

traditional ‘emergency shutdown’ component of such rooms needs to be considered in consultation with user groups.

Surge protection

- Provide power surge protection to all equipment within the central communications room, using a 3-mode surge reduction filter, installed in a visible location.
- Provide local transient surge protection for electrical circuits supplying power to all data/communications cabinets/racks and also to all administration and other critical function PCs.

Accessories

- All accessories must have fixed cover plates. Light switch mechanisms must be rated for fluorescent loads and secured with a retaining screw within the cover plate.
- Switches and outlets must not be fixed to wall through acoustic wall linings. Special linings are to be fixed around switch and outlet locations.
- All accessories must have circuit identification corresponding to the protection device in the distribution board. Circuit protection is typically by electrical identification studs. Circuit numbering must run numerically throughout each floor of a building. For example, switchboard A (with 60-ways) will be identified R1, W1, B1 through to R20, W20, B20. The next switchboard’s (switchboard B) numbering sequence must continue as R21, W21, B21 typically through to R40, W40, B40 and so on.

Internal lighting

Natural lighting must be used wherever possible and artificial lighting must be designed to complement natural lighting. High efficiency luminaires must be provided for all internal applications to promote energy savings and provide ease of maintenance and replacement through local contract arrangements.

Lighting types

- Light-emitting diode (LED) lighting must be specified for all internal areas unless specialty lighting is required or where LED lighting is not appropriate. All lights are to be flicker free. Lighting must be specified in accordance with AS 1680 Interior Lighting.
- Colour rendering index (CRI) is the measurement of how colours look under a light source when compared with sunlight. The index is measured from 0-100, with a perfect 100 indicating that colours under the light source appear the same as they would under natural sunlight. The colour rendering index of LED lighting must be >80.
- In spaces dedicated to colour sensitive activities (art, photography), LED lighting with a high colour rendering index of CRI>90 is recommended to ensure accurate perception of colours.
- Correlated colour temperature (CCT) defines the colour appearance of a white LED. A warm light is around 2700K, neutral white around 4000K and cool white at 5000K or more. LED lighting in learning

areas, offices and work areas must be 4000K. In reception, staff rooms, performance, presentation, gymnasiums, library, breakout and withdrawal areas a CCT of 3000K is acceptable and 5000K is acceptable in outdoor sports applications.

- Provide LED luminous efficacy of the LED luminaire at normal operating temperature in its normal position and enclosure of > 60 lumens per watt.
- Light sensitive learning environments and earning environments that provide specialist support facilities to children or young people with a disability or special needs are to be provided dimmable LEDs with a push button or rotary dimmer mechanism. Alternative options that provide both dimming and colour changing capabilities may also be considered and approved by the relevant project officer.
- Lighting levels (lux) are not to exceed ‘best practice’ illuminance as defined in AS 1680 by more than 25%, and the maintained illuminance values achieve a uniformity of no less than the values given in table 3.2 of AS 1680.1 - 2006.
- In activity halls/gymnasiums luminaires must provide a minimum of 320 lux, be mounted at maximum height, and be of impact resistant construction with shatterproof diffusers. High bay LED impact resistant fittings are preferred.
- Glare from lights is to be reduced through the use of diffusers and appropriate lighting designs.
 - Glare in standard learning environments is to aim for a Unified Glare Rating (UGR) of <19.
 - For specialty/technical learning environments such as senior art, engineering and technical drawing workshops aim for a UGR of <16.
 - Where existing fittings are being retrofitted with LED lighting, LED tubes must be Australian Standards approved and be opaque.
- In rooms which are dedicated to the use of computers, the lighting must be in accordance with AS/NZS 1680.2.2 - 2008 - Interior and workplace lighting - Specific applications - Office and screen-based tasks.
- Luminaires must not be located above ceiling sweep fans (to avoid strobing effects).
- Luminaires must be installed on proprietary supports by means of battens, trims, noggings, roses and packing material. Luminaries must not be supported by ceiling linings.
- Suspended luminaires must be rod fixed (solid or threaded rod) and have gimbal galleries at the ceiling line to permit inadvertent movement. This allows for any installation on raked ceilings. Where threaded rod is used, quantity of rods is to be chosen to provide a sturdy installation of the luminaire. Minimum size is 8mm.
- Stainless steel (Multi-Strand) levelling wire is only acceptable if rod suspension is not practical. Minimum 4 wires and 4 individual anchor points in a rectangular arrangement, at least 100mm apart at the luminaire and running up parallel up to the ceiling. Where narrow bodied luminaires (less than 100mm wide) are chosen, suspension systems must be solid/threaded rod.

- Electroplated welded link chain is acceptable for use in workshops only. Where link chains are used they must be a minimum of 4 chains and 4 individual anchor points in a rectangular arrangement, at least 100mm apart (width) at the luminaire ends, running parallel up to the ceiling.
- Surface mounted luminaires less than 150mm wide must have a single fixing at each end in conjunction with 1.6mm backing plates. Luminaires greater than 150mm wide or in vandalism prone locations must have a minimum of 4 fixings. Surface mounted luminaires must not be fixed directly into ceiling linings.
- Install recessed luminaires in trimmed openings in suspended ceilings. Recessed downlights with a narrow lip are not accepted. Provide a minimum 5mm wide lip to cover ceiling penetrations.
- Provide seismic restraint safety wires to comply with AS1170.4 part 8 to all luminaires.

Mounting type and heights

- Light fittings installed above 4m AFL must be changed using an elevated working platform. Where new lights are to be installed above 4m the requirements for access and maintenance must be clearly communicated and agreed to by the site leader and documented in the Safety in Design (SiD) register.
- LEDs may be located above 2700mm AFL and recessed due to the expected life and maintenance requirements of LEDs.
- Luminaires in general facilities (learning areas and administration areas) must be standard recessed fittings in T-bar ceilings or surface mounted luminaires in flush ceilings.
- Where there are high or raking ceilings approved or for existing facilities, luminaires must be rod or channel suspended.
- Luminaires in design and technology (typically tech studies) workshops to be mounted at the highest level, where possible. Note the requirement above regarding light fittings mounted 4m AFL.
- Where ceilings are lower than 2400mm and in large resource centres with T-bar ceilings, luminaires must be recessed.
- For all luminaires that are within easy reach, mounted less than 2100mm AFL, such as in-ground uplighters, bollard lights, wall lights (recessed or surface-mount), the touch-temperature of all exposed parts must not exceed 50°C.

Lighting controls

Infrared occupancy sensors

Infrared occupancy sensors are to be installed in occupied internal building areas either in series with mechanical light switches.

- Ensure occupancy sensors are located so they are not unnecessarily tripped by persons walking on the adjacent space/corridor.

- Larger spaces may require more than 1 sensor.

The following areas are to be set at 20 minutes “on” as a minimum:

- Classrooms/learning areas.
- Administration areas.
- Hallways/corridors.

Electronic timer switches

In areas with irregular activities and classes timer switches must be specified to reduce energy usage. Ensure occupancy sensors are located so they are not unnecessarily tripped.

Electronic timer switches are to be installed in assembly halls/gymnasiums set at a 2 hour “on” period. Consideration must be given to safe access lighting when the lights switch to off and the space is still occupied, ideally by the installation of a movement/occupancy sensor to bring the lights back on.

Switching

- Switches must be located at 1000mm AFL.
- Provide both manual control switching for user control and motion sensors. Switch lighting in banks and rows to suit varying light requirements to use natural daylight wherever possible and to reduce energy consumption.
 - Motion detection sensors to be set at 20 minutes “on” as a minimum.
 - Banks must be clearly marked with signage to allow ease of use and increase the likelihood that banking will be used.
 - Provide 1 bank of lighting to each interactive display, whiteboard or AV presentation area within learning areas and meeting spaces. Manual switching to off is required to override any timers and/or occupancy sensors.

External lighting

LED lighting must be specified for all external areas unless specialty lighting is required or where LED lighting is not appropriate. High energy efficiency and low maintenance lighting solutions must be investigated where LED lighting is not appropriate while ensuring that adequate lighting levels are not compromised. For all luminaires that are within easy reach, mounted less than 2100mm AFL, such as in-ground uplighters, wall lights (recessed or surface-mount), the touch-temperature of all exposed parts must not exceed 50°C.

Security lighting

- The surface method or target directed lighting is most effective in a school environment. Targeted lighting is directed at the building rather than away from it. This means that potential offenders close to a building are clearly illuminated.

- Vandal resistant to IK10, energy efficient security lights supplying an adequate level of security as specified above must be provided around all buildings, preferably at eaves level and under verandas. These must be installed above 2700mm AFFL and have vandal resistant stainless steel diffuser clips secured with stainless steel retaining screws.
- Effective security lighting must provide between 30 and 75 lux to provide adequate security levels.
- Courtyards and hidden areas must be illuminated.
- Security lighting luminaires must be mounted in a horizontal position and be operated by photo-electric solar switches (daylight sensors). Maintenance override switches must be provided in all switchboards supplying power to external lighting circuits/luminaires.
- Daylight sensors must be installed on buildings (south side) and operate dusk to dawn.
- Consider using movement activated lighting to reduce electricity usage and provide access lighting for staff movement after hours.
- Where electrical services are to be provided in sheds, activity halls and covered outdoor learning areas (COLAs), all cabling within such spaces /buildings must be installed in PVC conduit and be provided with double sided saddles.
- Where lighting is to be provided in activity halls and COLAs, luminaires must be vandal proof with an impact resistance of (IEC 62262) IK10.

Access lighting

- Access lighting must be provided to pathways, steps, ramps and car parks to allow safe access to and between buildings. Luminaires with high pressure sodium lamps are preferred for this application.
- Care is to be taken to prevent glare from these lights.
- Pole or building mounted luminaires must be used for access lighting. As far as practical all luminaires must be directed vertically downward and must have a light distribution cut-off not exceeding 80 degrees from the vertical (eg no light above horizontal).
- All external light poles must be a minimum of 4m high.
- Bollard lighting must not be used.

Flood lighting

Security issues must be resolved by the use of appropriately located access lighting. Where unavoidable, floodlighting can be provided and at a minimum height of 5m above ground. Floodlights aimed horizontally or near horizontally are not acceptable and must be designed to minimise nuisance lighting in to neighbouring properties.

Refer to AS 4282 - 1997 'Control of the Obtrusive Effects of Outdoor Lighting' to minimise external light pollution to neighbouring bodies and to the night sky.

Security and fire detection

- The department has three security alarm system platforms for use in schools and preschools. The type of system to be installed for a specific project will vary, dependent on the extent of planned construction works, the age and condition of any existing alarm system and the complexity of the site's security needs.
- The Security and Emergency Management team will determine the system to be installed as part of new schools, new building projects and upgrade works as well as the type and extent of systems to be installed where the existing security system has reached end of life.
- Unless otherwise directed by the Security and Emergency Management team the security alarm system to be installed must be either Gallagher 6000, Inner Range Integriti or Inner Range Inception.
- All electronic security systems are to be installed in compliance with Appendices A, B, C, D and E of the current version of the Education Security Design Standards (contact the [Security and Emergency Management team](#) to access these documents):
 - Appendix A - Electronic security systems - Combined fire and security systems.
 - Appendix B – Electronic security systems – Intruder detections standards.
 - Appendix C – Electronic security systems – Fire detection standards.
 - Appendix D – Electronic security systems – CCTV.
 - Appendix E – Electronic security systems – Access control.
- Security contractors must be approved by the Security and Emergency Management team prior to the award of sub-contracts for this work.
- Unless otherwise directed by the Security and Emergency Management team, the installation of multiple, separate security alarm systems at a single school or preschool is not permitted.
- KABA C-Lever and Assa Abloy Aperio access control systems are not approved for use in corporately funded projects. All escutcheon-based access control systems are to be SALTO XS4 One unless otherwise directed by the Security and Emergency Management team.
- The use of standalone digital locks or other non-programmable, generic PIN based systems as an access control solution is not permitted.
- Where SALTO electronic access control has been specified and the existing or required security alarm system is either Inner Range Integriti or Gallagher 6000, the installation must be an integrated access control setup.
- Unless otherwise authorised by the Security and Emergency Management team new standalone (ie non-integrated) SALTO access control systems are not to be installed. Existing standalone SALTO systems may be augmented provided the existing or required security alarm system is not Inner Range Integriti or Gallagher 6000.
- Where the specified security alarm system is Gallagher 6000:

- All components, access control media, licensable features and approved third-party integrations (eg SALTO door locks) must be ordered directly through Gallagher.
 - The system is to be costed and commissioned under the department's enterprise agreement and connected to the central Gallagher server.
 - The installer must be Gallagher Channel Partner approved by the Security and Emergency Management team.
- Where the specified security alarm system is Inner Range Integriti:
 - All components, access control media, licensable features and approved third party integrations (eg SALTO door locks) must be ordered directly through Inner Range/Central Security Distribution.
 - All 'Concept' expanders are to be replaced with Integriti hardware – firmware upgrades of 'Concept' or universal expanders will not be accepted.
 - All keypads are to be replaced with Elite X keypads.
 - Unless otherwise directed by the Security and Emergency Management unit, the system is to be a server installation on a vLAN on the administration network.
 - The installer must be Integriti certified and approved by the Security and Emergency Management team.
- Where the specified access control solution includes the use of SALTO XS4 or XS4 One door locks, the primary contractor must be a security integrator who is SALTO Certified in addition to any Inner Range or Gallagher certification.
- Unless otherwise authorised by the Security and Emergency Management team, all new CCTV installations must be supplied with Milestone XProtect Expert Video Management Software, suitable management and failover server provisions and commissioned to meet the requirements of the department's centralised CCTV network structure.
- Dahua CCTV is not permitted to be used in education sites.
- Unless otherwise specified by the Security and Emergency Management unit only AMPAC evac-U and AMPAC EV3000 systems are to be installed for use as combined emergency warning/school bell systems.
- Unless specifically authorised or required by the Security and Emergency Management team the installation of IP based audio systems to meet the single or combined functions of emergency warning/paging/school bell/public address systems (eg Bellcommander software and Barix Exstreamer devices) is not permitted.
- Wiring, zone descriptions and communication standards must be to the department's and Police Security Services Branch (PSSB) requirements.
- Contact the department's [Security and Emergency Management team](#) for all security system installations and upgrades.

