

# Creative Spaces Design Guide

PART 3C  
TECHNICAL  
APPENDIX:  
CREATIVE  
STUDIO  
SPACE



CREATIVE VICTORIA  ARUP

 CITY OF MELBOURNE

CITY OF SYDNEY 



We acknowledge the Traditional Owners of Country throughout Victoria and their ongoing connection to this land and water.  
We pay our respects to their culture and their Elders – past, present and future.

In preparing these guides, we acknowledge that First Peoples self-determination is a human right as enshrined in the United Nations Declaration on the Rights of Indigenous Peoples.

We also acknowledge that past injustices and continuing inequalities experienced by First Peoples have limited, and continue to limit, their participation in all land and resource management<sup>1</sup>, including development of creative spaces.

Creative spaces exist on land for which sovereignty has not been ceded and, as such, development, design and operation of creative spaces should involve consultation with First Peoples and Traditional Owners. Engagement and operation must be carried out in a culturally safe manner.

Any use of First Peoples design should follow the principles outlined in the International Indigenous Design Charter<sup>2</sup>, which stipulates that First Peoples must have opportunity to meaningfully participate in and influence design and development processes that affect their Country and community.

**Artist — Dixon Patten, Yorta Yorta and Gunnai**

*This artwork, commissioned in 2019 by the (then) Victorian Department of Jobs, Precincts and Regions is about developing the economy by working with community to create First Peoples' employment opportunities, supporting inclusion and economic prosperity and thriving First Peoples' communities.*

*The symbolism used represents opportunities for First Peoples to achieve personal and economic prosperity and improved employment outcomes, the diversity of First Peoples' knowledge, skills and resources in community, and the connection to cultural practices and ceremonies.*

**Terminology:**

**First Peoples** – Throughout this document the term Victorian First Peoples is used to refer to Traditional Owners of Victoria and all other Aboriginal and Torres Strait Islander peoples who reside in this state.

**Culturally-safe Spaces**<sup>3</sup> – Culturally-safe spaces are built environments, places, areas, groups, dialogues or bodies of work that positively and proactively acknowledge, accept and provide for the inclusion of the full spectrum of diversity of participants in that space. They are empowering places of mutually-beneficial exchange, personal and collective growth, and strength-based approaches.

For First Peoples, culturally safe spaces are places where imbalances of power, primacy and status are identified and structural adjustment is made to ensure equitable conditions are achieved and maintained. Culturally safe spaces are cognisant of, and proactively provide cultural safety at all levels of operation.

1. DELWP, see Traditional Owner and Aboriginal Community Engagement Principles on page 10 [https://www.delwp.vic.gov.au/\\_data/assets/pdf\\_file/0031/508099/Traditional-Owner-and-Aboriginal-Community-Engagement-Framework-compressed-2.pdf](https://www.delwp.vic.gov.au/_data/assets/pdf_file/0031/508099/Traditional-Owner-and-Aboriginal-Community-Engagement-Framework-compressed-2.pdf)

2. The International Indigenous Design Charter, see Guiding Principles on page 8 at <https://indigenousdesigncharter.com.au/international-indigenous-design-charter/>

3. More information can be found via the UTS Design Index. <http://www.utsdesignindex.com/researchmethod/culturally-safe-spaces/> and the Victorian Government's cultural safety framework: <https://www.dhhs.vic.gov.au/publications/aboriginal-and-torres-strait-islander-cultural-safety-framework>

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Cover: Fashion Designer  
Tamara  
Leacock of label REMUSE  
Credit: Noel Smyth

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Creative Spaces Design Guide  
PART 3C: TECHNICAL APPENDIX  
CREATIVE STUDIO SPACE



# Introduction

An abundant and diverse supply of creative space is essential to support a productive cultural sector. Due consideration for the operational, spatial, and technical requirements of these creative spaces can better support the functions and meet the needs of its users, operators and the community for the long-term.

Designing and delivering creative spaces that are fit for purpose will amplify its creative potential as well as increase operational efficiency, in turn reducing costs to the owner and/or operator.

## **Purpose of the technical appendices**

The technical appendices to the Creative Spaces Design Guides have been developed to guide good decision making in the planning and delivery of creative space projects. They demonstrate best practice in effective, efficient and sustainable design of creative spaces, and not all aspects will be applicable or achievable for every project.

These appendices are technical in nature, relating to program, spatial requirements, structure, amenity and serviceability of space. Readers of these technical appendices should be mindful of the very specific technical focus of the documents and use them in conjunction with other guidance on the proposed programming, management and operation of the proposed creative space. In particular, these technical appendices should be read in conjunction with **Part 1: Making space for creativity** and **Part 2: Principles for creative spaces** of this document which provide a wider context within which creative spaces are typically conceived and delivered.

These technical appendices are a live document that may be updated from time to time. They do not capture the breadth of all the possible types of creative space. They prioritise spaces that were identified through consultation as being in high demand and low supply. Guidance on other types of spaces are intended to be added in future iterations.

## **How to use the technical appendices?**

The technical appendices to the Creative Spaces Design Guides are intended to provide a preliminary technical brief prior to undertaking design work. These technical requirements include architectural, engineering and specialised design advice. The technical appendices:

- are aimed at providing 'best in class' outcomes and should be considered as a foundation for the development of detailed design briefs with project teams.
- are intended to be a practical resource to inform early planning and design conversations.
- should be used as a tool to facilitate early engagement with operators and user groups. Continued engagement throughout design and delivery is key to the development of fit-for-purpose creative spaces.
- are intended to support understanding and a shared language between stakeholders about the technical requirements for the type of creative space they wish to deliver.
- do NOT substitute specialist design, architectural and engineering advice as would be expected and required on any design and construction project.
- do NOT substitute early engagement with operators and end-users whose specific needs would need to inform project-specific design briefs.

## **Users of the technical appendices**

The intended audience and users of these technical appendices might include (but not limited to):

- Private property developers incorporating creative space into a larger property development.
- Local and/or state government arts and culture agencies that are delivering or supporting the delivery of creative space.
- Arts and creative organisations that are planning to upgrade, deliver or occupy creative space.

## **Appendix structure**

The first section titled **Key principles for designing creative spaces** provides guidance applicable equally across all space types and important considerations that need to be addressed alongside the technical framework of these appendices.

These include:

- End-user and operational needs
- Project process
- Procurement
- Code compliance
- Departure guidance

**The second section identifies the following technical requirements of a creative studio space:**

- Programmatic – key spaces and spatial relationships
- Spatial – key dimensions and spatial relationships
- Universal design
- Sustainability
- Structural engineering
- Lighting
- Electrical engineering
- Acoustics
- Fire engineering
- Hydraulic engineering
- Mechanical engineering

A glossary section is included for reference.

# Key principles for designing creative spaces

Creative spaces are places where people gather, inspire, connect, create and present their work. They are unique and respond to the needs of the environment in which they are located.

## Embedding good design in a creative space

These spaces will be used by professional artists, producers, construction and technical production staff and the broader community. It is imperative that good design is at the core of every creative space delivered.

The Victorian Government Architect recognises the critical need for good design. The 'Good design - Issue 1' publication by the Office of the Victorian Government Architect identifies that:

*"Good design comes in many forms and is defined by much more than how something looks. It refines the purpose and aspiration of a project, improves how it works, creates additional benefits and elevates how people feel and behave in the final outcome. Good design creates inspiring places and greater, lasting financial value. And of course, good design also looks and feels good."*

Incorporating good design in creative spaces includes designing for and understanding:

- User and operational needs
- Project processes
- Efficient procurement of goods and services
- Compliance with codes and standards
- Universal design
- Sustainability
- The local, national and international arts and culture ecosystem

## Operational and end-user needs

Early and ongoing engagement with operators, user groups and other stakeholders is a key component in the successful delivery of creative space projects. The establishment of critical success factors with primary stakeholders lays the foundation for the development of spatial, operational and management structures. The conception of a vision, operating models and target markets are all essential to designing creative spaces with a unique identity and place within the arts and cultural ecosystem.

Accordingly, defining operational and end-user needs is often the first step in a project delivery process.

## Project process

These technical appendices provide the key requirements for best practice design. However, design itself does not guarantee good project outcomes. Design of creative spaces is part of a bigger 'process' of project delivery, and these technical appendices are a tool to be deployed throughout a project process that can provide differing points of value. The diagram below outlines one possible project process.

Project  
visioning

Conceptual  
design

Detailed  
design

Construction

Operations

Ultimately, the success of the technical appendix will be realised through its application throughout a design and delivery process. The appendix is intended to be used as a reference at different phases of a project, as well as serving as a tool to facilitate collaborative discussions as project details unfold during design and construction. The table below presents some examples of how the technical appendix may be of value at each phase in the project process.

**Project visioning** – Project inception phase where site is selected, vision and direction of the project is established.

POTENTIAL USES	EXAMPLE OF USAGE
Assist a property developer to determine appropriate creative infrastructure aligned to a development vision	What are the spaces used for and what needs to be built? How does that align with your intended project outcomes?
Assist arts organisations to survey possible options for creative spaces	Your organisation is ready to find a new home – what technical and spatial requirements does the site need and how much might it cost?
Assist with site selection and due diligence by validating if sites can accommodate technical needs	Your arts organisation has found space that could be converted into creative space – does it have the clear height and services on site to support your needs?

**Concept design** – Project phase in which the creative space is designed fit for purpose to meet user and stakeholder needs.

POTENTIAL USES	EXAMPLE OF USAGE
Assist a property developer to determine appropriate creative infrastructure aligned to a development vision	The technical appendix establishes some primary design requirements to be incorporated into early design – has the design team made the right spatial, structural and services allowances?
A departure point for a design brief which recognises that the technical appendix is 'best practice' and can be de-scoped with the guidance of the consultant/design team	The preferred site and design of an arts organisation cannot achieve the guideline clear height for dance – what are the impacts of a reduced clear height and is this acceptable to the organisation?

**Detailed design** – Project phase in which technical documents including construction documentation is produced.

POTENTIAL USES	EXAMPLE OF USAGE
Detailed design and engineering requirements to be used as 'basis of design' for project design team	The technical appendix provides a clear set of functional and performance design criteria that needs to be delivered unless otherwise agreed – for example: can the appropriate background noise levels be met against the nominated criteria or has the design team agreed to relax them for this project?

**Construction** – Project phase in which the creative space is constructed on site.

POTENTIAL USES	EXAMPLE OF USAGE
Provide a reference point for collaborative discussion between stakeholders, designers and builders as projects are being delivered	The technical appendix is a common point of reference for a shared understanding of what is being built and why – for example: does the kitchen have all the facilities that the company requires?

**Operation** – Ongoing phase that includes operation and maintenance of the creative space.

POTENTIAL USES	EXAMPLE OF USAGE
Post-occupancy validation	Has the intended functionality and performance been delivered?
Real world implementation of technical appendix used to provide lessons learned for future refinement of the technical appendix	Feedback, such as if aspects of the guidance prove to be persistently difficult to practically achieve, can be recorded and submitted.

## Procurement considerations

Procurement methodologies – for both design and delivery, should be structured in a way that ensures alignment with, and ability to deliver against, the vision articulated by project stakeholders. The many varied ways that the design and construction of building projects can be procured are beyond the scope of this technical appendix, and each project will require its own specific procurement methodology.

Below are some examples of strategies that might be included within the procurement process to ensure best alignment of the creative space with the vision articulated by project stakeholders:

- A private developer delivering a creative space as part of a construction consent condition might be required to put in place governance structures that ensure stakeholders are consulted and their requirements are demonstrably met
- Consent authorities provide incentives to developers to establish and maintain ongoing outcome-oriented relationships with creative arts community members
- Arts organisations are recommended to engage with specialised consultants at the outset of a project to determine their specific needs, aligned with organisation mission and values, to form the basis of a project brief
- Arts organisations should be provided with quality advice for the procurement of design and/or construction services.

## Compliance to codes and standards

Any creative space needs to be designed, built and certified in accordance with current relevant statutory regulations. Of particular note:

- The facility is to comply with the National Construction Code of Australia (NCC) and all relevant associated Australian Standards (AS).
- A building regulations consultant and an accessibility consultant should be engaged to provide comprehensive advice and compliance check throughout design and documentation.
- For a change-of-use and/or works within an existing building, the building regulations consultant is to assess the extent of upgrade required for compliance in line with Clause 62 and 64 of the Environmental Planning and Assessment (EP&A) Regulations (NSW) and Building Regulations 2018 (Victoria). This assessment should be carried out in the concept phase of a project (pre development application in NSW).
- In an existing building, input from a fire safety engineer may be necessary to assist in defining the extent of upgrade to meet the required level of safety and assist the consent authority to determine the requisite level of upgrade.
- Part H of the NCC will apply to Class 9b spaces. In Victoria, if the space is a 'Place of Public Entertainment' (as defined in the Building Act 1993 and prescribed in the Building Regulations 2018), then part VIC Part H102 will apply. In NSW, if the space is an 'Entertainment Venue' (as described in the EP&A Regulations), then part NSW H101 of the NCC will apply.

## Departures from the technical advice in these appendices

These technical appendices articulate a set of functional and performance requirements that should be considered in the delivery of a creative space project. However, it is not always possible, or appropriate, to achieve best practice outcomes. The design should principally align with the capability and expectation of key users and stakeholders.

Misalignment between design and user/stakeholder expectations may result in creative spaces:

- that are not fit-for-purpose
- that are operationally burdensome
- that don't align to their broader built environment

These technical appendices represent best practice and are intended to be a 'point of departure'. Stakeholders should be empowered to descope from these requirements where appropriate. It is crucial that users are advised by a design, architectural, engineering and consultant team who understands and can explain the implications of descopeing these requirements.

### DEPARTURE GUIDANCE

Throughout the technical appendix document, there are boxes formatted in this style. These boxes contain commentary on the potential implications of descopeing against specific requirements. Please note that descopeing can have broader and more/less significant impact than the example given. It is important to gain advice from a professional design and engineering team to help understand these decisions on a case-by-case and project specific basis.



# Creative studio spaces

A creative studio space is used by artists, designers and small creative businesses to create and produce multiple forms of artwork – both digital and physical.

The general requirements of a creative studio space are identified below with provisions for clean work, and wet work.

## **Type A: ‘Clean’ studio**

A studio space to support ‘clean’ work that can function safely without onerous liquid waste management. Examples include printing, small-scale laser-cutting, model-making, drawing, sketching, fabric and fashion art forms.

## **Type B: ‘Wet’ studio**

A studio space to support ‘wet’ work that may require specific liquid waste management solutions. Examples include screen printing, fabric dyeing, painting (involving acrylic or solvent based paints) and resin work.

### **Exclusions:**

This guideline excludes:

- Food or food-based art. Spaces to support the creation of food will likely trigger several additional code requirements, such as food handling, food storage and food safety.
- Creative artforms that require larger plant and machinery or significant chemical and/or ventilation management. For these uses, please refer to Technical Appendix: Fabrication Space: Light-Industrial.

## **Usage profile**

A creative studio has a range of usage profiles:

- Occupation by a single user-group for an extended period of time, such as a tenancy
- Occupation by a single user-group for several weeks or months at a time
- A mix of individual practitioners sharing the studio space for short-term or long-term occupation

Creative studio spaces typically operate 6-7 days per week, but 24/7 access is required to accommodate users wishing to work in the studio at any time of day.





## References:

River Studios, Melbourne, Australia.  
Image: Breathe Architecture

Artscape Daniels Launchpad,  
Textile and fashion studio, Toronto.  
Image: Bob Gundu.





# Programmatic requirements

A creative studio is a collaborate environment for artists and creative makers. These spaces need to support both light construction and administrative tasks.

Creative studio spaces should be designed to be industry leading in sustainable design, energy efficient operation, and the provision of equality of access beyond the code requirements of AS 1428.2. Early engagement with the operator and user groups to determine the usage is necessary.

Key programmatic requirements for a creative studio space are outlined below:

## **Common to both Type A and Type B:**

**Print room** for basic printing and photocopying needs (optional)

**End of trip facilities** that includes secure bicycle parking, toilets, showers, changing rooms and lockers

**Kitchen** for simple meal preparation fitted with dining table and chairs

**Gallery space** to exhibit artwork (optional)

**Storage areas** connected to the studio rooms

**Loading area** for incoming physical artwork or technical equipment

**Step-free circulation and obstruction free access**, sized at minimum for an elevated work platform from the building exterior