Lifts

- The minimum lift car size for all new lifts is 1100mm wide x 2100mm deep between the inside of the closed car door and inside back wall. Minimum clear opening width of lift car door to be 900mm.
- Lifts must meet all other requirements of the current version of AS 1735.12 – Facilities for persons with disabilities.
- Consultants and contractors must work with the department's disability coordinators and the department's project officer to determine and obtain approval for any lift larger than the minimum size.
- Passenger lifts must have access control using card or key operation.
- Scissor and platform lifts are not recommended and must only be specified with approval from the relevant departmental project officer.

Information and communications technology

Communications cabling

- All cabling must be low smoke, zero halogen.
- Fibre backbone cabling must be provided from the main comms cabinet to other comms cabinets in every building in a star topology.
- The fibre backbone cabling must have 10GB capability, be electromagnetic compatibility compliant and comply with AS/NZS 3080:
 - for less than 300m from the main comms cabinet, minimum 6 – 12 core OM3, can be used.
 - for between 300m and 550m from the main comms cabinet minimum 6 – 12 core OM4 can be used.
 - for more than 550m from the main comms cabinet minimum 6 – 12 core OS2 (single mode) must be used.
 - If the measurements are within 5m of distance limitations of a cable type then, the next grade of cable must be used.
- All cores must be terminated in fibre trays with LC connectors.
- Cabling to the data points must be EMC compliant and comply with AS/NZS 3080.
- Exemplar horizontal cabling products;
 - Cat 6A - 3091B
- Where there are more than 48 cables together, they must be reticulated using wire mesh trays. For less than 48 cables, they must be reticulated using catenary in bundles of up to 24 cables.
- Comms cabling must be installed as per AS/CAS009 and manufacturer installation guidelines and be kept separate from power cabling by at least 50mm or a physical barrier.

- All copper and fibre comms cabling must be tested to the requirements of AS/NZS 3080 in accordance with AS/NZS ISO/IEC61935.1 (copper) and AS/NZS ISO/IEC 14763.3 (fibre).
- All data points and patch panels must be labelled in accordance with AS/NZS 3085.1
- All patch cords and fly leads supplied must be stranded conductor and from the same cabling manufacturer as the horizontal and backbone cabling.
- 2 patch leads must be provided per data point. 50% of the total number of patch leads must be 3m in length, 25% 1m, 15% .5m and 10% 2m.
- Cabling contractors installing the comms cabling must have an ACMA open cabling registration (OCR) and be certified to install the nominated comms cabling manufacturer to ensure a 20 year warranty can be applied to the site.
- Catenary cabling must not be specified between buildings and facilities. Cabling must be trenched as per the relevant Australian Standard and the requirements of DPTI amended NATSPEC.

Comms rooms

- The main communications room is the preferred location for servers (best practice) the core network switch(es), routers, primary node data communications cabinet(s) and PABX.
- The room must preferably be located centrally to all the site buildings and close to the site perimeter to minimise internal cable runs as well as the external links to services running along adjoining roads.
- The main comms room must be on a separate circuit with three mode surge reduction filter installed in a visible location.
- Other comms rooms also must be on separate circuit with local surge protection.
- The room area requirements of the main communications room are:
 - Primary schools and children’s centres - minimum of 8-10m².
 - Secondary school – minimum 12-15m².
 - Provide long blank sidewall and the door in the short wall.
- Must comply with AS/NZS 3084 Telecommunications installations – Telecommunications pathways and spaces for commercial buildings.
- Removed from sources of Electro Magnetic interference.
- The comms room must be secure (equal to secure store requirements).
- Movement and smoke detectors must be installed.
- Provide surge protected 15A power outlet sockets to service communications equipment racks and the PABX.
- Temperature Control

- For the main core comms rooms that contains servers, a dual air-conditioning solution with sufficient redundancy must be provided, with a heat rejection load of 100% of the heat load of intended initial equipment with an additional 25% to cater for future growth.
- The temperature needs to be maintained at 22°C with a relative humidity between 40%-60% (maintained by all units simultaneously).
- There must be an audio visual alarm facility for checking set at 25°C – for eg a red light flashing outside the comms room.
- There must be a second alert for shutdown facility provided at 27°C - to a sequential mobile list developed by the school that continues to loop until it is answered by someone on the list.
- In locations that only contain network switches and adequately passively ventilated space along with an exhaust fan must be provided with a local thermostat to activate the fan set to 24°C to on. The exhaust fan must not cause acoustic issues to the facility when running.

Comms cabinets

- All comms cabinets must be a minimum of 800mm deep and 800mm wide.
- All single instances of comms cabinets in a location must be accessible from the front and back and at least one side.
- All multiple instances of comms cabinets in a location must be aligned with side panels removed and accessible from the front and back.
- All comms cabinets in the main comms room must comply to EIA-310-D 19"W and need to be 45U high, 1200mm deep and at least 800mm wide. The cabinet must be fitted with metered power distribution units PDUs with a minimum of 24 outlets.
- Comms cabinets in other comms rooms must include adequate PDUs to run intended equipment be large enough to house.
 - Required fibre trays.
 - Required network patch panels.
 - Network switches.
- The department must be consulted for the physical measurements of servers, uninterruptable power supplies and network equipment required to be accommodated.
- All cabinets and metallic components within the cabinets must be earthed in accordance with AS/CA S009. Contractors are to verify the existence/soundness and if necessary upgrade the earthing requirements must it be found that the earth is not there, damaged, or presents high impedance readings when tested.

Minimum room data requirements

The department's project officer and the electrical engineer must meet with the site to establish the type and location of all IT and AV equipment, including phone handsets to ensure that adequate infrastructure is being provided to meet site operational needs.

Provide the following minimum data requirements for functional areas:

Learning areas:

- Provide a minimum of 6 double data outlets to general learning areas.
- The number of outlets to specialist areas are to be determined based on activities and equipment requirements.

Administration

Consultation regarding specific equipment is required. Please also consider the following:

- Provide a minimum of 2 double data outlets for each single use office.
- Provide a minimum of 4 double data outlets to reception counters to cater for 2 workstations.
- Ensure that each single office has a minimum of 2 double data points. This allows connection for phone, computer and printer with one spare for other use.
- Finance offices may need additional data or phone ports for eftpos machines, second computer etc.
- Reception offices may also have printers, fax machines and/or eftpos machines that also require data points.

UPS (uninterruptable power supplies)

- A dedicated 15A computer SSO must be provided for all UPS equipment less than 3000 VAs.
- If the department site intends to use UPS equipment that is more than 3000 VAs, then more than 15A is required. Subsequently each UPS over 3000 VAs will require a dedicated hardwired circuit.

Wireless networks

- Wireless network coverage must be throughout all internal areas except for toilets and storage areas. Coverage must also be provided for all undercover and other outdoor learning areas where possible.
- Data point locations are required to be determined by predictive wireless coverage/density software.
- A double data point must be provided at every wireless access point WAP location.
- The department must provide all WAPs for installation by the project contractor. The department will commission all WAPs.

- Data points for WAPs must be mounted in the ceiling cavity wherever it is structurally possible and easily accessible.

Closed-circuit television (CCTV)

All future CCTV cameras will be IP power over Ethernet. Double data points for CCTV cameras must be provided near all building entry/exit doors.

CCTV locations must be provided to the department's [Security and Emergency Management team](#) for review prior to the completion of documentation.

AV solutions

- When determining the position of AV solutions, the effect of glare from windows in the room needs to be considered. Building joinery on the window side of the AV solution is recommended to assist with glare issues eg screens.
- The AV solution needs to be installed by an AV specialist. The preferred approach is for the builder and AV specialist to coordinate prior to first and during second fix electrical, to confirm service location requirements.
- Provide bracing to all wall and ceiling framing that is to receive AV equipment.
- Recommended mounting heights for interactive screens are as follows, to be confirmed with the school and AV supplier:
 - B-2 students – 650mm
 - Year 3-4 students – 700mm
 - Year 5-7 students – 720mm
 - Year 8-12 students – 800mm
- In performance spaces include the following minimum provisions in a suitable location (or AV rack) at the side of and rear most area of the stage connected back to the control room:
 - 24 channel audio multi-core (balanced 2-pair individually shielded), terminated with XLR's (12 x male XLR's and 12 x female XLR's at each end) finished off on a technical panel.
 - Cable manufacturer to be 'Belden' for general Audio connectivity and 'Canare' for any High End/Broadcast Audio Connectivity.
 - 4 x Cat 6a dedicated data/comms cables.

Hearing augmentation systems (soundfields)

Soundfields provide best practice listening conditions for all students in learning spaces and helps to protect teacher voices particularly in contemporary open space learning environments. Permanently installed soundfield infrastructure must be installed to all learning spaces including open space learning environments and large breakout spaces used for learning activities.

Soundfield infrastructure involves the capture of all sounds of teaching (including and not limited to audio from AV sources including TV, projectors and other visual devices and voices of teachers and students) and distributes sound evenly throughout the learning spaces by wall or ceiling mounted speakers so that a teacher's conversational voice is heard in all areas.

Soundfield infrastructure must include:

- Soundfield audio, and that from a PA signal in the room, must be captured via cable and made available for electronic transmission to receivers built into assistive listening devices (including hearing aids) used by hearing impaired students, teachers and visitors to create complete hearing augmentation.
- Cabling from these sound sources is to terminate to a practical location so that transmitters to receivers in hearing aids can be connected and operate effectively without the need for software or proprietary technology. A suitable wall plate system is to be adopted with facility to keep transmitters secure, and this audio from these sound sources must be transformed and balanced so as to be ready for input to transmitters.
- Transmission is to be achieved by using transmitters that operate with the current generation of receivers supplied to hearing aided students by Hearing Australia or other government entity. It may be that students use their own transmitters or the school maintains communal transmitter(s) for this purpose. Induction/TSwitch systems are not to be used.
- Learning spaces that are smaller than 50m² and have PA infrastructure require a hearing augmentation wall plate system only.
- Soundfield technology is to be as discreet as possible and optimise safety by having speakers that are in-ceiling, or wall mounted at a height so as to not be knocked by students and teachers.
- Microphones used with soundfield must be as small and light as possible and not involve cabling to microphones or belt-packs. Transmission from microphone to soundfield receiver must be of a technology that minimises congestion with other forms of education technology including Wi-Fi and other radio frequency technology.
- A sign indicating that an assistive hearing device is installed or is available must be provided in accordance with AS 1428.2 Clause 16 and 17 at the main entry door to the learning space.

Assistance call system (accessible toilets)

- An emergency call system shall be provided in every Accessible Toilet. Provide a call button and locate the audible and visual warning device outside the accessible toilet and in an administrative area where a staff member is permanently located during operating hours.
- The warning device shall continue to operate until it is reset via the security software workstation or at the point of activation (subject to the type of call button provided).
- The call button shall be a red push-button, twist to reset type (CSD-WEL2210R-ASS or equivalent) with protective shroud cover to prevent accidental activation.
- An audible and visual warning device installed in an administrative area to ensure rapid physical response to the activation of an 'assistance alarm' must be clearly labelled with the location of the

associated alarm activation button (e.g. ACC TOILET – BLDG 3 – GROUND – RM 201). The label should be legible from the ordinary seated position of a staff member expected to monitor the audible and visual warning device.

- Security alarm systems must be programmed to report ‘assistance alarms’ as a medical alarm or other appropriate description using the approved Contact ID codes for PSSB. DfE will be responsible to advise/manage how PSSB act and/or respond on such ‘assistance calls’. Under no circumstances is an accessible toilet alarm or other ‘assistance alarm’ (e.g. balconies and cool rooms) to be programmed and commissioned as a ‘duress alarm’.
- Where necessary, special alarm instruction forms may be submitted to PSSB to ensure patrol attendance if ‘assistance alarms’ are activated outside of the normal operating hours for a site.

Printers/photocopiers/multi-functional devices

- Ensure that a double data point is included wherever a printing device is to be located, even if it is just in a 1 person office.

Specialist storage

Cleaning storage

Cleaning stores must be provided at the following dimensions

- A store room of 6m² (approximate proportion of 3m x 2m) must be provided for an aggregated building area of up to 1,500m².
- An additional store room of 3m² (approximate proportion of 2m x 1.5m) must be provided for every additional 1,000m² (or part thereof) aggregated building area above the initial 1,500m².
- Room dimensions must allow easy access into the store without the need to remove equipment.

Cleaning store location and access

- Locate centrally within buildings, on each level of multi-storey buildings, in proximity to an exit door on the building perimeter and provide reasonable vehicle access for equipment delivery.
- Disperse evenly across a site where more than 1 cleaning store is required.
- Adjacent to wet facilities for cost effective water supply and plumbing access (the provision of a cleaner’s sink is optional).
- Where modular buildings are grouped at a distance from solid buildings, provide a storage facility within the building, or group of buildings, either as a partitioned space or a lockable cupboard.
- Cleaning stores must not interfere with the teaching requirements and functions of a school.
- Storage sheds are not considered an acceptable provision for cleaning storage facilities due to the inherent and unacceptable risk exposures of such facilities (eg security risk).

Storage requirements

The types of equipment that need to be stored can range from vacuums, polishers, blower vacuums, auto scrubbers, buckets, mops, brooms, multiple chemicals in 5-10L containers and janitor's trolleys.

Store room materials and services

- All wall surfaces must be resilient and hard wearing.
- Wall surfaces must be painted with a semi-gloss finish to enable easy cleaning of surfaces.
- Flooring must be slip resistant to AS/NZS 4586 and have coved skirtings to a minimum 150mm with impervious joints in corners.
- Incorporate falls and floor drainage where applicable – refer [flooring](#).
- Doors must be solid core, flush panel doors with no viewing panels with a locking latch from outside and free access from inside at all times. Return D-handles must match other door furniture.
- Provide a double power outlet for testing of equipment.
- Mechanical ventilation must be provided to prevent the accumulation of fumes and odours.
- Provide a broom rack and lockable cupboard with timber shelving and chemical resistant laminate to interior surfaces.
- Provide wall stripping with timber shelving and chemical resistant laminate finish.
- Provide a flammable liquids storage cabinet (main store room only).
- Warning signs regarding the storage of chemicals must be permanently fixed to the external door and the storage cupboard door (compliant with Work Health and Safety Regulations).

Cold room storage provisions

The provision of new cold room storage is not permitted.

Approval must be obtained from the department for the relocation and re-use of any existing cold room storage.