**Inclusive and legible wayfinding signage**, including text, pictogram, visual, tactile and audible options

## **Type A**

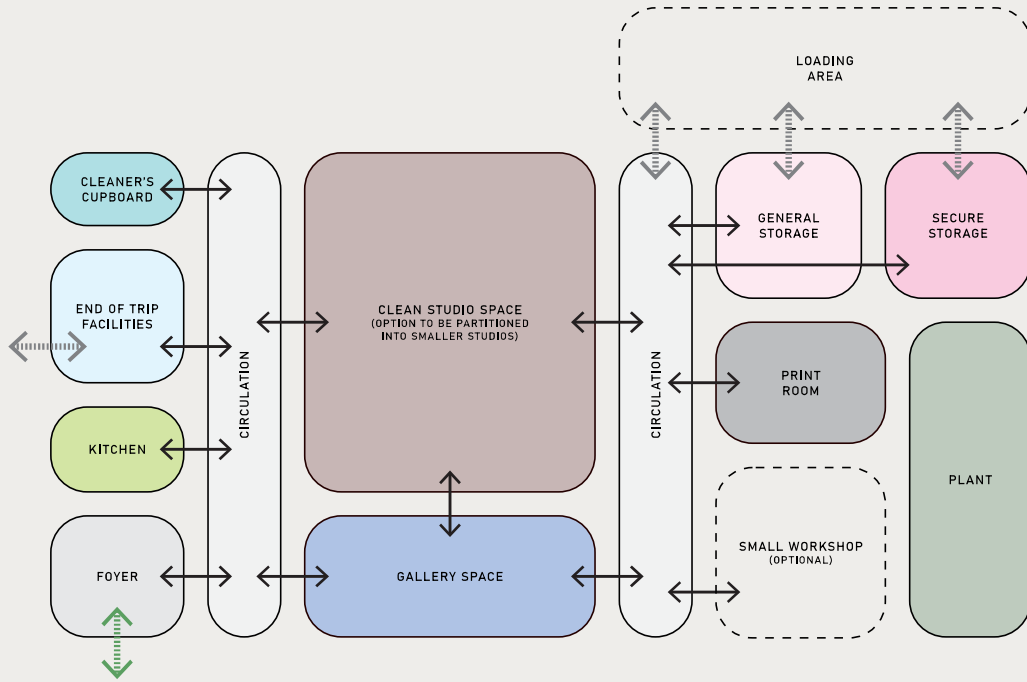
— Clean studio room to support the creation of art that does not require disposal of liquid waste. A building can have more than one clean studio room to allow for simultaneous occupation by multiple user groups.

## **Type B**

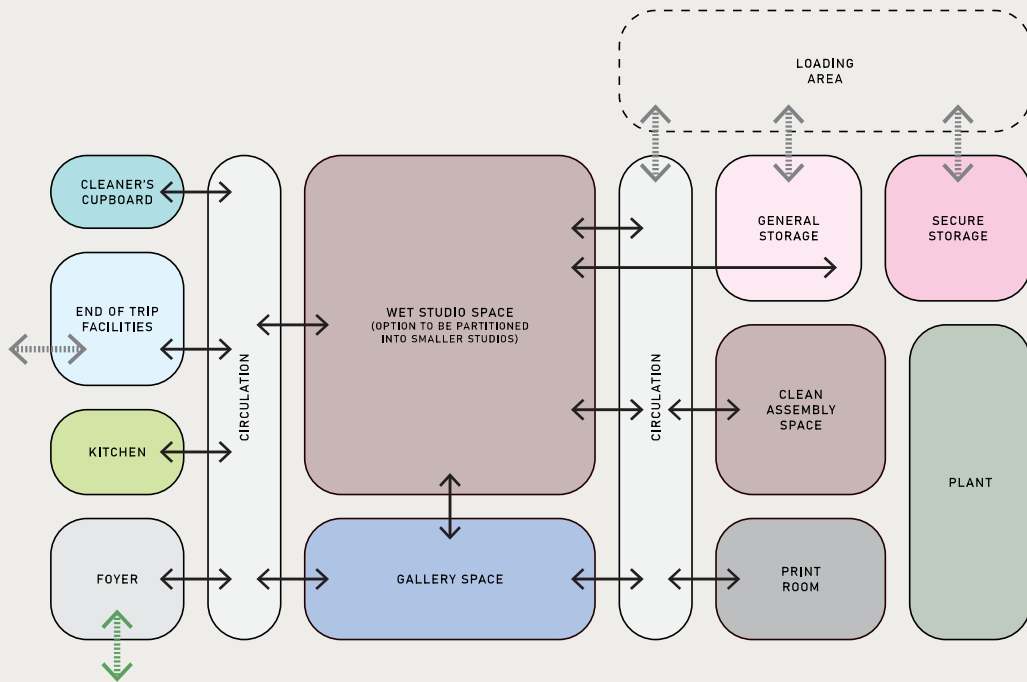
— Wet studio room, for supporting the creation of art that require disposal of liquid waste. A venue can have more than one wet studio room to allow for simultaneous occupation by multiple user groups.

— A communal assembly area, clear of obstructions that is adequately sized to assemble large and complex elements. This is generally a clean space, where the work is taken from the wet space to be finished in a more controlled environment.

Type A: Clean studio space –  
Spatial adjacency diagram



Type B: Wet studio space –  
Spatial adjacency diagram





# Spatial requirements

A creative studio space should have secure, straightforward, and controllable access for user groups, such as an electronic keypad entry, or similar. The design should facilitate equitable and universal access for all, regardless of a person's identity or circumstances.

Early engagement with the operator and user groups to determine the usage is key to defining area requirements. The following area allowances have been provided as an early planning guide:

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Studio rooms – open plan: **10 sqm per person**

— Additional secure storage and lockers will be required for each user of the open plan studio rooms

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Studio rooms – enclosed room: **10 sqm to 100 sqm**

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Small making space: **10 sqm**

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Clean assembly area: **10 sqm**

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End of trip facilities: **as per NCC**

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General storage: **15 sqm**

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Cleaners cupboard: **2 sqm**

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Ceiling: **3m to 4m clear height**

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All spatial requirements listed above denote minimum Net Internal Area.

## Type A – Clean studio requirements

### Clean studio space

Clean studio spaces can vary in size and configuration, and can be located within a variety of buildings. They can include:

- A large open plan space with individually rented studio space
- A large open space with temporary partitions to create small individually rented units
- Individual, fully secured rooms of varying sizes

Close consultation with operators and end users should inform the number, type and layout of the creative studio. Clean studios should provide the following:

- Mobile workstation for computers and laptops
- Obstruction-free workshop space
- Storage area

Secure storage should be provided within open plan creative studio spaces that are shared by multiple creatives.

All wall, floor and ceiling finishes should be acoustically treated, durable and resilient. Finishes, fittings and furniture should include good visual contrast of key surfaces and features (including considerations for how tones may be visually perceived when surfaces are wet), and should avoid confusion (example: heavy patterns, glare, reflections). Fittings and furniture selected should accommodate users with varying accessibility requirements.

Natural light is strongly advised along with provision for heating and cooling to create a welcoming and comfortable work environment. Services design should be flexible to allow for multiple arrangements of task lighting, power, Wi-Fi and data points.

### Small workshop (optional)

A separate common small workshop is recommended to be provided in clean creative studio spaces with 10 or more studio rooms. This room can be used for creative work using light machinery, such as laser cutting, model making, painting etc. If required, this space should be fitted with a paint sink and a wash-up area, provide mechanical ventilation for appropriate use of toxic materials and fitted with dust and fume extraction.

All wall, floor and ceiling finishes should be acoustically treated, durable, and be able to interact with pollutants, paints, oils, and minerals. Floor finishes should be slip resistant and have cove skirting for easy maintenance.

## Type B – Wet studio requirements

### Wet studio

Wet studios can vary in sizes, configurations, and be located within a variety of buildings. They can include:

- A large open plan space with individually rented desk space
- A large open space with temporary partitions to create small individually rented units
- Individual, fully secured rooms of varying sizes.

Close consultation with operators and end users should inform the number, type and layout of studio rooms required in a creative studio space. Wet studios should provide the following:

- Obstruction-free production space for work using light machinery
- Drying area fitted with drying rack
- Storage area
- Paint sink
- Wash-up area

For these spaces, the mechanical system should be adequate to serve the required functions within the space including adequate ventilation for specific activities like spray painting, activities that produces fumes, etc. Increased ventilation will also be required if drying areas are required. Refer to mechanical design requirements for further details.

Secure storage area should be provided in open plan wet studios shared by multiple creatives. Environmentally friendly and code compliant liquid waste disposal strategy should be employed.

All wall, floor and ceiling finishes should be acoustically treated, durable, resilient and be able to interact with pollutants, paints, oils, and minerals. Floor finishes should be slip resistant and have cove skirting for easy maintenance. Finishes, fittings and furniture should include good visual contrast of key surfaces and features (including considerations for how tones may be visually perceived when surfaces are wet), and should avoid confusion (example: heavy patterns, glare, reflections). Fittings and furniture selected should accommodate users with varying accessibility requirements.

Natural light is strongly advised along with provision for heating and cooling to create a welcoming and comfortable work environment. Services design should be flexible to allow for multiple arrangements of task lighting, power, Wi-Fi and data points.

### DEPARTURE GUIDANCE

If special equipment is used within the studio rooms, they may require additional loading, ventilation, noise and fume separation requirements.

### Clean assembly area

A separate common assembly area should be provided in wet creative studios with ten or more studio rooms. The assembly area should be obstruction free with a typical construction of plywood sheets with a sacrificial layer that can be fixed into as needed by the users. The assembly area should be fitted with overhead rigging infrastructure to support the assembly of large and complex items.

## Common to Type A and B

### End of trip facilities

The end of trip facility should be designed for universal access and should be located within 100m of a main entrance to the building. End of trip facilities should include secure bicycle parking, toilets, showers and changing facilities.

- **Toilets:** The NCC sets out the ratio of male and female toilets to the number of occupants, and the specifications for toilets. Accessible toilets should also be provided for people with a disability compliant with the NCC and the AS 1428 suite of Standards. It is recommended that both gendered and gender-neutral facilities be provided to accommodate cultural preferences and non-binary gender identity. A minimum clear height of 2.4m AFFL should be maintained in the toilets, showers and changing facilities.
- **Showers:** Each shower should have a floor area of not less than 1.8sqm. Showers should comply with accessibility standards and best practice, the NCC and the AS 1428 suite of Standards. A minimum clear height of 2.4m AFFL should be maintained. Number of showers provided should comply with NCC requirements to suit the required occupancy of the creative studio space.
- **Changing facilities:** Changing facilities should be provided with a clear space of no less than 1.5 sqm for each occupant changing at any time. Change rooms should be equipped with lockers for storing clothing and personal belongings. Lockers should be well ventilated, accessible and secure. There should be a clear space of at least 1800 mm between rows of lockers facing each other and at least 900 mm between lockers and a seat or wall.

### Kitchen and breakout room

A kitchen is intended for basic meal prep and reheating of pre-prepared meals. The kitchen should allow for food rinsing, utensil washing and the sanitary disposal of associated wastewater. There is no need to provide an oven or stove unless specified by the operator or user groups. A minimum clear height of 2.4m AFFL should be maintained in the kitchen. Basic kitchen provisions should include: a large fridge, microwave, sink and instantaneous hot water boiler for efficient tea and coffee preparation. A dishwasher may be considered.

Adjacent to the kitchen, a reasonable amount of bench space, dining tables, seating and storage should be provided for breakout.

It is noted that there should be dual height surface tops in kitchen areas allowing users of various heights (e.g. very tall or short stature, and people who may be seated, such as wheelchair users) to access facilities safely and independently. The lower countertop is recommended to be adjustable or at 760mm fixed height.

### Print room (optional)

A print room is a dedicated room that houses printers for small and large format printing along with photocopying facilities. Additionally, these rooms should also include a work bench, pin board, general storage and a waste station that allows for recycling as well as confidential document disposal

### Gallery space (optional)

A gallery space is for the display of different forms of artwork. This can be both physical and digital display. A gallery space is a type of exhibition space. Refer to technical appendix: Exhibition spaces for further information.

The provision of a gallery space can be an appealing feature for users as it can allow them to promote and sell their work to the public. Design of the gallery should consider other alternative uses of the gallery space (e.g. event space and meeting room) for added flexibility.

### Storage requirements

General storage areas adjacent to or within the creative studio space should be provided and capable of storing:

- Loose furniture such as folding tables and chairs

Secure storage adjacent to or within the creative studio rooms should be provided, to safely store:

- High-value items belonging to users of the studio rooms
- Raw materials
- Some users may need to store mobility or medical equipment therefore large enough storage areas should be provided for these

Cleaner's cupboard must be provided adjacent to or within the creative studio space with the following:

- Mop sink
- Area to hang wet mops, and brooms
- Cupboard to store general cleaning products securely and safely (dustpan & brush, bin liners, cleaning fluids, vacuum cleaner, etc.)

### DEPARTURE GUIDANCE

Storage space is often the most overlooked allowance in the design of creative spaces, sometimes sacrificed to increase space for other functional requirements. The saying "you can never have too much storage" is true and failure to provide adequate storage can have a negative impact on the safety, efficiency and operation of a facility.

### Loading zone and circulation requirements

The loading & unloading of equipment into the studio space and/or the building in which the studio space is housed should be carefully considered. The building's load-in door should be a minimum of 1.8m wide by 3m high to allow for large items and equipment destined for the studio space. The load-in area should be level or gently ramped to allow heavy and wheeled items to be safely transported. Ramped routes should have handrails on both sides.

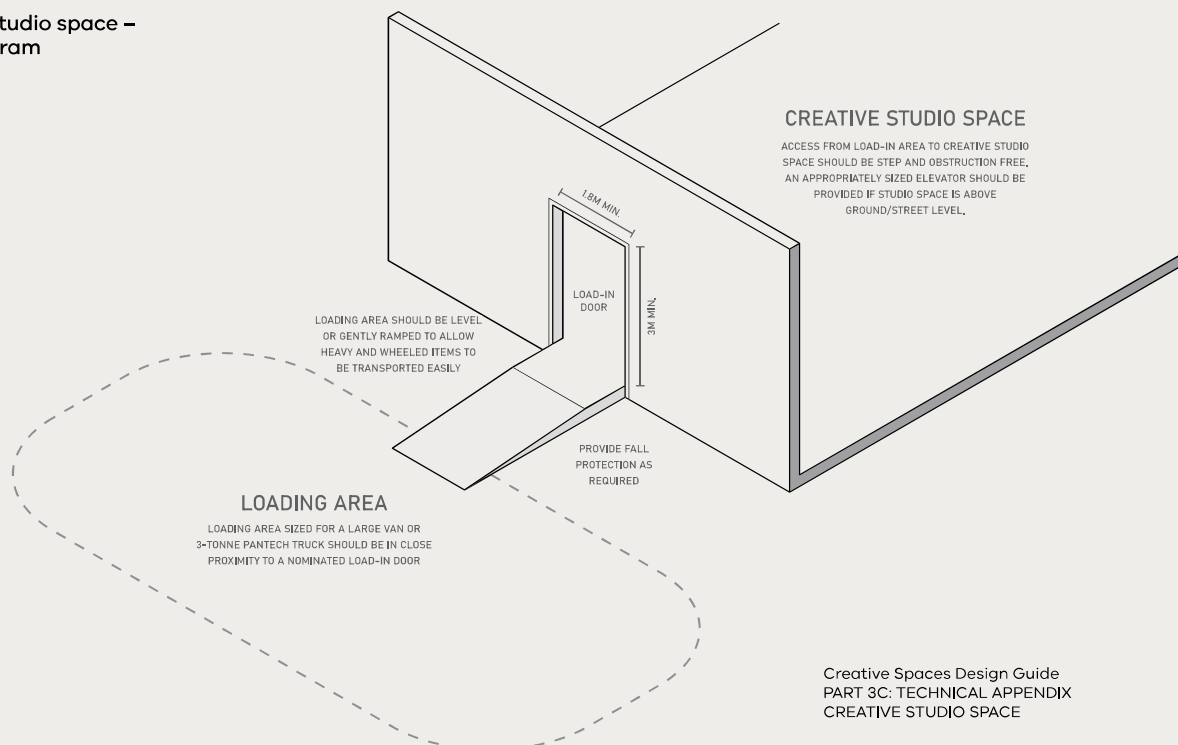
Circulation paths from the load-in area to the studio space should be step and obstruction free and have legible way-finding signage. Doorways and accessways should be minimum 1.8m wide. An appropriately sized elevator will be provided if the studio space is situated above ground/street level.

A dedicated loading dock is not required to support this type of space, but a loading zone sized for a large van or 3-tonne Pantech truck should be in close proximity to a nominated 'load-in door'.

### DEPARTURE GUIDANCE

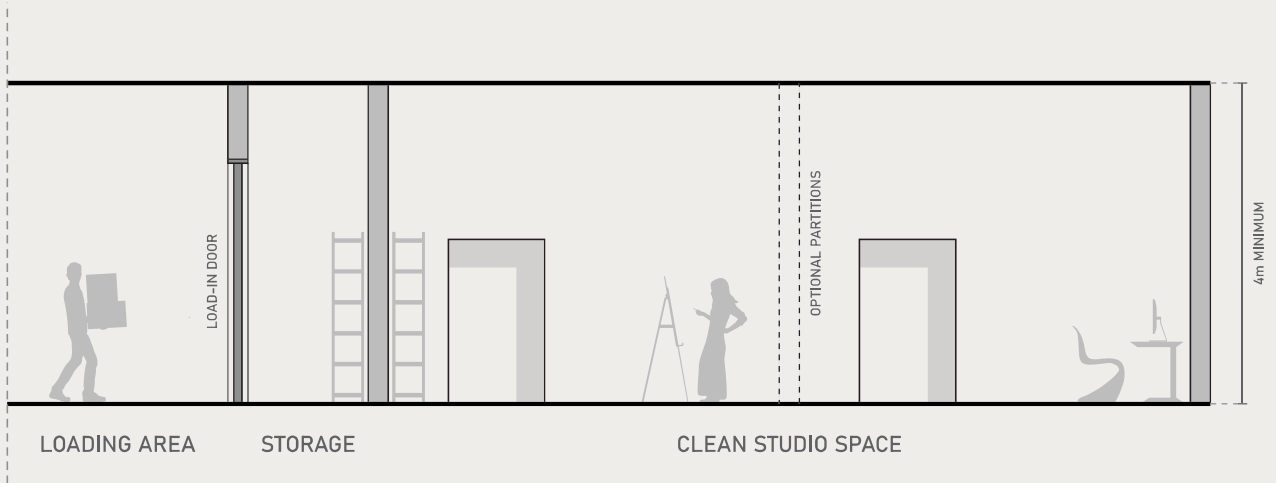
Inadequate loading and circulation requirements can result in: operational inefficiencies; unsafe practices; disturbance to neighbours; loss of reputation and revenue. As such load in paths should avoid; stairs; lifts; excess turns and bends; and uneven surfaces from loading bay to the creative studios.