Existing cold room storage facilities must meet the requirements of the NCC G1.3 Refrigerated chambers, strong-rooms and vaults, including:

- A door which is capable of being opened by hand from inside without a key, with a clear width of not less than 600mm and a clear height of not less than 1500mm.
- Internal lighting controlled only by a switch which is located adjacent to the entrance doorway inside the storage room.
- An indicator lamp positioned outside the storage room which is illuminated when the interior lights are switched on.

- An alarm that is located outside but controllable only from within the storage room and is able to achieve a sound pressure level outside the storage room of 90dB(A) when measured 3m from the sounding device.
- Periodic testing of these emergency systems must be undertaken in accordance with Australian Standards.

Fire rated chemical storage rooms

- Refer DPTI Drawing DD19 Typical Chemical Store layout.
- Open shelving units for chemical storage to comply with DPTI Drawing DG04 Chemical Storage Open Shelf Unit.
- Chemical storage in small schools with only 2 laboratories can be located in the preparation/store room provided:
 - Preparation/store room is only accessible by authorised school staff.
 - The room is to have at least 1 external wall.
 - The chemical storage is to be in standard vented corrosive cupboard units located together at the furthest end of the room to the door.
 - Flammable liquids cabinet vented to the outside air.
 - An air intake grille is located in the external wall at low level.
 - The ceiling, wall and floor linings are of non-combustible construction.
 - Walls to be 2 hour fire rated full height to the underside of slab or roof over.
 - Door to be 2 hour fire rated door and frame, opening outwards with closer. Mortice deadlock with free lever handle inside for escape, keyed separately.
 - Fire and smoke alarms are fitted.

Fixtures, fittings, equipment and furniture

Curtains and blinds

Use passive design principles including building design and fixed shading devices to regulate internal environments in regards to heat load and glare as far as practicable.

Sun control must be achieved by the design and location of the windows and the use of fixed external screens or verandas, and must not rely on internal curtains or blinds.

Blinds may be used in specific circumstances to provide dim out provisions, reduce heat load and glare when required, with specifications as follows:

- Cordless blinds are preferred. Where this is not possible, blinds with a cord must be installed in such a way that a loose cord cannot form a loop 220mm or longer at less than 1600mm AFL.

- Cords must be secured with either tie-downs (cleats) or tension devices that enclose cords and chain loops at a minimum height of 1600mm AFL.
- Where windows are obstructed by a cupboard or fixture and fixing is unable to be mounted at 1600mm, the cord fixing must be mounted at a level which is accessible to staff and does not pose a risk for Work Health and Safety.
- Internal corded window coverings must not be installed in unsupervised learning areas such as sensory rooms and withdrawal rooms.
- Curtains may be specified in specialist learning areas where blackout or dim out provisions are required, such as media or drama learning areas.

Curtains and blinds must have a fire retardant incorporated in their manufacture in accordance with AS/NZS 1530.3 Methods for fire tests on building materials, components and structures, simultaneous determination of ignitability, flame propagation, heat release and smoke release.

Mechanical window coverings

Where sites require specialty daylight control in areas such as sensory rooms and withdrawal rooms, mechanically operated systems may be installed.

Sinks and troughs

Sinks and troughs must be stainless steel, grade 304, except the following:

Secondary school science laboratory and preparation areas (and other areas where chemicals are to be used such as Science, Technology, Engineering and Mathematics labs).	<ul style="list-style-type: none"> • Grade 316 stainless steel sinks and troughs for teacher use • Vitreous china or grade 316 stainless steel sinks for student use • Chemical resistant corian solid surface; avoid plain white due to staining • All science lab sinks must be under mounted to ensure chemical spills can be easily cleaned into the sink.
High salt areas (Coastal and APY Lands)	<ul style="list-style-type: none"> • Grade 316

- Sinks with front lip and tile skirt are preferred over inset sinks.
- All sinks and troughs to have integral overflows where no floor traps are provided.
- Student toilet hand basins may be stainless steel or vitreous china.

Please refer to the following approved DPTI Drawings:

- DD16 - Basic Laboratory Sink/Cupboard
- DD17 - Laboratory Sink Island Demonstration Model
- DD18 - Art Sink
- DG17 - Photographic Sink

- DG18 - Sluice Trough
- DG19 – Silk Screen Cleaning Trough

Tapware

General

- Basin and sink taps must be specified to the highest practicable Water Efficiency Labelling Scheme (WELS) rating.
- All outlets and breeching pieces must be manufactured from de-zincification resistant material approved by SA Water.
- Taps can be wall or bench mounted. If bench mounted they must be secured to the bench top and not just to the sink or trough.
- Swivel outlets must not be used.
- Taps must have lever handles unless otherwise indicated in this standard. Lever handles must have not less than 50mm clearance from an adjacent surface.
- All single lever mixers need to be commercial grade and have highly visible colour indicators which are permanently attached.
- Student ablution areas in schools must have 1 pillar cock for cold water to each basin, push button activated timeflow with delayed return. Provide soft touch push button timeflow tap in preschool and early learning settings.
- Staff ablution areas must have commercial grade single lever mixers with colour indicator.

Drinking troughs/fountains

Where new drinking fountains are being specified, or where existing fountains are being replaced, disability provisions must be considered to ensure equitable access. Although not required at every fountain, convenient access for both able bodied and people with disability must be considered.

They must be stainless steel proprietary items in convenient locations around the school and must be located away from toilet areas and entrances to reduce the likelihood of cross-contamination and conflicts in student movement. For ease of maintenance and cleaning, it is preferable that the drinking outlets are above stainless steel troughs, particularly if they are located outside of buildings. All drains must be ferrous if easily accessible.

Provide a sturdy, low maintenance chrome plated bubbler outlet with integral rubber bacteria preventative mouthguard and a self-closing tap. The drinking bubbler must also have an integral bottle filler for filling water bottles in a quick and easy manner. Drinking fountain outlets must aim to be the highest practicable WELS rating. The bubbler outlet must be set at the following heights except where disability provisions are specified:

- Junior primary schools: 600 to 650mm

- Primary and middle schools: 750 to 800mm
- Secondary schools: 900 to 1000mm

Provision of refrigeration and/or filters to the drinking water is not a standard provision and is not financially supported by the department. Where schools or preschools elect to install refrigeration and/or filters, installation and ongoing maintenance (as per the manufacturer's instructions) is the responsibility of the school. If provided ensure any electrical connections are hard wired and that cabling and the like does not pose a trip hazard.

Toilet pans

- Specify the most water efficient equipment practicable, aiming for within 1 star of the best available WELS rating.
- Toilet pans must be white vitreous china of basic design, with single flap seat (no lids). Disability toilets must have a dual flap.
- Toilet pans must be adult size in all primary and high schools and junior size in preschools and early learning settings.
- Disability access toilet pans to be provided in accordance with AS 1428.1.
- Ambulant facilities for children in preschools and early learning settings are to be junior size.
- Cisterns must be vitreous china dual flush with vandal-proof push buttons.
- Urinals must not be provided in male student or staff/visitor toilets. The required male student urinals stipulated in the NCC are to be converted to closet pans. Please refer to section [toilet provisions and design](#) for more information.

Hand basins

Hand washing facilities must be provided within or in close proximity to all learning and common areas. The number of hand basins or sinks provided must consider the number of students entering the learning area, common area or building at one time to ensure hand washing can be undertaken for all students efficiently. These provisions are in addition to those provided in student amenities.

Hand basins must be also be provided for personal hygiene and where food preparation is undertaken in the following areas:

- Staff and Student toilet amenities
- Nappy change areas
- Sick rooms
- Staff room kitchen
- Early childhood kitchens
- Canteen
- Primary school serviced learning areas used for cooking activities

- High school home economics/food technology
- High school VET commercial kitchens
- High school commercial kitchens

Hand basins must be mounted at the following heights:

- Early learning centres: 550mm for children under 2 years of age, 600mm for children over 2 years of age.
- Preschools: 600mm.
- Primary schools: 700mm.
- Secondary schools: 850mm.
- Staff facilities: 900mm.

Hand basins must be white vitreous china mounted on heavy duty brackets. All drains to be ferrous if easily accessible.

Hand dryers

- Electric hand dryers must be provided in accessible toilets.
- Electric hand dryers are the preferred option in all student and staff toilets, 1 per amenity facility for toilet rooms and 1 per cubicle for individual unisex facilities.
- Where hand dryers are not suitable for facilities such as special needs schools, paper towel dispensers may be specified with approval from the department.
- Hand dryers must have metal casing, with fixed air nozzle and push button or sensor operation.
- Air jet hand dryers to be wall mounted only with downward direction of air stream and have integrated drainage.
- Hard-wire each hand dryer via an isolator mounted at high level at 2100mm AFL.
- Hand dryers must be RCD protected.
- The operable outlet of the hand dryer must be mounted at the following heights:
 - Preschools and early learning centres – 650mm AFL.
 - Primary student and disability access toilets - 1000mm AFL.
 - Staff and secondary student toilets - 1200mm AFL.

Mirrors

Mirrors must be vandalism resistant, an appropriate size for the age group, and provided in each toilet amenity cluster.

Staff toilets must have individual mirrors contained in a frame fixed to the wall above each hand basin. Mirrors 600mm high by 450mm wide are an appropriate size.

Mirrors in accessible toilet amenities to comply with AS 1428.1

Toilet amenities fixtures and fittings

- Provide shelf space adjacent to the washbasin in accessible toilet amenities in accordance with AS 1428.1.
- Provide fixtures including clothing hooks, soap dispensers, toilet paper dispensers, hand dryers and folding shower seats in accessible and ambulant toilet amenities in accordance with AS 1428.1.
- Provide a clothing hook to staff toilet cubicle doors; for inward opening doors provide Part 297SSS with rubber bumper, for outward opening doors provide Part 296SSS without rubber bumper.
- Toilet roll holders must be adequately secure to prevent rolls being removed by students. Double roll holders are recommended.
- Provide grab rails to ambulant toilets, accessible toilets and showers to comply with AS 1428.1. Grab rails to ambulant toilets in preschools and early learning centres to be mounted at 600mm AFL. Install adequate bracing to wall framing for grab rail fixing.
- Sanitary disposal in female cubicles will be supplied by the department as freestanding units, under a separate servicing contract.

Showers

Student and staff showers

- Shower heads must be specified to the highest practicable WELS rating eg if 6 star is the highest available rating however does not provide an appropriate solution, a 5 star minimum must be specified.
- Student showers are normally only provided as part of change rooms in secondary schools.
- Separate cubicles including a seat must be provided for male and female change rooms.
- A single unisex staff shower must be provided as part of the school administration facilities. This can be part of the staff toilet suite or included in the disability/special needs toilet area.
- Refer to DPTI Drawing DD02 – Pre-finished Fibre Cement Shower Partition

Emergency shower and eyewash

A hand-held shower must be provided in every science laboratory and design and technology workshop, mounted on a bench adjacent to a sink. Enware model EL540 drench hose (or equivalent) is an acceptable fitting. Final location to be determined in consultation with the site users.

A drench shower and eye wash unit must be provided in the science laboratory preparation/store room. Enware model EC090 combination emergency shower and eyewash (or equivalent) is an acceptable fitting.

The following provisions apply to all emergency shower/eyewash facilities:

- Locate in an easily accessible, visible and unobstructed location.
- Provide a floor trap connected to the building sewer waste system.
- Controlled flow of flushing fluid is to be provided to both eyes simultaneously at a low velocity.
- Provide with a separate potable water supply.

Joinery

Fixed joinery

The preference is to minimise fixed joinery and to provide flexibility with loose furniture. System furniture workstations are similarly not desirable as they restrict flexibility in general work areas.

For primary schools, fixed joinery is generally provided only in the following areas:

- Reception area and general office.
- School services officer work area and printery.
- Staff lounge kitchen.
- Storage cupboards in classrooms.
- Benches and cupboards in classrooms, including wet strips.
- Library charge desk and work room benches and cupboards.
- Canteen servery and preparation areas.

For secondary schools, fixed joinery is generally provided only in the following areas:

- Reception area and general office.
- School services officer workroom and printery.
- Staff lounge kitchen.
- Design and technology workshops.
- Art studios.
- Science laboratories.
- Home economics.
- Serviced classrooms.
- Library charge desk and workroom benches and cupboards.
- Canteen servery and preparation areas.

Joinery cupboards

- Doors to cupboards under benches must be no more than 450mm wide.

- Doors to cupboards taller than bench height must be no more than 600mm wide and must have 4 hinges.
- Hinges must be of commercial standard and have a cam for height adjustment and not a slotted screw.
- All concealed cupboard door hinges are to have a 170 degree opening unless the cupboard is adjacent a wall in which case the door may open to 90 degrees.
- In staff areas, early childhood and primary school facilities: 2 hinges per door must be fitted to under-bench joinery.
- In secondary school facilities: 3 hinges per door must be fitted to under-bench joinery.
- All full height cupboards or overhead shelving must have a bulkhead extending to the ceiling to enclose the space above cupboards/shelving. The highest shelf of joinery is to be mounted at 1800mm above floor level.

Benchtop work surfaces

- Administration, reception, canteen, library and specialist learning areas must have a bench/counter suitable for disability access as per AS 1428.2.
- Dropdown counter tops are not preferred due to finger entrapment.
- Bench heights for standing and seated use for junior primary students (reception to year 2) must be 720mm, including sinks and troughs.
- Bench heights for primary school students (year 3 to 6) for seated use must be 720mm and 850mm for standing (or stool) use. Sinks and troughs must be at 850mm height.
- Bench heights for secondary school students (years 7 to 12) must be 720mm for seated use and 850mm for standing (or stool) use. Sinks and troughs must be at 850mm height.
- Bench heights for all school staff areas must be 720mm for seated use and 900mm for standing use to conform to industry standard and allow appliances such as dishwashers to fit under counter tops.
- These heights match the heights of standard school tables supplied as furniture items.
- Provide a minimum of one accessible work point to each specialist area including fixed benching at 850mm height with knee and foot space under, sink, services and tapware in accordance with AS 1428.2.
 - Provide an induction cooktop and wall mounted oven with slide and hide door to each food technology/home economics/VET kitchen space.
 - Sinks incorporated in work benches in kitchen areas are acceptable at 850mm height.
 - Handles to tapware and gas turrets must be a maximum of 300 millimetres from the front of the bench to the operable part of the tap measured from the centre line of the tap or turret

- Bench tops must be designed to reduce the likelihood of injury and for the intended age group/users. Open corners of bench tops adjacent to main pedestrian thoroughfares must be rounded or mitred at 45 degrees for safety reasons.
- Bench top surfaces in science laboratories must be chemical and heat resistant compact laminate or chemical resistant solid surface.