### Type B: Wet studio space – Loading diagram

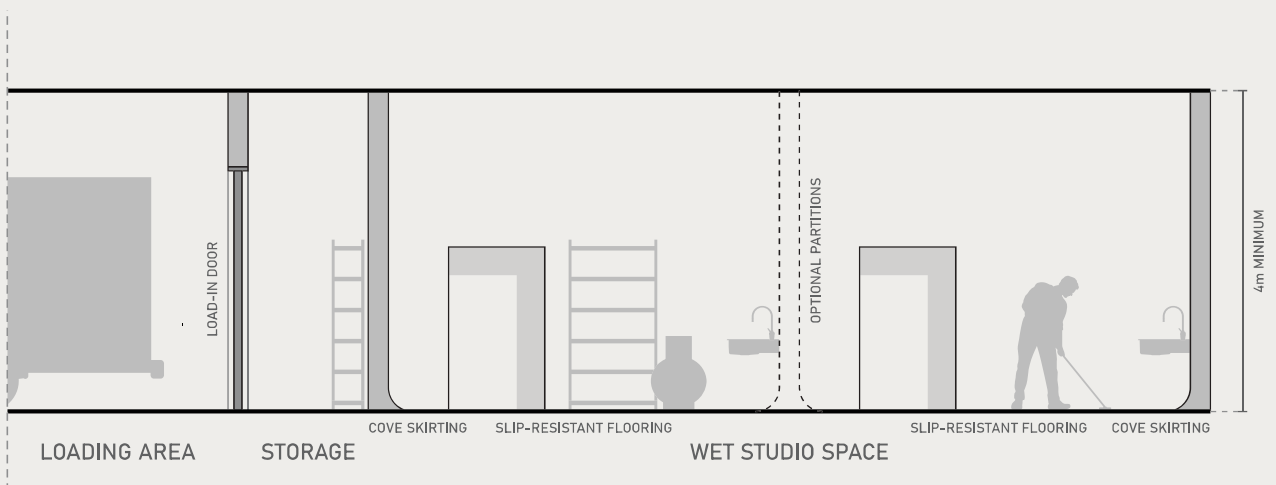




Type A: Clean studio space –  
Sectional diagram



Type B: Wet studio space –  
Sectional diagram



# Universal design considerations

Universal design acknowledges human diversity and difference through design that is user-centred and responsive to people's needs, enabling people to participate equally, confidently, and independently.

Creative spaces should work for everyone, but too often they fall short of this ambition. For a creative space to be inclusive, it must reflect and respond to the widest range of people's requirements, enhance visitor and user experience providing equal opportunities to access the space and use its facilities/services.

The key principles and goals of universal design are outlined below.

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**Equitable use:** creating welcoming and accommodating spaces that offer equality in experience for different users, regardless of personal circumstance or identity.

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**Flexibility in use:** creating spaces that can offer choice in use and adapt to future changes and requirements and reasonable adjustments based on user needs.

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**Simple and intuitive:** creating spaces that are intuitive to use.

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**Appropriate size and space:** providing appropriate size and space for approach, circulation and use.

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**Perceptible information:** effectively communicating information to all users, considering the needs of users and the constraints that the environment may place of communication

Universal design should be considered at every stage of the project lifecycle. By considering this earlier in the design phase, expensive late-stage alterations can be avoided, and the cost of management and maintenance can be lowered.

For universal design to be integrated into a creative space, compliance is required with the following codes:

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The access provisions of the NCC

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The DDA Access To Premises Standard

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The local council's DCP relating to Access for People with a Disability

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AS 1428 suite of Standards

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AS 2890.6 for car parking.

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It is recommended that universal design considerations extend beyond compliance with codes and should respond to other areas including but not limited to:

- Provision of different sanitary facilities: accessible, ambulant accessible, gendered and non-gendered facilities
- Provision of reflection and prayer rooms, these areas should be designed to be calm avoiding bold patterns which can be confusing for some neurodiverse users
- Equitable circulation around spaces by providing circulation paths of at least 1500mm (1800mm preferred) clear of obstructions from furniture or any door swings
- Inclusive presentation of information to provide a choice of visual, audible and tactile means
- Egress for all – considerations for an evacuation strategy that allows everyone to evacuate in a safe and equitable manner
- Provision of 30pt LRV contrast between key surfaces (doors/walls, walls/floors) when wet and dry

# Sustainability considerations

## Every industry can influence emissions and their sustainability performance.

Sustainability and climate change are increasingly at front of mind for the general public and inform consumer decisions. Effective sustainability approaches should entail the application of systems thinking, considering the project holistically from its conception (e.g. “do we need to create something new, or will repurposing something we already have suffice?”) to its end of life.

Sustainability considerations for creative studio spaces, both clean and wet, are arranged within key themes below:

### **Greenhouse gas emissions**

Victoria has a goal of being net zero by 2050. Creative studio spaces should aim to reduce greenhouse gas emissions to support this goal:

- Understand and quantify Scope 1, 2 and 3 greenhouse gas emissions for the space over its lifetime, including a clear definition of the emissions reporting boundary for the space in line with Climate Active or other credible guidance.
- Develop emissions reductions targets, targeting net zero emissions that are in line with or more ambitious than Victoria’s emissions reduction targets

### **Energy usage**

Reducing energy usage and selecting a low emissions source of energy can significantly reduce greenhouse gas emissions. Potential sustainable energy strategies include:

- Using energy efficient appliances with an Energy Rating label, economy mode
- Obtaining an energy rating for the space or meet energy rating requirements if rating is not available (NABERS Tenancy Energy Rating, Green Star),
- Exceeding National Construction Code Section J Energy Efficiency requirements,
- Monitoring energy usage through use of on-site energy metering,
- Evaluating applicability of use of data centres, cloud storage and other means as an alternative to in-house comms. rooms. Where these options are deemed feasible evaluate their operational energy approach using the Energy Hierarchy below.
- Ensuring energy efficiency through design, including:
  - Use of programmable Building Management Systems,
  - Insulation to reduce heating and cooling loads,
  - Passive lighting and temperature control,
  - Specification of LEDs,
  - Specification of solar hot water and electricity panels.

If space is to be leased within a broader commercial building context, ensure landlord has an energy rating for the base building:

- NABERS Base Building or NABERS Whole Building targeting 4.5-stars (without green power) for existing buildings and 5-stars (without green power) for new buildings, and/or
- Green Star Buildings v1 rating (minimum targets for new and existing building may be informed by Property Council of Australia guidance), and/or
- A reasonable equivalent rating

### **Energy source**

- Minimise natural gas usage and replace gas with electricity for cooking and heating wherever possible
- Strategic energy procurement for the operation of creative spaces should be considered by applying the energy hierarchy outlined below when selecting a provider. Selection of energy source can contribute to ratings such as NABERS and Green Star and should be considered in concert with energy efficiency measures.

### **Energy hierarchy**

HIERARCHY	ENERGY MEASURE
1	<b>Sustainable energy production</b> <ul style="list-style-type: none"> <li>— Renewable energy from sun, wind, waves, tides or rainfall, or geothermal energy</li> <li>— Bio-energy from the combustion of biomass</li> <li>— Includes off-site renewable energy generation, Power Purchase Agreements (PPAs) and other renewable energy options from energy suppliers</li> </ul>
2	<b>Low carbon generation</b> <p>energy sources or generation that makes use of carbon capture and storage to reduce emissions from generation</p>
3	<b>Offsetting</b> emissions from energy usage using certified, additional emissions offsets

### Water management

Reduction of water usage overall and use of non-potable water sources where possible contribute to sustainability performance and may contribute to sustainability ratings for the space.

Water management in Creative Studio Spaces should consider:

- Use of efficient fixtures and fittings with a WELS rating,
- Monitoring water usage through on-site metering,
- If space is to be leased within a broader commercial building context, ensure landlord has a water rating for the base building:
  - NABERS Office Water 4 star for new buildings, and/or
  - A Green Star Buildings v1 rating that includes achievement against Water Use credit, and/or
  - A reasonable equivalent rating
- Obtaining a water efficiency rating for the space or meet water rating requirements if rating is not available (NABERS Water, Green Star),
- Ensuring water efficiency through design, including use of recycled water, reticulated wastewater, rainwater capture.

### Waste management

Waste is a source of greenhouse gas emissions and its disposal can result in costs for Creative Studio Spaces. Management of waste can result in both emissions and cost reductions and can improve operational efficiency. Waste includes single use items, food waste, waste associated with the fit out of the space and waste associated with the processes undertaken in the space, for example in the assembly space, workshops or studios.

Waste management in Creative Studio Spaces should consider:

- Application of circular economy principles in line with the Victorian DELWP's Recycling Victoria A new economy Plan:
  - Design to last, repair and recycle
  - Use products to create more value
  - Recycle more resources
  - Reduce harm from waste and pollution
- Obtaining a waste rating for the space or meet waste rating requirements if rating is not available (NABERS Waste),
- If space is to be leased within a broader building context, ensure landlord has a waste rating for the base building:
  - NABERS Waste, and/or
  - A Green Star Buildings v1 rating that includes achievement against Operational Waste credit, and/or
  - A reasonable equivalent rating
- Setting targets to reduce waste production overall, from both construction and operation of the Creative Studio Space. This can be achieved through achievement of or alignment with Green Star Buildings v1 Operational Waste and Upfront Carbon Emissions credits

— Setting targets to maximise diversion of waste from landfill and aligning with Victoria's target of 80% diversion by 2030. Strategies may include the following and should be captured in an Operational Waste Management Plan:

- Having separate collection for multiple waste streams, including organics waste, and adequate space to accommodate these waste streams,
  - Have specific waste recycling or disposal options identified for non-standard materials used in the creation and production of artwork,
  - Educate staff on waste sorting,
  - Provide signage and nudge mechanisms for staff, audiences and clients to promote waste sorting.
- Minimise the use of hazardous waste, that is waste that has the potential to harm humans or the environment, in the construction and operation of the space, and provide adequate and safe storage and disposal options for hazardous waste where use of hazardous materials is unavoidable. For Wet studios hazardous waste may include waste disposal into sewer may require special permitting.
- Implement a sustainable procurement policy that guides procurement decisions during operation with the aim of reducing waste overall, reducing hazardous waste, increasing reuse and recyclability, and integrating circular economy and whole of life principles into procurement evaluation.
- If space is to be leased within a broader building context, ensure landlord has a waste rating for the base building:
- NABERS Waste, and/or
  - A Green Star Buildings v1 rating that includes achievement against Operational Waste credit, and/or
  - A reasonable equivalent rating



# Structural design requirements

Key structural design considerations and requirements are outlined below:

## Future flexibility

As defined in universal design considerations, flexibility of use of space is integral to the design of the creative studio space. Creating spaces that offer choice in use and adaptability to future changes should be a key consideration in the structural design. This includes considering:

- Designing for higher floor loadings to allow for change of use without future structural strengthening of the floor
- Geometry of structure including column layout, beam layout and slab set-downs to allow for changes to studio layout
- Additional penetrations to allow for change of use and services reticulation without future structural implications

## Floor loading

Load allowances for the creative studio space should consider the intended use and future flexibility of the space and comply with structural design actions specified in AS1170.1:2002. Specific loading areas are to be assessed on a case-by-case basis to meet the relevant Australian standards. However, as a guideline, refer to the table below.

## Sacrificial cover for future provisioning of wet areas (Type B only)

Setdowns for wet areas will be required for Type B – Wet studio. It is recommended that an additional concrete zone above the structural slab be allowed for to create the falls required to drain the wet areas. An additional load allowance for these concrete finishes zone should be allowed for in the superimposed dead load.

If future flexibility of the space is key consideration, a 40mm integral, unreinforced concrete sacrificial cover above the minimum cover is recommended. This will give flexibility of set downs for wet areas.

## Structural system and column grid

Specific to new construction projects, careful consideration into the structural system and column grid should be made to balance structural efficiency and flexibility of the creative office space.

To minimise the depth of the floor plate and improve structural efficiency, a regular column grid is required. Columns can be either expressed or easily incorporated into fitout and internal partitions.

The preferred framing system (e.g. flat plate, band beams, composite structure etc) and material type (e.g. concrete, steel, timber etc) should be determined on a project by project basis considering floor to floor heights, proposed grid, services coordination and construction constraints.

## Serviceability requirements

A structural engineer should carry out design checks for all relevant service conditions in accordance with the governing Australian Standards to ensure the structure will adequately perform for its intended function and purpose.

## Floor loading guidelines

USE OF SPACE	PERMANENT SUPERIMPOSED DEAD LOAD (kPa)	IMPOSED LOAD	
		UNIFORMLY DISTRIBUTED LOAD (kPa)	CONCENTRATED LOAD (kN)
Studio (general)	2.0	3.0	2.7
Gallery space	2.0	5.0	4.5
Storage and print room	2.0	5.0	4.5

Notes:

1. It is important to note that these loads are provided as a guide and should be reviewed on a case by case basis and in accordance with relevant Australian Standards
2. Super imposed dead loads are provided as a guide for areas with lightweight partitions, finishes and typical services. Further allowances should be made if heavier finishes, partitions etc are desired in the space.

### Allowance for services penetrations

Penetrations required through horizontal and vertical structural elements for services ducts, cables and pipes should be coordinated on a case by case basis and will be dependent on the structural system of the building. Careful consideration into floor-to-floor heights is required to ensure services reticulation at high level can pass under the floor structure above.

General guidance for penetrations through structural elements are noted below.

- Both vertical and horizontal penetrations should not pass through beams. This includes partial penetrations for floor boxes.
- Floor penetrations should be limited around columns to avoid punching shear.
- Large floor penetrations (for services, stairs, atrium etc.) may require additional trimming structure.

Amenities areas will require multiple floor penetrations with limited layout flexibility. These should be carefully considered and coordinated with the floor structure at an early stage in the design.

An allowance for future penetrations should also be considered and allowed for where possible.

### Footfall vibration performance criteria

The design of the structural floor should consider the vibration induced by typical foot traffic through the space. The aim of conducting a footfall analysis is to capture the dynamic performance of the floor plate when subject to an average person's walking frequency.

#### Walking Frequency

It is important to consider the spatial arrangement of the floor plate as this helps to determine the walking speed and the number of steps that will be input into the vibration analysis. Walking frequency is dependent on the expected length over which a person could walk without interruptions. For example, long straight corridors could experience many uninterrupted steps compared to an area with regular obstacles such as desks and seats. Future flexibility of the studio space should also be considered when analysing the vibration of the structure due to footfall.

For design purposes, the following walking frequencies are proposed:

- Corridors and circulation Zones: 2.5 Hz
- Stairs: 2.5–4 Hz
- Studio: 2–2.5 Hz

#### Damping

Due to the extent of fitout, 1–2% damping is deemed appropriate

### Response Factors (RF)

Vibration criteria for floors with people walking are typically quoted in terms of a response factor or multiplier on the threshold of human perception. The level of excitation of the structural floor should be within the acceptable limits for the specific function of the space. The accepted level of response should be defined and agreed with the client, but compliance with ISO 10137 2007 (Basis of design of structures) can be used as a preliminary guidance.

Maximum response factors summarised below are a good guidance for preliminary design.

AREA	MAXIMUM RF
Studio space	RF = 4
Gallery space	RF = 4

More sensitive areas may suffer excessive vibration caused by vigorous walking in adjacent walkway or corridor areas, this should be considered in the design. For example, more stringent criteria may be required in seated areas as the perception of vibration is heightened when seated. It may also be desirable for studio areas with sensitive equipment to have limits on acceptable vibration levels.

# Lighting design requirements

Key lighting design considerations and requirements are outlined below:

## **Lighting design considerations**

- The creative studio should have good general lighting throughout. The average general horizontal illuminance level should meet 600 lux as a base illuminance level. Minimum uniformity should be 0.7 in task areas and 0.5 for general spaces.
- The colour temperature of the studio space should be tunable white (2700k – 6000k), with fittings to allow for colour temperature control.
- The Colour Rendering Index (CRI) of the work lighting and house lighting luminaires should be 90 or higher.

## **Lighting controls**

- Good natural light throughout is preferred. Control of natural light with blinds/shutters/drapes should be provided on all windows and glass surfaces.
- Motion sensors, potential use for daylight harvesting sensors and lighting timers should also be considered to turn off the lighting and conserve energy when room is not in use.
- All lighting should be dimmable, with smooth fading from 0-100%.
- Task lighting will be required in multiple locations throughout the space. Preprogrammed lighting scenes should be provided with different illuminance levels based on the type of activity being undertaken.

## **Emergency Lighting and Exit signs**

- AS2293 and NCC Section E4 compliance emergency lighting and exit signs should be provided throughout as required.
- Consideration should be given to incorporate integrated emergency lighting to the general lighting within the space.
- Exit signs should be able to operate at minimum brightness to eliminate glare and light spill during a black out.