Hardware

- Cupboard doors and drawers must have D-handles.
- Cupboard door locks are only to be provided where specifically briefed, such as secure storage in specialist areas.

Equipment

Fume cupboards

- Provide 1 fume cupboard in laboratories used for chemical experiments and 1 fume cupboard in preparation/store room.
- Fume cupboards are to be 1500mm wide and include sink, cold water and gas supply. Double sided fume cupboards are acceptable.
- In small schools, 1 fume cupboard 1500mm wide in 1 laboratory is to be provided, accessible from the preparation area.
- Locate all fume cupboards a minimum of 1m away from door openings.
- All fume cupboards to have flues vented to external atmosphere.
- On site testing of all fume cupboards is required to be carried out in compliance with AS/NZS 2243.8 - 2014.

Flammable materials cabinets

- Refer DPTI Refer DPTI Drawing DD19 Typical Chemical Store Layout.
- Constructed to comply with AS 1940 and vented to the atmosphere.
- Minimum 250L capacity with double doors and 3 shelves.
- High and low level vents on opposite sides of the cabinet.

Vented corrosives cupboards

- Constructed as per DPTI Drawing DG03 – Vented Corrosives Cupboard.
- 2 x 100mm diameter UPVC vent ducts vented to the atmosphere.

Kilns

Schools are responsible for the purchase of kilns. Students cannot operate, load, unload or clean kilns.

Where provided kiln selection, location and installation must meet the following requirements:

- Primary schools: 1 front loading electric kiln for the art/practical activity room in an outdoor enclosure. Provide electricity supply, ventilation and extraction systems and an enclosure for the kiln.
- Secondary schools: 1 or more front loading gas or electric kilns in an outdoor enclosure adjoining the ceramics room of the art area. Provide the appropriate gas or electricity supply, ventilation and extraction systems and an enclosure for the kiln.
- Kerosene and oil drop kilns are not to be used in schools.
- Provide 300mm minimum distance at the rear of the kiln and 600mm minimum clearance at the front, to the sides and around the door arc for safe access to the plant for operation, cleaning, maintenance and inspection. The kiln and door opening arc must not obstruct walkways and emergency exits.
- Ensure any adjacent wall linings are non-combustible.
- Shell construction to be pre-shrunk ceramic fibre board with multi-layer back-up ceramic fibre blanket insulation.
- Ensure the kiln has adequate insulation on all parts, a lockable isolation switch, and a 2-stage door latch with padlock loop including integrated safety switch. Provide auto fire multi-stage, multi-program digital controller with built in safety circuit and delay start function, a red pilot light viewable from the exterior to indicate kiln operation/firing process is continuing and a safety heat fuse.
- Fume extraction system to be exhausted to the outside atmosphere. Ensure extraction system is operating before, during and after firing to prevent inhalation of kiln emissions. Note corrosion of metal fittings outside a kiln enclosure may indicate an ineffective ventilation system.
- Ensure the extraction system operates effectively at all times during the firing cycle, and vents outside the building, away from populated areas such as walkways and areas where staff and students may congregate.
- All controls to be clearly labelled.
- Copper chrome arsenate treated timber and other chemically treated wood or sawdust **must not** be used or burnt in kilns.
- Implement a firing schedule for kilns (eg after 3pm, when no students are around), including for bisque, glaze and decal/lustre firings. Become familiar with the information in the Safety Data Sheet (SDS) about known or suspected health risks associated with all ceramic materials, and implement safe working practices.
- Obtain manual and safe operating procedures (SOP) from the manufacturer including procedures for exhaust and emissions management after firing and protocol for cooling down the kiln.

3D printers

Schools are responsible for the purchase of 3D printers. Where provided 3D printer selection, location, installation and operation must meet the following requirements:

- Select a fully enclosed cabinet model with high efficiency particulate air (HEPA) grade particulate filter and activated carbon filter. Open framed printers are not accepted.
- Manufacturer's filter maintenance recommendations must be entered in the site maintenance schedule.
- Use polylactide (PLA) printing filaments for lower airborne contaminant levels (ultrafine particle emissions and VOC emissions). Do not use nylon filaments.
- Maximise natural air movement around the machine; locate adjacent to openable door/window where possible.
- Avoid sanding; use scraping tools to clean up student models.

Fixtures

Bag storage/lockers

- Bag storage must be provided in close proximity to general classrooms in primary schools to accommodate bags for 100% of the enrolment.
- Bag storage must be provided in secondary schools for all students. Lockers must be distributed across the site, located particularly with the general learning areas, including in corridors with adequate circulation, in shelter areas, alcoves and on verandas externally. They are not to be consolidated in locker rooms.
- Bag storage units must be fixed securely to walls or ground surfaces and be protected under roofed areas/covered ways from wet weather.
- Consider placing the lockers in secure locations where the possibility of vandalism is reduced.
- The use of traditional metal lockers is recommended when located externally and appropriately shaded.
- External plastic lockers are at risk of melting and create toxic fumes if set alight and must not be specified for sites without full security fencing.
- Coat/bag hooks may be provided in lieu of lockers in primary schools. Where provided, they must be in close proximity to general learning areas and include pelmets to provide protection from accidental injury from protruding hooks.

Display boards, whiteboards and writeable surfaces

- Provide display boards to internal walls in learning areas, offices and staff work areas. Maximise pin-up space to available wall surfaces and provide a minimum equivalent length of 4800mm x 1800mm in learning areas. Display surfaces can be distributed through the learning area.
- Avoid locating display boards above sinks.
- Ensure power/data outlets, switches, controls and other fittings are conflict with display board locations.
- Fabrics that allow velcro strips as well as being pinable are preferred.
- Provide writeable surfaces/whiteboards in learning areas, offices and staff work areas. Provide the equivalent of at least 2400mm wide x 1800mm high in learning areas. Writeable surfaces can be distributed through the learning area. Coordinate locations with display boards and AV locations.

Compactus units

- Compactus storage units must be provided generally in store rooms, combined staff preparation/store rooms and where specifically briefed.
- Use proprietary units 900mm deep by 2000mm high. Unit lengths, shelf depths and fit-out of the unit must be as required for each particular location and as briefed.
- The end mobile bay must be 400mm deep to provide stability.
- For disability access and safety ensure that floor finish is level with the top of the tracks.
- Where tracks are laid on the floor slab, form a ramp on the entry side of the unit and infill between tracks with flooring. Where plinth units are used, provide identification warning strips to edge of step.
- The location of the units must be confirmed by a structural engineer to ensure floor load capacity is not exceeded.

Key cabinet

A secure key cabinet must be installed in the administration area. It must be securely fixed to a solid wall. The size of the cabinet must be to suit the school's key requirements.

Pigeon-holes (staff)

Staff pigeon-hole units must be located in or near the staff lounge to provide 1 compartment for each staff member (maximum projected school enrolment) plus 10%. Compartment size is to allow for A4 size envelopes to lie flat. Shelves must be at least 16mm thick to allow staff names to be displayed horizontally.

Safe

- A freestanding safe must be provided for primary and secondary schools. An acceptable safe is a "Chubb Protector", or equivalent.
- An alternative is a wall safe that can be securely and appropriately installed.
- The safe must be installed in the administration area, preferably in the secure store room.

Signage - internal

Room signage

Signage must be provided in buildings and to rooms to provide appropriate identification. The system must be consistent with the Strategic Asset Management Information System (SAMIS) building and room numbering where this is appropriate.

Signage must be robust and securely fixed to walls and doors. Rooms generally are preferred to be numbered rather than named, as room functions can change over time.

Emergency identification signage

Emergency identification labels and signs are required to be permanently fixed and vandal resistant. Stick-on labels are not acceptable as they are easily removed. Engraved signs are preferred. Signs to be legible and in conspicuous locations.

Staff Preparation areas – Science

Provide sign in preparation/store room 'STORAGE OF CHEMICALS PROHIBITED' in a prominent position (where separate chemical store room provided).

Loose furniture

All loose furniture items will be purchased by the site, including but not limited to the following items, and are not captured within the scope of the design standards:

- Tables, desks, chairs and stools.
- Unfixed whiteboards and chalkboards.
- Shelving that is to be hung on wall stripping.
- Microwave ovens and refrigerators.
- Design and technology equipment.
- Computers.
- Dishwashers.

Clocks

- Battery operated clocks will be purchased by the site as a furniture item.

- Wall mounting points must be provided in teaching and staff areas for the clocks to be hung on.
- Contractor must allow to hang all clocks provided by the facility within the area of project works.

Shelving

- Metal shelves are purchased by the site as a loose furniture item to be hung on the wall stripping.
- Fixed shelving must be provided by the project for specialist storage requirements such as in workshops, kitchens and studios when required.

Siteworks

Site access

General

- School site access points must be planned to consider building entrances, street design, the physical and emotional needs of children and students with disability and their carer, the requirements of pedestrian and cyclists, proximity to pick-up and set-down zones, council planning requirements, community use of facilities and the movement of vehicles on the site.
- Fencing adjacent to main roads must be considered for controlled access on to main roads.
- Design to avoid conflict between pedestrian, cycle and vehicle paths.
- The need for vehicles to reverse on the school site must be kept to a minimum and avoided wherever possible.
- Ensure that future and existing modular buildings can be brought onto and removed from the site with minimal disturbance to surroundings.

Building access

Access to all education facilities must be designed and constructed to provide safe, equitable and dignified access to buildings, services and facilities. Access to buildings for those with disability must be available through the principal street entrance.

While paths providing direct access to buildings on sloping sites may be stepped, ramped access must be provided to cater for the following:

- People with disability and their carer.
- Hand truck deliveries where service roads do not permit vehicles to deliver directly.
- Movement of transportable equipment including book trolleys, television sets and science trolleys etc.
- Community use, ie prams/strollers.

Ramps

- Ramp must be designed for a maximum gradient of 1:16. Where not achievable, the ramp gradient must be approved by the department's project officer.
- Due to the specialised nature of education facilities, greater consideration must be given to the design, location and specification of ramps and must consider the overall site layout and location of buildings and services.
- Walkways are preferable to ramps wherever possible. Walkways must have a maximum gradient of 1:20. Handrails and kerb rails are not required to walkways where there is a firm and level surface in a different material to the walkway, extending horizontally at the same level and grade, for a minimum of 600mm on both sides. Refer to AS 1428.1 for walkway specifications and gradients.
- Unobstructed width between handrails must be 1200mm.
- Steps must be provided adjacent ramps as an alternative means of access.

Step ramps

- Step ramps are not preferred. Where no other option is available, step ramps must not be provided for more than 1 interval eg step ramps must have a maximum total rise of 190mm and must not proceed to a landing with another ramp (step ramp or standard ramp).
- Where space does not allow for a full sized ramp, access to ramps via a step ramp must only be provided with approval from the department and must have a second landing eg step ramp to a landing – followed by a second landing - proceeding to the second ramp as per AS 1428.1.

Pedestrian access (paths/walkways)

- Pedestrian paths are to be provided to link all points of access and located to take into account the need for convenient access.
- If paths are diverted from the most obvious and practicable routes, planting or fencing may be used to direct pedestrians along the appropriate path and discourage alternative routes.
- Main path width must be at least 2000mm wide and secondary paths at least 1200mm wide.
- Pavement adjacent to a building and with little pedestrian traffic must be at least 900mm wide. Pavement design adjacent to a building will also depend on structural/geotechnical engineering requirements.
- Pavers must be a maximum 200mm x 200mm with bevelled edge, 60mm thick over 30mm bedding sand over 125mm PM1/20.
- All pavements to have non slip finish.

Bicycle access

Bicycle access points and paths must be kept separate from vehicle traffic and must have logical access to bike parking/storage.

Vehicle access

Student safety is an important design consideration. The separation of pedestrian and cyclist traffic from vehicular traffic is paramount.

- Ensure emergency vehicles can gain access to all buildings, hard-play and grassed areas as per performance requirements of the NCC.
- Preferred surface is 30mm thick AC10 or 60 to 80mm thick herringbone type A pattern interlocking pavers over 30mm sand over 200mm PM1/20.
- Allow for 3000mm wide double gates for ambulance access onto courts.
- Ensure access by taxis, buses and access cabs is available to appropriate parts of the site that minimises travel distances to buildings and exposures to the elements.
- It may be necessary to provide a delivery drop off point for goods to be taken by hand truck to the point of requirement.
- Landscaping must be designed in such a way that it will not obstruct driver vision.
- The design must prevent the need for vehicles to reverse if possible.

The location of the following facilities needs careful consideration to avoid vehicle/pedestrian conflict and unnecessary cost (length of roadway, construction and future maintenance) for service vehicle access and must consider community use:

- Canteen
- Library resource centre (workroom entry)
- Design and technology workshops
- Administration (medical suite, book room)
- Gymnasium
- Grounds maintenance
- Mechanical and electrical plant (air conditioners, transformers, etc)
- Waste disposal area.

Bus zones

- Where practicable, a bus zone is to be provided at a convenient location on a street abutting the school. Where a bus zone cannot be provided external to the school site, a bus access road with a loading point may be provided in consultation with the department.
- For special schools, an undercover student drop-off and pick-up area is required for buses and taxis. A secure compound for bus parking and storage may also be required.
- In area, rural and special rural schools where buses are used daily, provision is to be made for suitable parking zones. Each situation must be studied and provisions made as a result of the schools' requirements.

- In designating the bus zone, it is important that access roads and student bicycle and pedestrian paths do not conflict with the zone. Suitable access roads must be provided and buses are not permitted to reverse on school grounds.
- Bus zone pavements are to be appropriately designed using 80mm thick interlocking pavers as a minimum.

Internal roadways

- Access roads into the school site must be kept to a minimum and only to provide convenient delivery of goods to the administration, canteen, design and technology workshops and art buildings, for grounds maintenance and access to mechanical and electrical plant, and to waste disposal areas. The objective is to keep vehicles to the periphery of the school site.
- Vehicle reversing in school grounds must be avoided wherever possible.
- Access and manoeuvrability of industrial bin collection vehicles must be considered.
- Two-way roadways are a minimum of 5500mm wide between kerbs.
- One-way roadways are a minimum of 3000mm wide between kerbs.

Speed reducing devices

Speed humps may be used on service roads and access roads to ensure traffic slows down to an acceptable speed. However speed reducing devices must consider heavy vehicle access and slow vehicles at entry. Humps must be constructed and painted in accordance with AS 2890.1 - 2004.

If there is some doubt as to whether the device is visible to the driver appropriate signage must be used in accordance with AS 1743 - 2001, Road Signs - Specifications and AS 1744 - 2015, Standard alphabets for road signs.

Road surface treatment

A variation in texture or colour can be used to indicate a potential danger area such as a pedestrian movement or a conflict point. These provisions effectively:

- Slow down and direct pedestrian traffic
- Alert vehicles to circulation areas commonly used by students
- Avoid potentially dangerous situations.

Provisions of safety features external to the school

The following features are to be considered by the designer in consultation with relevant bodies:

- Avoid congestion at entrance and access points
- Vehicle speed inside the facility
- External traffic volume passing the facility at any time

- Are traffic lights and other monitoring systems required
- Visibility and site conditions
- Median strips
- Pick up/set down and parking bays
- Special surface treatments
- Street signs
- Fences
- Landscape design.

Consultation with the site, governing council, local government and transport authorities must take place at the feasibility and design stage. Where practicable, pick up and set down zones must be provided for students travelling by car or bus. A median strip off site is a desirable feature as it provides additional pedestrian safety and prevents vehicles from making U turns.

Parking

Car parking

Car parks must be designed and constructed in accordance with:

- AS 2890.1, Parking Facilities Part 1 - Off Street Car Parking, and
- AS 1742 Set-2010, Manual of uniform traffic control devices Set.

The following must be adhered to:

- Appropriate security and area lighting must be provided as per AS 1158, Lighting for roads and public spaces.
- Car parks are preferred to be asphalt using 30mm thick AC10 and must have kerbs and channels, bollards to restrict vehicle access and 100mm wide white line markings.
- If pavers are used in areas where vehicles are accessing, pavers are to be 60mm or 80mm thick herringbone type pattern over 30mm sand over PM1/20.
- Consideration must be given to the location of car parks using compacted quarry material, as these are generally dusty in the summer and may be muddy in the winter.
- Wheel stops must be provided adjacent to buildings, landscaped areas or pedestrian access areas and pathways which may be impacted by car overhang.
- Schools must develop a traffic management policy which reflects the local traffic and parking issues.
- Boom gates are not preferred and if installed by a school all maintenance and replacement costs are a site responsibility.

- Recycled pavement materials must not be used for any road pavements as per DPTI Guidenote G36 Recycled Pavement Materials.

Parking for people with disability and their carers

- All car parks for people with disability and their carers must be in accordance with AS 2890.6, Parking facilities - Off-street parking for people with disabilities.
- Car parks must be located as close as possible to the main entrance with an accessible pathway.
- Parallel parking spaces must meet minimum dimensions as per AS/NZS 2890.6 - 2009, however 3700mm is preferable (excluding any required shared area).
- A minimum of 1 space for people with disability and their carers must be provided in primary schools and 2 spaces in high schools. It is preferred that 2 spaces are provided in primary schools, with only 1 marked initially to allow for future requirements.
- Provide appropriate security and area lighting.

Staff and visitors car park

- Where possible, car parking must be provided for staff and visitors located close to and in view of the administration area. Car parks must be designed to avoid conflict between pedestrian, student and bicycle access and site circulation.
- New schools and major refurbishments must consider the integration of electric vehicle charging points/infrastructure to assist in the transition to low carbon forms of transport.
- Provide 1 car parking space for each staff member (full time equivalent) plus 10% for visitors (or 5 spaces whichever is greater).
- With the increasing use of schools by the community negotiations must be undertaken by the school, in consultation with the department, with the local council to provide additional off-site parking adjacent to the school, or as part of neighbourhood facilities.

Senior students parking

- The department does not provide an area for student car parking on the school site, even in instances where the local council prohibits parking in the surrounding streets.
- The allocation of space by schools for senior student parking must only be specified with written approval from the department.
- The department will not undertake or incur costs for this provision. No compensation will be considered if the area is required later for other educational purposes.

Pick up and set down provisions

- Pick up and set down provisions must not be provided on primary or secondary school sites unless there is an exceptional circumstance which has written approval from the department.
- Such areas are to be constructed on the public thoroughfare in order to afford users protection under the *Road Traffic Act 1961*.
- Negotiations are to be undertaken with local government authorities to provide these facilities on roads or public reserves adjoining the school.
- Negotiations may be entered into concerning the grant of an appropriate portion of school property to local government or DPTI for the purpose of constructing a pick up and set down facility.
- The department may assist with funding for the construction of pick up and set down areas adjacent to schools, provided that the development is undertaken as part of the school construction phase.

Bicycle/scooter parking

- A minimum of 1 secure bicycle storage space per 5 students (for students in year 4 and above) is to be provided. Scooter storage facilities must also be provided in primary schools.
- Cyclist facilities are to be provided for minimum 5% of school staff and consist of the following:
 - Secure bicycle storage.
 - Accessible showers (based on 1 per 10 bicycle spaces provided or part thereof).
 - Changing facilities adjacent to showers.
 - 1 secure locker per bicycle space in the changing facilities.
- Bicycle paths are to be located within school grounds, easily accessible in a highly visible, well lit location with good passive surveillance.
- Consider enclosing bicycle parks within an 1800mm high chain mesh fence with lockable gates, where the local situation requires this level of security.
- Bicycle parking area must be paved.
- Student bicycle parking will consist of racks/rails which are covered and protected from the elements, and designed to allow both a wheel and the frame to be locked securely to the structure in accordance with AS 2890.3. Racks for student bicycles must be ground mounted.
- Staff bicycle parking is to consist of either:
 - Racks/rails which are covered and protected from the elements, and designed to allow both a wheel and the frame to be locked securely to the structure in accordance with AS 2890.3, or a locked bicycle shed, with access for staff only. Racks for staff bicycles can be vertically mounted. Sufficient space must be provided to store all bikes.

Pedestrian paths and paving

General

- Interlocking unit pavers, concrete and bitumen are the preferred materials. Specify clearly the type, shape, colour, thickness, pattern and starting point for paving layout. Pavers must be a maximum 200mm x 200mm x 60mm thick over 30mm bedding sand over 125mm PM1/20. Select with bevelled edges to reduce the likelihood of damage due to vehicle access and trip hazard.
- Pedestrian paths must meet AS 4586 – Slip resistance classification of new pedestrian surface materials.
 - For sloped surfaces with a slope greater than 1:20, specify the next highest classification than the required class for a level surface.
 - For more information on slip resistance pedestrian materials please refer to HB 197:1999 An Introductory Guide to Slip Resistance of Pedestrian surface Materials.
- All pavements must be designed and constructed appropriate to substrate type, location and possible usage eg vehicle access and pedestrian traffic. Where vehicular access is required, heavy duty interlocking unit pavers must be specified.
- Pavement must be designed so as to avoid becoming a tripping hazard with changed conditions (ie reactive soils).
- Large pavers susceptible to cracking must only be specified in areas of pedestrian traffic.
- Recycled materials PM2/20RG & PM3/20RG (Transport SA specifications) must not be used, and are not acceptable alternatives to PM2/20QG & PM3/20QG.
- For paving edges please refer to DPTI Construction Drawing G38 - Concealed Concrete Edge Restraint for Unit Paving.

In situ concrete

- Concrete pavement to have a non-slip finish, eg broom finish.
- Concrete edge restraints detail is required to prevent movement of the edge of the block pavement.

Asphalt and bitumen pavement

- Generally, on school sites a layer of hot mix asphalt is specified as the wearing surface using an asphaltic concrete mix. Asphalt footpaths must not be used in areas with reactive soils and/or poor drainage. Only concrete or block paving must be used in these areas.

Outdoor decking

- Any timber or wood composite product fixed externally or abutting a building such as floor decking must:

- meet the requirements of AS 5113:2016, or
- be tested and certified to withstand exposure up to a minimum BAL-29 in accordance with AS 3959:2009 Construction of Buildings in bushfire-prone areas regardless of the bushfire risk rating of the school.
- For schools located in bushfire protection areas requiring construction above BAL-29 comply with the relevant bushfire attack level for that site.
- Consider decking products selected for seating, tiers and platforms as heat gain from sun exposure may result in surfaces becoming too hot for seating.

Landscaping

Landscape design

The design of outdoor environments must be developed in conjunction with building design and site layout to ensure outdoor environments provide multi-functional education spaces. Where possible, landscaping must be designed to enhance passive design in buildings to reduce mechanical heating and cooling and improve site climatic conditions.

Landscaping must comply with all relevant legislation, regulations and local council and water authorities. Please refer to the [outdoor learning environments standard](#) for more details on the minimum and recommended standards for creating and maintaining outdoor learning environments that provide children with optimal learning opportunities. The department recommends a landscape designer/architect is commissioned to design the landscaping in conjunction with the building designer/architect.

Landscape design must consider the following:

- Proximity to power lines and subsequent maintenance requirements. Refer to the guidelines set out in the Electricity (Principles of Vegetation Clearance) Regulations 2010. At no stage must a tree touch, overhang or be able to fall across an overhead power-line.
- Proximity to underground services and potential root system growth.
- Proximity to buildings and paved areas.
- Hazard prevention – consider trip hazards, fire risk, health hazards and falling limbs.
- Damage to buildings due to soil moisture changes as a result of vegetation.
- Proximity of site works to neighbouring properties.
- Landscape design must enhance existing site biodiversity and replace any lost biodiversity due to site construction work.
- Plant selection must be from local native vegetation as they have adapted to local soil and climatic conditions.
- Landscape irrigation for garden beds and lawn areas (separate from oval) must be provided by a drip irrigation system with a moisture sensor override. Where possible, planting must take place before the school is occupied to allow for plants to become established.

- Plants must have sufficient space in which to mature.
- Plants with excessive water demands, invasive root systems or are short lived must be avoided. Ongoing maintenance requirements must also be considered.
- Grassed areas have a high water demand and require considerable maintenance and must only be provided for essential requirements.
- Consider small to medium sized trees which are not subject to limb loss.
- Planting must be used to direct or restrict pedestrian traffic.
- Provide tree guards for specimen trees in paving, courtyard and heavily trafficked areas.
- Provide garden watering points to planted areas, preferably connected to rainwater tanks.
- Contact local councils and nurseries prior to selection of plants – many provide lists of recommended plants and invasive species relevant to the area.

Reducing fire risk

- Planned planting designed to reduce potential fire danger risk must be incorporated in to the specification of landscaping and vegetation.
- Plants must be spaced so that there is not a continuous canopy or line of flammable undergrowth from the surrounding vegetation to site buildings.
- Trees must not be planted in close proximity to buildings and tree canopy at adult maturity must be considered to ensure overhanging trees are eliminated.
- Deciduous trees are more suitable for planting closer to buildings as they do not drop litter during summer. Avoid conifers and rough barked Eucalyptus or species which shed bark and may create fire hazards.

Site security

Landscaping must consider site security and avoid creating spaces for intruders to hide and impede surveillance.

- Dense foliage must be avoided to allow security surveillance
- Plantings must be species that allow clear undisturbed vision above 1m and below 3m
- The minimum acceptable tree canopy height above ground is 1.8m.

Turf management and grass selection

Climate conditions in South Australia often require drought resistant and warm season turf grasses to reduce water consumption. It is recommended a site analysis is undertaken prior to specifying a turf grass to ensure the intended usage and climatic conditions are considered.

Appropriate soil preparation eg correct soil type and depth must be undertaken.

The following must be considered when selecting turf grasses:

- The department recommends warm season Kikuyu or Couch grasses as they require 30-50% less water than cool season grasses. However, warm season grasses such as Kikuyu are prone to frost damage which must be considered prior to selection.
- If Kikuyu is selected, ensure to specify Male Sterile Kikuyu for any high demand lawn areas.
- Where turf is subject to intensive winter activity, over sowing in autumn with a cool season turf species, such as transitional rye grass, will improve wearability without requiring additional watering.
- Due to the prevalence of Kikuyu in South Australia, keeping Kikuyu out of sports fields is cost prohibitive.
- Consultation with a turf specialist is recommended prior to specifying an alternative grass type to Kikuyu or Couch.

Outdoor recreation areas

The [outdoor learning environments standard](#) details the minimum and recommended standards for creating and maintaining outdoor learning environments, including play spaces and nature play areas, that provide children with optimal learning and play opportunities.

The below standards predominantly relate to the establishment of outdoor recreation areas for new schools or major redevelopments.

To ensure schools continue to play an active part in the community, outdoor areas must be designed to be easily accessible by the community and meet all relevant Acts, Standards and Government Legislation. If school sporting facilities (ovals/courts) are intended for both school and community use, they must meet the standards and requirements as specified by the relevant regulatory body eg South Australian National Football League (SANFL).

Landscape design must consider the needs of current and possible future students with disability to participate in outside play and sport.

If community facilities are within an acceptable distance, it is recommended shared use is investigated to reduce duplication of existing infrastructure and services.

Grassed play areas

The preference is to provide flexible grassed areas that enable a range of formal playing fields to be marked out as required, while also allowing for informal play area.

Where schools are also specifying playing fields for school, district, state or national competition, the relevant regulatory bodies must be referenced. Sites must also consider the age group being specified for, and amend playing field size to the appropriate size. The regulatory body will depend on the sporting activity and may include, but is not limited to, the following bodies:

- **Football:** South Australian National Football League (SANFL)

- **Soccer:** Federation of International Football Association
- **Cricket:** South Australian Cricket Association
- **Hockey:** International Hockey Federation.

Grassed play area guidelines

- All grassed playing areas must have easily accessible emergency vehicle access.
- Playing fields must have a north-south orientation wherever possible, especially if designed for competition use.
- An additional 3000mm run off grass must be provided around playing fields.
- Cross-fall on playing fields is to be constant and in 1 direction. Hips and valleys are not to be included.
- Grassed areas must be designed for ease of maintenance, shifting equipment and reticulation.
- Additional area allowance must be made for embankments on sloping sites where the site requires cutting and filling to achieve playing field sizes.
- Banks must be no steeper than 1:4 to ensure grassed areas can be maintained by a ride on mower.

The following specifications must be used as a guide for the provision of green space for new school builds. The provision of grassed play areas must be assessed depending on the site's location and the proximity of community facilities.

Recreational green space	Description	Dimensions	Area (m²)
Primary school	Football oval	110m x 80m	8,800
	Hockey Pitch	60m x 90m	5,400
	1 football oval/ cricket/ hockey pitch	130m x 110m	14,300
	Activity/ adventure play area		1,500
	15% incidental play area		2,200
	Total grassed play area		18,000
Area school	1 football oval/ cricket pitch (maximum joint use facility)	155m x 125m	19,375
	1 soccer pitch/ hockey field	105m x 64m	6,720
	Total grassed play area		
High school	1 main football oval	140m x 110m	15,400
	1 junior football oval	120m x 95m	10,500
	1 soccer pitch	120m x 90m	10,800
	1 hockey field	90m x 60m	Include in area for soccer pitch
	10% incidental grass area		3,800

	Total grassed play area		40,500
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Practice cricket pitch nets

Construction and design of cricket practice net fencing enclosures must be in accordance with AS 1725.4 - 2010 Chain link fencing – Cricket net fencing enclosures.

Pitch fencing must have chain mesh cover especially when located near play areas, pedestrian traffic, buildings and car parks.

Hard play areas

A minimum of $3m^2$ multiple use hard play area per student must be provided, unless briefed otherwise. This does not include walkways, outdoor learning areas or courtyards, but may include tennis, basketball and netball courts. Additional court spaces may be provided as subsidy items.

If there is the possibility of duplicating nearby community court facilities, consideration can be given to shared use. However, adequate hard play area is to be provided for minor games, physical education lessons and play activities within the school.

In junior primary, primary and area schools, it is desirable to include an area suitable for the establishment of 2 adjacent netball or basketball courts.

As a guide the following hard play areas must be provided:

- Primary schools: 2 paved netball or basketball courts plus 600m² informal paved area. Total area approximately 2000m².
- Secondary schools: 6 tennis courts, 2 netball courts plus 500m² informal paved area. Total area approximately 4800m².

Standard surfacing for hard play areas and courts is asphalt. Asphalt playing surfaces must use a 7mm aggregate.

Artificial sports surface coatings are a non-standard finish and approval must be obtained from the department project officer for their installation. A range of artificial coatings are available depending on user requirements. Some products are an acrylic coating only while others include a cushioning system made up of layers of rubber particles.

Product specifications, maintenance requirements (such as recoating intervals), limitations of the product, slip resistance, how the slip resistance changes over time and warranties must be carefully considered when selecting artificial sports surfaces.

Typically warranty clauses exclude damage caused by movement of the asphalt surface including when a new surface coat is applied over an old bitumen surface that is already in poor condition. Carefully consider the condition of any existing asphalt surfaces before using these products as any existing cracks or defects will show through the new surface within 12 months and this is typically not covered by a warranty.

Courts

All courts must be designed and constructed in accordance with the relevant regulatory authority which may include, but are not limited to, the following bodies:

- **Tennis:** International Tennis Federation – Rules of Tennis
- **Netball:** International Federation of Netball Associations
 - Note: For junior netball competition, the court size remains the same, but the pole height can be reduced from 3050mm to 2440mm.
- **Basketball:** International Basketball Federation
 - Note: For domestic competition, the basketball court length can be reduced from 28m to 24m, and the width can be reduced from 15m to 13m.

Where netball, basketball and tennis courts are specified, courts will be constructed with backstops, line marking and inserts for net posts. The school will be required to fund and install equipment such as nets, backstops, goals, etc.

Site fixtures

Mobile phone towers and mobile telecommunications facilities

Mobile phone/cellular towers must not be installed on education sites (schools, preschools, children's centres etc).

Fences

Please contact [Security and Emergency Management](#) for information on internal and security fences.

Tennis court fencing

- Tennis court fencing must be chain mesh minimum 3600mm high with top and bottom rail. Where tennis courts are adjacent to private property, investigate increasing the height in consultation with the neighbouring property owners.
- Fence to have 1 double gate 3000mm wide for ambulance access.
- Provide pedestrian gate/s.

Bollards

- Bollards may be placed across points to prevent vehicles entering areas used by students or where regular use by vehicles could damage surfaces provided.
- The bollards must be able to be removed or lowered to allow delivery, maintenance or emergency vehicles to enter.

- All traffic control devices must be in accordance with the *Road Traffic Act 1961*.

Outdoor seating

Seating is to be incorporated in the design of outdoor learning and recreational areas to cater for one third of the estimated total student enrolment. Seating can be incorporated into retaining walls, fixed to building walls, as tree surrounds or under shade structures. Recommended seating heights:

- Primary schools: 325mm to 450mm high
- Secondary schools: 325mm to 600mm high

Preferred seating materials are those that do not require painting, sealing or maintenance and can withstand the weather and heavy use. Consider selection of materials suitable for their location and sun exposure (ie metals and skin contact). Recycled plastic and composite timber products can become too hot for use as seating if not adequately protected by shade.

Flagpoles

A flagpole for the Australian national flag must be provided in a new school in a suitable location. Additional flagpoles may also be provided for the Aboriginal flag.

Flagpoles to comply with AS 1664 - 1997 aluminium structures code, AS 4100 - 1998 steel structures code and AS 1170 Part 2 - 2011 wind actions.

Flagpoles must be of the internal halyard design with captive weighted necklace fitted around the flagpole and able to be demounted if maintenance is required.

Generally flagpoles are to be a height of 6m, manufactured from 6063T6 80mm x 2mm thick wall parallel or spun tapered aluminium alloy. Where flagpoles of 8-9m height are approved, flagpoles to be manufactured from 6063T6 100mm x 3mm thick wall spun tapered aluminium alloy. All steelwork to be hot-dip galvanised after fabrication.

Preferred flagpole finish is Pearl White powder coated to AS 3715 for external use.

Halyard to be 5mm 8 ply polyester UV stabilised. Rope cleat to be cast aluminium (CL236 Ronstan); plastic not allowed. Halyards to be fitted with 2 UV stabilised nylon flag clips. Access to halyards must be via tamper proof hatch, sliding collar type, held secure with security screw and supplied with 2 keys per pole.

The 6m flagpoles to have 1650mm length 50NB medium wall galvanised spigot with 2 poly bushes to insulate dissimilar metals. If an existing footing is to be used a flange base can be used and secured with chemical anchors. It is essential that existing footings are in good order and of a known dimension and are not less than specified footing dimensions. Minimum footing size for 6m flagpole is 650mm deep x 400mm diameter 25MPA. Wet mix concrete only.

The 8-9m flagpole to have flange base with 1800mm long 80NB x 4mm spigot continuous butt welded to 12mm thick base plate. The 3 x M20 galvanised cranked hold down bolts, 650mm long to be set in concrete footings. Minimum footing size for 8-9m flagpole sis 900mm deep x 500mm x 500mm, 25MPa concrete.

Where flagpoles are mounted in lawned areas a raised concrete plinth approximately 400mm x 400mm x 100mm square is recommended to protect the flagpole from mowing equipment.

All fittings to be of marine grade stainless steel or UV stabilised polycarbonate.

Signage – external

Clear, distinctive signs are to be provided to indicate the following:

- Site name on main road frontage
- Visitor car-parking
- Signs to direct to administration and any community use facilities
- Standard regulatory and safety signs (use these as teaching aids)
- Male, female and wheelchair access toilets
- Erect clear and unambiguous warning signs about trespass and potential prosecution in areas that may be accessed by the public.

All signs must be robust and preferably mounted on buildings. The signage system must relate to the Strategic Asset Management Information System (SAMIS) building and room numbering system where this is appropriate.

Other signs for buildings, rooms and to give direction can be considered where appropriate and/or where required by Work Health and Safety or Australian Standards.

Sheds

- A grounds person's shed must be provided for storage and as a workplace on each school site. Power and water supply requirements must be briefed separately by the department.
- Provide galvanised metal mesh lining for security, and ensure adequate security to doors.
- Provide a concrete floor with ramp access.
- Provide lighting and power.
- Connect downpipes to underground stormwater system where convenient.
- Sheds are required to have development approval through the State Commission Assessment Panel.

Covered outdoor learning area (COLAs) structures

- COLAs require development approval and the total structure must be designed by a professional structural engineer considering the wind terrain category, design wind speed and soil classification for the particular site.
- The design requirements for each site must conform to the manufacturer's specifications and standard designs as well as the following requirements:
 - The structure is preferred to be freestanding. If it is intended to abut an existing building, a structural engineer must advise on the structural requirements.

- These structures are designed to cover outdoor learning areas only and must not be designed to be subsequently enclosed.
- Bird nesting opportunities must be minimised.
- Where electrical services are to be provided, all cabling must be installed in PVC conduit with double sided saddles.
- Where lighting is to be provided, luminaires must be vandal proof with an impact resistance of (IEC 62262) IK10.

General structure sizes

(Dimensions are clear distances between columns, height is clear height to lowest point of structural frame, excluding bracing)

- 21m X 14m x 5m high: Appropriate for primary schools with enrolments from 150 to 500 students and to secondary and area schools with enrolments up to 400 students.
- 22m x 18.5m x 7m high: Appropriate for primary schools with enrolments over 500 students and to secondary and area schools with enrolments over 400 students.
- 37m x 22m x 7m high: Large enough to allow a regulation netball court to be marked out as well as basketball, tennis and 3 volleyball courts, including required run-off areas all around.

Structure

- Framing components must be galvanised steel sections, bolted together with high tensile fasteners.
- Columns must be supported by concrete footings specifically designed for the site conditions, and independent of any floor slab. Columns and base connections below pavement level must be encased in concrete.
- Frames must be portal frames (not trusses) with bracing as required.
- Corrosion protection to steel sections must be Z350 coating (Z450 coating in severe or aggressive locations). Corrosion protection to fabricated components and connections must be hot-dipped galvanised with Z600 coating.
- Paint finish to all exposed frame members must be 2 coats full gloss enamel as part of an approved paint system for galvanised surfaces.

Roof

- Roof cladding must be Zincalume or Colorbond 0.48mm BMT steel sheeting.
- Some clear roof sheeting may be considered in full length strips to provide additional daylight, taking care not to cause glare. Any clear roof sheeting must have safety mesh installed underneath conforming to AS/NZS 4389 - Safety mesh.
- Roof water is to be collected in Zincalume or Colorbond roof gutters and downpipes and discharged into a site stormwater collection system.

Infill

- Mesh infill between columns may be provided as scheduled in the Project Brief. This can be retractable netting.
- No solid wall cladding is to be provided.
- Column protectors must be provided to all columns to a minimum of 2.4m high, to fully enclose the steel column sections.

Other provisions

- Backboards and goal posts are preferred to be independent structures, although they may be incorporated into the structural frame if designed from the outset with appropriate structural engineering input.
- Power may be provided for incidental use, if a supply is available nearby.
- Artificial lighting is not to be provided, except for security lighting where this is considered necessary due to the particular location on the site.

Shade structures

The provision of shade structures in schools to reduce avoidable sun exposure for children can be achieved with a wide range of solutions such as fixed structures and the use of natural vegetation.

An assessment of the risk and safety issues associated with the provision of shade structures must be undertaken prior to any decision about the type of structure, its location and installation.

Siting and design must consider:

- The range of required uses, from general shade provisions to covering playgrounds, sand pits and hard play areas.
- The sun path at various times of the year to ensure that the shade is provided where and when it is most required.
- Proximity to buildings and access to roofs or restricted areas.
- Locations of existing modular buildings that may be required to be removed in the future.
- Appropriateness of existing ground surfaces and disposal of stormwater from the new roof.
- Access around the site for emergency vehicles.
- Proximity to existing buildings and shading of windows.
- Avoiding opportunities for students to climb on the structure and to gain access to the roofs of adjoining buildings.

- Structures are preferred to be freestanding and not fixed to buildings or other structures (as they can exert stresses that the original building was not designed to take), unless a structural evaluation confirms their suitability.
- Location of underground services where posts may require to be sited.

Roofed structures

- The total structure must be designed by a professional structural engineer considering the wind terrain category and design wind speed for the particular site. (These structures can be susceptible to damage from strong wind).
- Cantilevered structures are not permitted.
- Posts are to be set in concrete footings specifically designed for the site conditions.
- Must be installed permanently and not as removable structures.
- Must be freestanding but can be designed to abut existing buildings.
- Clear or translucent sheeting must be of webglas fibreglass material. Wire mesh must be installed underneath all clear and translucent sheeting conforming to AS/NZS 4389 - Safety mesh.
- Fabric covering material must provide at least 90% shade and 95% UV-B block-out and must comply with AS 4174 - 2018.
- Fabric covering materials can be susceptible to damage if within easy reach or accessible from adjoining structures and must be fire resistant. Refer to [sail structures](#).
- The repairs, maintenance and replacement of fabric coverings will be at the site's own cost.
- If covering a playground, ensure adequate clearance above any play equipment (1.5m), and posts at least 2.5m away from play equipment.
- Roof is to be pitched to shed rain water.
- Roof water is to be collected in rainwater tanks and connected to underground irrigation or connected direct to underground stormwater system.
- Steel framed structures are preferred for long term durability and reduced maintenance. Obtain approval from the department for the installation of timber structures.
- Any approved timber structures must not be treated with arsenic containing preservatives (ie CCA).

Fabric membrane structures

Where engineered fabric membrane structures are identified as the only feasible shade provision option a risk benefit analysis of the proposed structure must be undertaken and submitted to [Asset and Facility Services](#) for assessment.

All material data sheets for the proposed fabric membrane must be provided for NCC compliance.

Sail structures

Shade sail structures comprising of fabric material supported by tension wires between structural members, and cantilevered fabric structures, must not be installed due to:

- The possibility of students accessing the sails and potential collapse and injury
- High maintenance costs and susceptibility to vandalism
- Ineffective shade provision due to the shape of fabric cover and/or height of the structure
- The potential failure of connections and tension wires in high winds.

Existing sail structures that fall due for replacement for any reason (eg vandalism or age) must be replaced by alternative shade structures which meet the above requirements.

Approval process

Development approval is required for shade structures, and applications for approval must be submitted to the State Commission Assessment Panel.

Some minor works are exempt from development approval and reference must be made to the facilities management contractor for advice.

All building projects including pergolas, verandas and shade structures require certification of compliance with the NCC, to ensure that all health and safety issues have been satisfactorily addressed.

Certification must be undertaken by an independent accredited professional and a fee is charged for this work. A list of registered certifiers is available from the [Plan SA Portal](#).

Individual approval for each structure is necessary under the legislative requirements since each site has a unique set of conditions applying to it, especially with regard to wind and soil. A general engineering certification for a manufacturer's standard product is not sufficient.

Approval is required from the site owner, which in most instances is the Minister for Education, for the construction of any permanent structures on an education site. For site managed projects and projects managed through the facility manager this approval is sought by completing a project commencement form and emailing to the [Asset and Facility Services team](#). This procedure applies regardless of the source of the funds for the structure.

Stormwater and sewerage

All work external to the boundary to be carried out in accordance with the requirements of the local council, SA Water, and other relevant authorities. Design of stormwater drainage system must be based on design methods outlined in the current edition of [Australian Rainfall and Runoff](#).

A site wide stormwater design report is to be provided during the concept phase for any new work that connects to an existing stormwater system or where new stormwater infrastructure is provided. The design report is to detail design assumptions, design standards and parameters and calculations used.

If existing underground stormwater infrastructure is being relied upon for the disposal and management of site stormwater run-off, existing systems must be inspected and the condition assessed to ensure pits and pipes are suitable and not damaged or blocked.

All pavement and grassed stormwater runoff is to be collected on the property prior to discharging on to Council or neighbouring properties. Check flows from adjacent properties.

All stormwater and sewer drains to be at least SN4 PVC.

- Stormwater minimum pipe diameter – 100mm for connection direct to downpipe
- Stormwater minimum pipe diameter – 150mm downstream from any grated pit
- Sewer minimum pipe diameter – 100mm.

If there is a risk of vehicle traffic or insufficient pipe cover, reinforced concrete pipes (RCP) must be used for storm water.

The minimum pipe diameters are specified to reduce the risk of pipe blockage affecting operation of the pipe, and if a blockage does occur the minimum specified diameter allows for easier cleaning. Although the minimum pipe diameter specified may be larger than what is required following a detailed drainage design, it provides an improved service life.

Individual site specific designs must be undertaken for each site and needs to consider factors such as location, impervious area, gradient across the site and downstream infrastructure.

The document ‘Australian Rainfall and Runoff’ is a design guide for storm water drainage design and considers these factors.

Other factors to consider as part of the design process is the depth of pipe cover and type of traffic over the pipe as this will influence the type of pipe specified, however the specified minimum pipe class and diameter must be maintained.

Services to be marked with the approved magnetic tape.

Consider the use of vegetated buffer strips to intercept and filter the run-off reducing the extent of piped stormwater collection.

Ensure external overland flow paths exist around buildings to minimise the possibility of flooding buildings due to blocked pipes and major storms. Ensure no local ponding adjacent to buildings or ponding that prevents access to buildings can occur.

The selection of suitable design Average Recurrence Intervals (ARI) for the surface water drainage system is to be made by the designer in accordance with local conditions and requirements, and the risks of injury or inconvenience to people and damage of property caused by stormwater.

For minor storm performance, the surface water drainage system must be designed to dispose of stormwater flows from rainfall events having an ARI appropriate to the importance of the site, the level of nuisance and the severity of potential damage and injury that would be caused by overflows due to rainfall events of greater ARI or failure of the system. Typically, ARI for minor storms is 5 to 20 years. Design to ensure that there is no impeded access to the entrances to the school or school buildings for an ARI of 20 years.

For major storms the surface drainage system must be designed so that overflows do not present excessive danger to people, cause significant damage to property, or enter the buildings. Typically ARI for major storms is 50 to 100 years.

The drainage system must be aesthetically pleasing, economical, safe, robust and durable, and designed to avoid blockages. For a project involving new work on an existing site, the existing surface drainage system for the whole new site must be checked that it is sufficient for the addition of the drainage from the new work.

In fully enclosed courtyard areas (but not covered) allow for 2 independent outlets for water to escape to, to keep flooding potential to a minimum.

Allow for a minimum of 300mm freeboard in flood prone areas.

Consider the use of rainwater tanks for water capture and re-use. Refer to the department's [water supply and management at schools and preschools webpage](#) for guidelines on the installation of rainwater tanks.

Tanks must not be placed adjacent to buildings without providing appropriate restrictions to ensure the roof cannot be accessed from the rainwater tank eg provide appropriate security fencing.

Flood management

An assessment of the project flood risk must take into account factors such as sea level rises where this may impact on the design life of the project. After considering these factors, the designer will need to ensure:

- All piped systems are designed to convey all flows up to and including 1 year ARI.
- Overland flow systems are designed to safely convey all flows up to and including a 20 year ARI.
- Damage is prevented to all on-site infrastructure and neighbouring properties for all flows up to and including a 100 year ARI.

Specialist hydraulic and flood modelling must be undertaken by the designer where the site is within an [identified floodplain](#).

On-site detention

On-site detention is not desirable but if required must be discussed and agreed to with the department, and must comply with AS/NZS 3500.3 - 2018, Plumbing and drainage - Stormwater drainage. In addition, for the case that on site detention may be required as a development condition, pumped systems are not preferred and must be avoided where possible. If a pumped system is designed, the designer must ensure that:

- There are sufficient backup systems in the case of a pump failure.
- There are sufficient backup systems in the case of an extended power outage.

Future expansion

Ensure that stormwater and sewer pipe capacity and invert levels of the present system are adequate to cope with future development such as additional buildings and hard paved areas.

Pit covers

- Side entry pits must not be used on school sites as balls and other such items are hard to retrieve.
- Wherever possible hard paving to abut pit frames.
- Cover infill to be in the same material as and match adjacent paving.
- Pit covers must be a tight fitting bolted down design or have sufficient weight to prevent their easy removal.
- All covers must be according to AS 3996 - 2006, Access covers and grates must be Class "D" to any paved areas and where vehicle access may occur. For landscaped areas, Class "B" covers and grates are suitable. If a lesser class of cover is considered, note the requirement to prevent their easy removal.
- Grates must be cast iron and in accordance with AS 1428, Design for access and mobility.
- SIO (inspection opening) and SIP (inspection point) covers to be screwed down type and supported on concrete rings.
- SIO and SIP in high profile areas must be brass or chrome cover type.
- Checker plate covers must not be used.

Swales

- Swales are only to be used after careful consideration since they are high maintenance items.
- If not maintained, swales after several years become ineffective due to weed growth and silt build-up.
- If ponding occurs in swales, they become occupational health safety and welfare risks.
- For slopes and depth of ponding as in AS/NZS 3500.3 - 2018 – Section 8.11.2 must be taken as minimum and maximum values rather than desirable values.
- The sides of swales must be 1:6 to 1:4 maximum so that they can be maintained with a ride on mower.

Neighbouring properties

Designs must prevent runoff from the school property, including the oval and grassed areas as well as paved and building areas that may potentially cause damage to neighbouring properties and facilities.

All storm water runoff must be collected on the school property and discharged into council drains through an underground stormwater system.

Sub surface drainage for sports fields

- Poor draining soil or excessive run off has the potential to create water logged soils.

- Sub surface drainage for grassed playing fields that are connected to council stormwater drains are to be considered depending on soil type.
- Drains must run at a slight angle to the design contours.
- An assessment of the site is required in order to design the subsurface drainage system.
- It is considered preferable to have a separate design/documentation phase rather than a design and install contract.
- The consultant must assess the survey of existing levels, conduct a geotechnical assessment of the soil type, soil profile and structure, permeability and its consistency across the playing fields by sampling, testing and analysis.
- Ensure using minimum grades as recommended by manufacturers of propriety items such a strip drain and agricultural pipe.
- Design spacing and depth of laterals using information on soil type, permeability, rainfall, surface grades and size and grade of strip drain or agricultural pipe.
- Use under strip drain or slotted agricultural pipe for laterals.
- Minimum subsoil drainage pipe size for all mainlines and laterals to be 100mm diameter.
- Minimum cover of 500mm required over all subsoil drainage pipes, or 300mm cover minimum over strip drains.
- Consider providing a surface inspection point at the high point of the lateral or sweep up the end of the lateral. Cap on SIP or pipe at 200mm below surface.
- Generally, backfill laterals with imported coarse washed sand (refer to Nynex Strip drain Designer's Guide for sand grading envelope) to surface.
- Use PVC pipework over main collector lines.
- Cut existing turf and relay on main lines.
- Provide surface inspection points at the end of the mains line. Locate cap on vertical riser at 200mm below surface.
- During installation locate and record the setout dimension inspection points, laterals, main lines etc from fixed points for inclusion on as constructed drawings.
- Provide as constructed drawing to DPTI using DPTI title block and drawing number.
- Note the location of existing irrigation system and the constraints on the installation of the subsurface drainage system.

Pits (neutralisers, grease arresters)

Pits to be cast iron tight lids, which allows for top to be flush with pavement, tank will require separate vent and treated internally with epoxy coating.

Stormwater pollution prevention

The design of stormwater systems must minimise pollution loads as part of the ‘general environmental duty’ under the *Environmental Protection Act 1993*. Ensure adherence to the requirements of the Code of Practice for Local, State and Federal Governments for Stormwater Pollution Prevention published by the Environmental Protection Authority dated 1997 and a similar Code of Practice for the Building and Construction Industry for Stormwater Pollution Prevention dated 1999. There are implications for both designers and contractors, particularly for large sites (greater than 0.5 ha or if there is a risk of significant sediment pollution).

Due to the risk of the potential petroleum hydrocarbon, heavy metal and other toxic constituent contamination associated with car park stormwater, run-off must not be collected from driveways and car parks for irrigation purposes.

Water sensitive urban design (WSUD)

As a design approach to improve liveability of the urban environment to South Australia, WSUD is central to the design of site stormwater management infrastructure by integrating the management of the total water cycle into the land use and development process.

WSUD principles must be applied wherever possible to the design of site stormwater management infrastructure. The following [guidelines](#) are relevant and must be referred to be the designer.

Stormwater drainage wet system

Design of wet systems for the drainage and collection of roof rainwater runoff must include adequate inspection points and flushing valve in accordance with DPTI Standard Detail Drawings.

Waste management

- Waste disposal areas must be located adjacent to an access road so that a front loading truck can easily access the waste collection bins and preferably be screened by brick, metal, timber fencing or plantings.
- The floor of the waste disposal area is to be of a heavy duty paving suitable for heavy vehicle loading and that can be easily cleaned. Access and manoeuvrability of industrial bin collection vehicles must be considered.
- The access road must be a heavy duty surface or pavement to withstand the high loads and turning movements of the truck. The access road must be wide enough to manoeuvre to avoid damage to site fixtures.
- Wherever possible it is desirable to avoid the need to reverse.
- Storage areas for bins are to avoid any overhead cables and overhanging trees.
- Consider sites for present and future recycled materials storage, collection and sorting bins (ie glass, paper, cardboard and plastic).

- The design of new schools must provide opportunities to maximise recycling and composting and reduce waste.
- Wheelie bin poles with a concrete base must be provided to secure the bins at all times.
- Wheelie bins must be located at minimum 10m from buildings/structures, covered walkways or eaves/verandas and overhanging trees to prevent the potential spread of fire.
- On new sites, a lockable storage facility must be provided to safeguard the bins from theft and vandalism during weekends and school holidays.

Termite management

- To assist in termite prevention and inspections, the department prefers that building slabs are exposed to 75mm on all edges.
- Sites must not undertake any work such as paving or installing garden beds that cover termite barriers, weep holes or inspection zones. This includes the installation of air-conditioners and hot water systems that may obstruct termite inspections.
- Termite management measures must be in accordance with DPTI Termite Management Guideline G38.

Roles and responsibilities

Site leader

The design standards are mandatory for all maintenance, renovation/refurbishment and new building works and must be referenced and adhered to all development at education facilities.

Architects and designers

The design standards are mandatory for all renovation/refurbishment and new building works and must be checked and adhered to for the design, documentation and construction of building projects at education facilities.

Builders

The design standards are mandatory for all new buildings works and must be checked and adhered to for the construction of building projects at education facilities.

Maintenance workers

Comply with the relevant mandatory requirements referenced in the design standards when undertaking maintenance work on school and preschool sites.

Facilities managers

Maintain up to date knowledge of departmental requirements for maintenance, renovation/refurbishment and new build work.

Comply with the facilities management services arrangements and relevant mandatory requirements referenced in this design standard.

Asset Planning, Standards and Sustainability team

The department's Asset Planning, Standards and Sustainability team monitors, evaluates, and reviews this design standard in consultation with the Department of Planning, Transport and Infrastructure (DPTI) and schools and preschools to capture changes in legislation, Australian Standards or education specifications.

Definitions

Must

Indicates that a process is a legislative, Australian Standard or an education requirement.

Site leader

Any person who has the responsibility, management or control of a workplace or work unit or personnel officially assigned as a nominated delegate by that person to adopt that responsibility. This includes, but is not limited to executive directors, education directors, directors, assistant directors, principals, preschool directors, managers and supervisors.

Significant work

Construction that is to be carried out where the proposed budget is in excess of \$150,000 or where the works will have an impact on infrastructure eg storm water, change in perimeter fence position, removal or installation of fixed structure.

U

A rack unit (abbreviated as U) is a unit of measurement applied to equipment racks and the servers, disk drives and other devices that they contain.

Supporting information

DPTI Guidenotes and Drawings

The following DPTI Guidenotes and Drawings are relevant to education projects and must be referred to for all new projects and the redevelopment of existing buildings. DPTI's Guidenotes and Drawings are referred to throughout the standards and can be accessed through [DPTI's bpims library](#).

To search for Guidenotes and Drawings, please use the referenced identifier (eg G44) to search for the document/drawing. For a full list of DPTI Standard Drawings please search for D04 – DPTI Standard Drawing Index on the [DPTI website](#).

Type	Name	Viewable By
DRAWING	Access Hatch for Perforated Ceilings (DG34)	General Public
DRAWING	Accessible Handrail Details (DG45)	General Public
DRAWING	Art Sink (DD18)	General Public
DRAWING	Basic Cupboard Construction (DD03)	General Public
DRAWING	Basic Cupboard with Drawer (DD10)	General Public
DRAWING	Basic Laboratory Sink/Cupboard (DD16)	General Public
DRAWING	Basic Open Shelf Construction (DD04)	General Public
DRAWING	Basic Tray Storage Unit (DD06)	General Public
DRAWING	Benchtop Support Bracket (DG06)	General Public
DRAWING	Bottled Gas Cylinder Details (DG29)	General Public
DRAWING	Broom Rack (DG09)	General Public
DRAWING	CAD Drawing Titleblocks (D03)	General Public
DRAWING	Chemical Storage Open Shelf Unit (DG04)	General Public
DRAWING	Condensing Unit Roof Mounting Detail (DG41)	General Public
DRAWING	Cupboard for Drinks Boiler Unit (DD07)	General Public
DRAWING	Cupboard for Water Heater (DD08)	General Public
DRAWING	DPTI Standard Drawings (D01)	General Public
DRAWING	Door Bollard (DG02)	General Public
DRAWING	Downpipe Connection With Cleaning Eye (DG42)	General Public
DRAWING	Gas Bottle Enclosure (DG27)	General Public
DRAWING	Heavy Storage Shelving (DG13)	General Public
DRAWING	Inset Sink and Cupboard (DD14)	General Public
DRAWING	Internal Bag Storage (DG08)	General Public
DRAWING	Internal Bag Storage - Individual Compartments (DG08A)	General Public
DRAWING	Laboratory Sink Island Demonstration Model (DD17)	General Public
DRAWING	Ladder Frame Storage (DG14)	General Public
DRAWING	Mobile Drawer Unit (DG12)	General Public
DRAWING	Modular Pigeon Holes (DG16)	General Public
DRAWING	Multi Drawer Bench Unit (DD05)	General Public
DRAWING	Nappy Change Bench (DD13)	General Public
DRAWING	Overhead Cupboard Construction (DD09)	General Public
DRAWING	Pinboards and/or Wallstripping (DG01)	General Public

DRAWING	Plant Enclosure Details (Floor Mount) (DG24)	General Public
DRAWING	Plant Enclosure Details (Wall Mount) (DG26)	General Public
DRAWING	Pool Fence Plinth Detail (DG37)	General Public
DRAWING	Pre-finished Fibre Cement Shower Partition (DD02)	General Public
DRAWING	Pre-finished Fibre Cement Toilet Partition (DD01)	General Public
DRAWING	Protected Hooks (DG07)	General Public
DRAWING	Reception Counter (DG11)	General Public
DRAWING	Sealed PVC Downpipe for Wet System with Inspection Point (DG44)	General Public
DRAWING	Services Trench Infill/Slab Repair (DG47)	General Public
DRAWING	Sluice Trough (DG18)	General Public
DRAWING	Soakage Pit for A/C Units (DG28)	General Public
DRAWING	Steel Bag Storage Unit (DG05)	General Public
DRAWING	Stormwater Wet System Details (DG46)	General Public
DRAWING	Structural Roof Penetration Flashing (DG36)	General Public
DRAWING	Tall Open Shelf Storage (DG15)	General Public
DRAWING	Tall Storage Cupboard (DD15)	General Public
DRAWING	Typical Ball Guard Detail (DG33)	General Public
DRAWING	Typical Chem Store Layout (DD19)	General Public
DRAWING	Typical Mains Pressure Electric Water Heater for Under Bench Locations (DG40)	General Public
DRAWING	Typical Plant Enclosure (Floor Mount) (DG23)	General Public
DRAWING	Typical Plant Enclosure (Wall Mount) (DG25)	General Public
DRAWING	Typical Valve Box Detail (DG32)	General Public
DRAWING	Unit Paving Edge Restraint (DG38)	General Public
DRAWING	Vented Corrosives Cupboard (DG03)	General Public
DRAWING	Worktop Construction (DD11)	General Public
DRAWING	Worktop Construction Freestanding (DD12)	General Public
GUIDENOTE	As Built Documentation and Maintenance Manuals (G54)	General Public
GUIDENOTE	Asbestos Management in Government Buildings (G143)	General Public
GUIDENOTE	Assessment and Management of Department Sites Treated with Termiticides (G32)	General Public
GUIDENOTE	Building Code of Australia 2010 - Section J (G149)	General Public
GUIDENOTE	Building Defects Advice Guide (G58)	Project Team
GUIDENOTE	Construction Detailing and Site Inspection Guide (G16)	General Public
GUIDENOTE	Construction Site Visits (G18)	General Public
GUIDENOTE	Contract Documentation Technical Checklist (G19)	General Public
GUIDENOTE	DPTI Standard Drawing Index (D04)	General Public
GUIDENOTE	Development Approval (G31)	General Public
GUIDENOTE	Development Proposals for Heritage Assets (G103)	General Public
GUIDENOTE	Disability Access Checklist (G119)	General Public
GUIDENOTE	Drinking Water Regulations (G170)	BPIMS Login
GUIDENOTE	EPA Environmental Information (G96)	General Public

GUIDENOTE	Earthquake Hazard Risk Mitigation in Government Leasing (G137)	General Public
GUIDENOTE	Ecologically Sustainable Development Planning, Design and Delivery (G44)	General Public
GUIDENOTE	Ecologically Sustainable Development Sustainment of Existing Buildings (G45)	General Public
GUIDENOTE	Ecologically Sustainable Development in Department Projects (G43)	General Public
GUIDENOTE	Environmentally Sustainable Building Materials - Selection (G164)	General Public
GUIDENOTE	Existing Trees (G33)	General Public
GUIDENOTE	Fire Services Guide for Lead PSC (G165)	Organisation Only
GUIDENOTE	Identification of PCB-Containing Capacitors (G134)	General Public
GUIDENOTE	In Floor Electrical Boxes (G167)	General Public
GUIDENOTE	Insulation to Air-conditioning Ductwork (G115)	General Public
GUIDENOTE	Legionella Control in Heated Water Systems (G106)	General Public
GUIDENOTE	National Australian Built Environment Rating System (G68)	General Public
GUIDENOTE	PCB Containing Capacitors in Fluorescent Light Fittings (G141)	Organisation Only
GUIDENOTE	Polychlorinated Biphenyls Management Plan (G133)	General Public
GUIDENOTE	Post Construction Review and Post Occupancy Evaluation (G79)	General Public
GUIDENOTE	Principles of Safe Design (G125)	General Public
GUIDENOTE	Recycled Pavement Materials (G36)	General Public
GUIDENOTE	Registered Private Certifiers Panel (G80)	General Public
GUIDENOTE	Seismic Restraint of Engineering Services (G172)	General Public
GUIDENOTE	Selection of Site Contamination Consultant (G100)	Project Team
GUIDENOTE	Shop Drawings (G21)	General Public
GUIDENOTE	Site Contamination (G37)	General Public
GUIDENOTE	Solar Panels For Government Funded Building Projects (G140)	General Public
GUIDENOTE	Termite Management (G38)	General Public
GUIDENOTE	Using a Site Contamination Auditor (G101)	General Public
GUIDENOTE	Water Efficient Outlets in Government Buildings (G108)	General Public
GUIDENOTE	Access for Maintenance (G189)	General Public
GUIDENOTE	Building Access and Safety Systems (G190)	General Public
POLICY	Building Information Modelling Implementation (PO42)	General Public
POLICY	Energy Efficiency Action Plan (G128)	General Public
POLICY	NEP (Movement of Controlled Waste between States and Territories) Measure 1998 (G135)	General Public
POLICY	Strengthening Existing Buildings For Earthquakes (PO45)	General Public
POLICY	Tackling Climate Change (G99)	General Public

Schedule of updates – July 2020

The following schedule outlines the major changes and content updates undertaken as part of the 2020 review of the 2015 edition of the standard.

Section	Component	Updates
Policy Information and Guidelines	Document Guidelines	Removed text from Early Childhood facilities design standards.
		Added instructions on how to access the digital NCC.
Building Design and Specification	Design for Accessibility, Participation & Learning	Updated section to provide greater clarification on what disability access upgrades are required and when this must occur, inclusion of Universal Design principles.
	Green Star Accreditation	New section added with additional information on Green Star points and certification
	Site Design	New section added to ensure solar reflectance and heat island effect of site is minimised to align with Green Star requirements and for environmental benefit
	Roof and roof plumbing	Updated section to include requirement for high capacity overflow provisions on box gutters. Roof sheeting thickness clarified. Minimum roof pitch amended.
	Acoustics	Expanded acoustics section to provide greater flexibility and meet current pedagogical approaches.
	Flooring	Updated to include specified VOC limits for flooring, requirement for high abrasion resistance for flooring materials, compliance with NCC fire hazard indices, slip resistance ratings and moisture content of substrates.
	Walls	Updated to include more specific requirements for anti-graffiti protection and to allow for a broader range of instances where it can be installed, clarification of internal walls to toilet amenities,
	Doors	Section updated to include new requirements for doors particularly in flexible learning environments based on learning in STEM Works projects and Adelaide Botanic HS.
	Windows	Added text regarding natural light all learning and activity areas, required daylight factor reduced, changes to glazing requirements to encourage indoor-outdoor connection, updated to allow insect

		screens on windows used for ventilation, provided more guidance on the use of skylights and solar tubes.
	Building air leakage	Added new requirement for air leakage test due to significant impact on energy use in poorly sealed buildings. Aligned with current practice in Europe and America and based on Green Star rating.
	Stairs, ramps, handrails, balustrades and barriers to prevent falls	New title and expanded section with additional information on balustrades and barriers.
	Toilet Provisions and Design	Added instructions on how to access the digital NCC. Clarified student vs staff requirements. Added information on signage. Clarification of the calculation of amenities
	Materials and Finishes	Updated section to include requirement for the life cycle impacts of materials to be considered and reduced, use of timber internally and externally, included limits for VOC in paint and adhesives used.
Building Services	Demand management	Additional note regarding investigation of alternatives to transformer upgrades.
	Solar Photovoltaics (PV) Systems	New section outlining requirements for solar PV systems to be installed as part of major refurbishments and new builds.
	Heating, Ventilation & Air Conditioning (HVAC)	Updated ventilation requirements to account for central HVAC systems, inclusion of CO ₂ monitoring and fresh air introduced mechanically to be conditioned via ERV. Requirement for independent switching and temperature controls. Updated requirements to allow evaporative cooling in new gyms, revised to include preference for ceiling fans for climate control, updated information for smaller/individual site initiated projects.
	Fire Protection	Updated to ensure minimal water is wasted in testing systems
	Plumbing	Revised to include requirement for HDPE pipework and to include electric hot water systems with gas as preferred systems. Inclusion of trade waste discharge requirements.
	Power and Gas Supply	Updated to include recommendations for electrical sub metering on new buildings and independent emergency isolation switches for power and gas.
	Internal Lighting	Updated requirement for both manual control switching and motion sensors. Updated requirements for LED lighting levels and ensuring glare reduction. Added additional information based on Sustainable School Program LED upgrades.
	External Lighting	Added reference to Australian Standard for minimising light pollution

	Lifts	Updated requirements for the size of lift cars.
	Information and communications and technology (ICT)	Updated based on current projects and to ensure integration with NBN requirements. Expanded requirements for hearing augmentation systems. Assistance call system (access toilets) moved to this section.
Fixtures, Fittings and Furniture	Cleaner's Storage	Section relocated.
	Cold Room Storage	New section added.
	Curtains and Blinds	Updated to allow blinds in specific circumstances, generally for reducing need for mechanical cooling in rooms. Updated requirements for blinds in these circumstances.
	Sinks and troughs	Additional information provided for vitreous, stainless steel and corian sinks in science laboratories.
	Tap Ware	Text updated to reflect that taps must have lever handles, sensor plates or other similar controls.
	Toilet Amenity Fittings	Updated WELS rating targets to cover future advances in rating system.
Site Works	Parking	Updated requirements for inclusion of fuel efficient and electric vehicle parking, bicycle parking standard increased to reflect green star requirements
	Landscaping	Included reference to Outdoor Learning Environments (OLE) Standard, section updated to include standard for drip irrigation systems with moisture override sensor as per green star requirements. Deleted section on legal liability for trees as this is covered in the Outdoor Learning Environments Standard.
	Site Fixtures	Added the department's position on mobile phone/cellular towers. Moved section on bins to Waste Management. Removed section 'Swimming Pool Fencing'. Expanded section on flagpoles. Included text on outdoor decking.
	Shade Structures	Provided justification for continuing current standard for framed structures. Provided clarification on the types of acceptable fabric structures.
	Stormwater and Sewerage	New section added on flood management. Clarification on the class of pit covers.

	Waste Management	Added section on bins previously located under Site Fixtures. Requirements for bin location updated as per advice from Security and Emergency Management.
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Schedule of updates – June 2022

The following schedule outlines the major changes and content updates undertaken as part of the 2020 review of the 2015 edition of the standard.

Section	Component	Updates
Information and Communications Technology	Comms cabinets	Minimum depth of comms cabinets updated.

[Australian Standards](#) as identified in the standards including but not limited to:

- AS 1170 Structural Design Actions
- AS 1428 (Set) - 2010 - Design for access and mobility Set
- AS 2107 - 2016 – Acoustics – Recommended design sound levels and reverberation times for building interiors
- AS/NZS 4586 - 2013 - Slip resistance classification of new pedestrian surface materials
- AS 2455 Textile Floor Coverings – Installation Practice – General
- AS/NZS 4858 Wet Area Membranes
- AS/NZS 4389 - Safety mesh
- AS/NZS 1859.2 - 2017 - Reconstituted wood-based panels – specifications
- AS 2441 - 2005 – Installation of Fire Hose Reels
- AS/NZS 1680.2.2 - 2008 - Interior and workplace lighting
- AS 1735.12 –Lifts, escalators and moving walks facilities for persons with disabilities
- AS 1743 - 2018, Road Signs – Specifications
- AS - 1744 - 2015, Forms of letters and numerals for road signs
- AS/NZS - 2890.1, Parking Facilities Part 1 - Off Street Car Parking
- AS - 1742.3 - 2019 Manual of uniform traffic control devices
- AS/NZS - 3500.3 - 2018, Plumbing and drainage - Stormwater drainage

Related legislation

[Disability Discrimination Act 1992](#)

[Disability Standards for Education 2005](#)

[Planning, Development and Infrastructure Act 2016](#)

[Education and Children's Services Act 2019](#)

[Education and Early Childhood Services \(Registration and Standards\) Act 2011](#)

[Education and Care Services National Regulations 2011](#)

[Environment Protection Act 1993](#)

[National Construction Code \(NCC\)](#)

[Urban Design Charter](#)

[Work Health and Safety Act 2012](#)

[Work Health and Safety Regulations 2012](#)

Related documents

[Asset services policy](#)

[Outdoor learning environments standard](#)

[Energy and water efficiency guideline](#)

[Recycled water connections procedure](#)

Disability Access Provisions Procedure

Early Childhood Facilities Design Standard

Revision record

Version: 20/22095 v3.2

Edits: inclusion of a portable telephone in disability units

Approved by: Senior Manager, Asset Planning, Standards and Sustainability

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