# Electrical design requirements

Key electrical design considerations and requirements are outlined below:

## Electrical requirements

- Incoming power supply (3-phase power) to the studio space and the power supply authority power metering requirements to be developed based on the incoming power supply to the building and as per local power supply authority requirements
- A dedicated distribution board must be provided for the studio with separately metered power and lighting as required by NCC, for ESD purposes and for subleasing (if required)
- A separate clean earth distribution board complete with a technical earth connection directly from the building main earth bar to be provided within the studio to connect all specialist audio and video equipment and outlets
- General power outlets to be provided for the user ports and cleaners' outlets as required
- Equipment power to be provided for the kitchenette, model making workshop, print room and the like together with spare general power outlets. Power provisions to be provided for AV racks, toilets and foyers and other general areas as required
- Power provisions to be provided for all mechanical and hydraulic services equipment and to be coordinated with mechanical and hydraulic services installations
- Cable reticulation to be coordinated with acoustic requirements of the floor/wall build up. To maintain the required acoustic performance based on the installation requirements, rigid conduits, flexible conduits or steel conduits are to be used

The studio will require:

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10A DGPO's around perimeter of each room

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20A supply to technical equipment racks

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Facility panels with Single phase and three phase power outlets

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Clean power/technical earth system for all outlets in recording studio

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Power supply for light machinery (sowing machines, laser cutter, 3D printer, etc.)

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## DEPARTURE GUIDANCE

As well as ensuring adequate electrical supplies, the distribution of power supplies is critical to success for the creative studio space; electrical supplies should be 'clean' and free from noise generated by inductive loads; design of earthing systems should avoid potential for 'earth loops' which can cause hum in sensitive equipment; power should be distributed liberally with outlets mounted to every wall between a set of doors in recording spaces and associated with all potential equipment locations.

## Communications requirements

Incoming communication services requirements to be developed based on the building/space requirements. Minimum 10pair Cat 5 cabling connection to be installed from the building distributor to the floor distributor together with minimum 6 core single mode fibre optic connection to be provided within the creative studio space.

The creative Studio space will require:

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Data outlets distributed in each room, wired back to dedicated AVDATA rack

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Additional data outlets to the print room

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AV switch in standalone AV network rack in machine room

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Minimum 1Gbps internet connection provided to AV switch

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Wi-Fi network provided throughout studio for users

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Data outlets within facility panels

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Facility panels with inter-connections fitted in each room to provide specialist AV signal types between rooms, control room and machine room patch rack

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Data storage capacity

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## Electrical design standards and system criteria

Relevant electrical design standards and system criteria are outlined below:

ITEM	STANDARDS	CRITERIA
Supply conditions	Supply Authority service rules	<ul style="list-style-type: none"> <li>— 400V 3-Phase nominal</li> <li>— 50Hz</li> </ul>
Main switchboard	AS/NZS 61439 AS/NZS 3000	<ul style="list-style-type: none"> <li>— 25% spare space or one spare space (whichever is greatest) for each frame size excluding main switch(es)</li> <li>— Main busbars 125% initial load</li> </ul>
Distribution boards	AS/NZS 61439 AS/NZS 3000	<ul style="list-style-type: none"> <li>— Form 2 unless stated otherwise</li> <li>— 30% spare space or minimum 18 poles (whichever is greatest) for each frame size excluding local main control)</li> <li>— Local main control required</li> <li>— Fault interrupt capacity of circuit breakers minimum 6kA</li> <li>— Provide fault current limiters or use higher fault interrupt capacity circuit breakers as required</li> <li>— Internal DBs: IP52 min.</li> <li>— External DBs: IP56 min.</li> </ul>
Consumers mains	AS/NZS 3000 AS/NZS 3008.1	<ul style="list-style-type: none"> <li>— Voltage drop: max. 2%</li> <li>— Max. demand: + 25% capacity (current carrying and voltage drop)</li> <li>— Fire rate where required to AS3000</li> <li>— At least 100% neutral; provide oversize neutral where harmonic currents are expected to be high</li> </ul>
Submains	AS/NZS 3000 AS/NZS 3008.1	<ul style="list-style-type: none"> <li>— Voltage drop: 1%</li> <li>— Max. demand: + 20% (current carrying and voltage drop)</li> <li>— Fire rate where required for Fire and Life Safety Services</li> <li>— At least 100% neutral; provide oversize neutral where harmonic currents are expected to be high</li> </ul>
Final subcircuits	AS/NZS 3000 AS/NZS 3008.1	<ul style="list-style-type: none"> <li>— Voltage drop: max. 2%</li> <li>— Power 2.5 mm<sup>2</sup> min.</li> <li>— Lighting 2.5 mm<sup>2</sup> min.</li> <li>— Max. 80% utilisation to AS 3000</li> </ul>
Lighting	AS/NZS 1680	<ul style="list-style-type: none"> <li>— Use long life, energy saving lamps such as LEDs; use tungsten and tungsten halogen only to approval</li> <li>— Allow overall depreciation factor of 0.8 for clean, air conditioned areas, 0.7 for clean, non-air conditioned areas and 0.6 for dirty areas</li> </ul>
Communications	AS/NZS 11801	<ul style="list-style-type: none"> <li>— Provide Cat 6 UTP cabling</li> <li>— Contain Cat 6 cable route length to &lt;90m</li> <li>— Cross power cables only at 90°</li> <li>— The maximum fill of a cable tray should not exceed 50%</li> </ul>
Electrical Metering and EMS system	NCC Section J6 Supply authority standards	<ul style="list-style-type: none"> <li>— Meters and CTs should comply with NCC and supply authority standards</li> </ul>



# Acoustic design requirements

Acoustic outcomes will be influenced by the site location, internal design and interface with surrounding development. The key design factors include:

- Environmental noise and vibration emission
- Internal design noise and vibration levels,
- Environmental noise intrusion
- Building services noise and vibration control
- Internal acoustic separation, including spatial planning and physical isolation
- Room acoustics (e.g. reverberation, etc.)

## DEPARTURE GUIDANCE

Careful evaluation of typical and maximum noise levels for creative studios should be developed to inform what noise mitigation measures might be required to avoid noise emission impacts. Hours of operation should be considered when determining noise emissions, such as from ventilation exhausts, external plant or loading docks.

## Design criteria and management requirements

ITEM	CRITERIA AND REQUIREMENTS
Environmental noise and vibration emission	<ul style="list-style-type: none"> <li>— Minimum requirements will be according to council consent requirements and will be dependent on surrounding or adjoining development. Due regard must be given to any requirements or expectations for ventilation, including external plant, exhausts or intakes.</li> <li>— The design must be based on the full operating hours of the space and maximum noise and vibration levels potentially generated by the use.</li> <li>— The acoustic design requirements will be heavily influenced by the proximity and sensitivity of nearby or adjoining receivers. Site location will be critical to minimising design requirements and maximising operational flexibility.</li> <li>— Consideration must be given to noise generated by the use of loading docks, which should allow for use late at night and early in the morning to coordinate with load-in times at performance spaces.</li> </ul>
Internal background noise and vibration levels	<ul style="list-style-type: none"> <li>— Criteria relate to the noise and vibration in the space excluding occupant activity.</li> <li>— Internal background noise levels, from both environmental noise intrusion and internal plant and equipment should not exceed the lower bound design sound level range in AS/NZS 2107:2016 by more than 5 dB. Refer to Education&gt;Art/craft studios in Table 1 of AS/NZS2107:2016. This would typically be assessed with any operable windows closed.</li> <li>— Internal background vibration not to exceed the maximum levels in British Standard BS 6472:2008.</li> </ul>
Internal acoustic separation, including spatial planning and physical isolation	<ul style="list-style-type: none"> <li>— Vibration and structure borne noise from mechanical equipment and activities within Studios must be factored into the building design and siting.</li> <li>— Where the space is located above or below other tenancies, the floor/ceiling sound insulation and footfall impact control measures should be considered.</li> </ul>
Room acoustics	<ul style="list-style-type: none"> <li>— Reverberation should be in accordance with in AS/NZS2107:2016. In the absence of specific recommendations in AS/NZS2107:2016, reverberation times should be minimised for noise control, occupant comfort and space functional requirements. <ul style="list-style-type: none"> <li>• For studios, reverberation time should in accordance with Education&gt;Art/craft studios in Table 1 of AS/NZS2107:2016.</li> <li>• For workshops, reverberation time should be minimized for noise control, occupant comfort and space functional requirements.</li> </ul> </li> </ul>

# Fire safety design requirements

Key fire safety design considerations and requirements are outlined below:

- Fire safety design requirements from the base building are to be incorporated in addition to requirements triggered by the new space.
- Fire exits and egress routes are to be in accordance with the requirements of the NCC. Where temporary equipment is expected, management provisions are to be implemented to prevent blocking of the exits and egress routes.
- Fire safety systems (e.g. fire sprinklers, hydrants, hose reels, fire detection and alarm systems, portable fire extinguishers and blankets) are to be provided in accordance with the requirements of the NCC.
- Smoke detection may be unsuitable for studio/workshop spaces, due to the potential for an increased likelihood of false alarm. An alternative means of detection should be considered in areas prone to false alarm.
- Sprinkler systems are generally recommended within studio and gallery facilities. Their inclusion within a facility is to be considered on a case-by-case basis in line with the requirements of the NCC.
- A Dangerous Goods Consultant is to be engaged to assess hazards associated with the presence of Dangerous Goods. Any Fire Engineering Performance Solutions are to consider the ignition sources and goods present within a facility.
- Fire separation for fume generating equipment is to be considered.
- Audibility of the Occupant Warning System is to be considered. Competing sound systems are to shut down in accordance with AS1670.1-2018 clause 3.22.3. The placement of occupant warning speakers is to consider any sound-proofing measures within the facility.
- Visual warning devices are to be located in areas where portable sound systems may be used.
- Linings are required to meet the Fire Hazard Property requirements outlined in C1.10 of the NCC. This requirement is to be considered in conjunction with any acoustic or sound proofing linings if provided.
- It will be important to consider how inclusive the evacuation strategy is, including plans for people who may require step-free routes (e.g. use of evacuation lifts for older people, disabled people, etc.) or who require particular features to help with the evacuation (e.g. audible alarms for blind and partially sighted people, visual alarms for D/deaf and hard of hearing people, etc.).

# Hydraulic design requirements

## Key hydraulic design considerations and requirements are outlined below:

- Domestic water and sanitary drainage is to be provided to any kitchens, showers and amenities, art sinks and cleaners sinks which are part of the space.
  - Where the space forms part of a shared building, domestic water services should be metered separately from the base building supply to allow landlord billing of water use.
  - As the kitchen is not producing hot food a trade waste grease arrestor is not required.
  - Mechanical condensate should drain to the sanitary system via a trapped tundish.
  - Domestic hot water should be generated local to the space and consider the frequency of use. Where spaces are used infrequently, instantaneous electric hot water generation is preferred to avoid energy associated with heat losses. Where the space is used daily, electric storage, heat pumps or a combination of both may be more appropriate.
  - Provide a trade waste pre-treatment strategy in line with local sewer and water utility requirements for wash down of any plaster, oils and paints (including heavy led, oil and acrylic). This may include plaster arrestor, general dilution pit, paint and oil separator, and screened basket arrestors subject to authority requirements.
  - Reticulation of wet hydraulic services should be avoided in rooms likely to store sensitive art work. Where this is not possible, leak detection or leak management should be considered with the stakeholders to avoid risk of water damage.
  - Reticulation of hydraulic services should be avoided in gallery spaces. Where this is not possible acoustic treatment should be considered and pipework located in a way to avoid impact on the space during routine maintenance or repair.
- In addition, the design should meet all requirements of national and local Statutory Authorities and should be in accordance with the following:
- Relevant Australian Standards
  - BCA/National Construction Code
  - Plumbing Code of Australia
  - EPA regulations
  - Worksafe regulations
  - BCA/Building Surveyor requirements
  - Manufacturer's Guidelines
  - AGA and Jemena requirements (where gas is provided)
  - Water Supply and Drainage Authority Requirements
  - Fire Rescue regulations and any Fire Engineering
  - Electrical Supply Authorities
  - Applicable ESD Requirements
  - Applicable Acoustic Requirements

### Hydraulic design criteria

The hydraulic services design is to be based on the following design criteria.

SYSTEM	STANDARDS	DESIGN CRITERIA
Domestic hot, cold and recycled water services	NCC AS/NZS 3500.1 AS/NZS 3500.4 AS/NZS 2500.3	<ul style="list-style-type: none"> <li>— Cold water average supply temp: 14°C</li> <li>— Hot water storage: 60°C to 65°C</li> <li>— Hot water distribution: 55°C to 60°C</li> <li>— Amenities (visitor and non visitor): 43°C</li> <li>— Utility rooms (bin stores, kitchens, non ablution areas etc): 55°C to 60°C</li> <li>— Max. velocity: 2.4m/s externally and in ground</li> <li>— Max. velocity: 1.5m/s in risers, BOH spaces</li> <li>— Max. velocity: 0.8m/s in acoustically sensitive spaces</li> <li>— Min. operating pressure: 250kPa</li> <li>— Max. operating pressure: 500kPa</li> </ul>
Sanitary Plumbing and Drainage	NCC AS/NZS 3500.2	<ul style="list-style-type: none"> <li>— Min. grade: 2.5% for 40 – 65mm, 1.65% for 80-100mm and 1% for 150mm pipelines</li> <li>— Sanitary stacks design capacity: 22% to 33% full</li> <li>— Drainage design capacity: max. 70% full</li> <li>— Velocity: 0.75m/s to 1.2m/s</li> </ul>
Building Rainwater Drainage	NCC AS/NZS 3500.3 Australian Rainfall and Runoff Guidelines Local council requirements	<ul style="list-style-type: none"> <li>— Flat roofs, box gutters: 5min 1% AEP</li> <li>— Eaves gutters: 5min 5% AEP</li> <li>— Climate change allowance: +10%</li> <li>— Full capacity overflows to be provided to all building rainwater drainage catchment areas</li> <li>— Velocity: 0.75m/s to 1.2m/s</li> <li>— Siphonic drainage velocities TBC by hydraulic calculation; insulation where required to limit noise in noise sensitive areas</li> </ul>

# Mechanical design requirements

Key mechanical design considerations and requirements are outlined below:

## General mechanical requirements

- Separate mechanical systems should be provided to serve each of the studio/assembly, gallery and support spaces. Each system should be activated as required to avoid unnecessary energy usage. Operation of these systems should be either programmed (for the larger spaces) or based on occupancy sensing (for small rooms/workshops).
- Consider pressure gradient within the studio/workshop spaces to ensure the air path is from clean to dirty to prevent contamination of clean spaces.
- If mechanical extract is provided with makeup from an unconditioned space, local heating may be required in winter to temper the temperature in the space. Any heating/cooling provided must be in line with NCC Section J requirements.
- If provided with active air conditioning:
  - Appropriate filtration should be provided based on the materials which are expected to be used in the space.
  - CO<sub>2</sub> sensors should increase the outside air proportion to the space in response to high CO<sub>2</sub> levels. Mechanical equipment should be sized to maintain internal temperatures and deliver increased outside air at high ambient temperatures.
  - Wall-mounted temperature and CO<sub>2</sub> sensors should be installed at 1500mm AFFL inside the space and in areas that will be representative of the conditions inside the space.
- Mechanical system should be variable volume and respond to temperature and CO<sub>2</sub> levels within the space.
- If system supplies >1000 l/s, economy mode should be provided in line with NCC 2019 Section J requirements. Economy mode should be offered with smaller units to achieve energy reductions.
- Increased outside air (50% above code minimum is recommended) in normal operation.
- For mechanical sizing, internal gains within the space should be based on metabolic rates to reflect activity level within each space.
- Relevant ASHRAE and CIBSE external design criteria should be used. Consideration should be given to future climate change and resultant elevated ambient design temperatures.
- Increased outside air (50% above code minimum is recommended) in normal operation
- If system supplies >1000 l/s, economy mode should be provided in line with NCC 2019 Section J requirements. Economy mode should be offered with smaller units to achieve energy reductions
- Openable windows should be incorporated for passive temperature control where possible to allow for natural ventilation in low-load scenarios when the external temperature is acceptable
- When determining airflow and mechanical equipment sizing, consideration should be given to uplighting vs. downlighting so that the mechanical system is not oversized (a proportion of high-level lighting and equipment load will not land in the space so does not require direct air conditioning)
- For spaces with a floor-to-ceiling height of 4-6m, minimum air change rate of 6 air changes per hour to be achieved
- Mechanical system should be designed to meet acoustic requirements of the space.



### **Creative studio space**

- The mechanical systems should maintain an environment within the specified values during times of use:
  - Temperature: 21 to 24 degrees Celsius, with ability to widen temperature criteria depending on space use to save energy
  - Humidity: 40 to 60% (note: this will not be directly controlled but will naturally fall into this range as a result of the air conditioning)
- CO2 sensors should increase the outside air proportion to the space in response to high CO2 levels. The mechanical equipment should be sized to maintain internal temperatures and deliver increased outside air at high ambient temperatures.
- Mechanical system should be variable volume, responding to temperature and CO2 levels within the space (wall-mounted temperature and CO2 sensors should be installed at 1500mm AFFL inside the space). Sensors should be installed in areas that will be representative of the conditions inside the space
- If extensive lighting and equipment is used, make allowance for mechanical system to offset expected maximum lighting and equipment loads
- Air supply should be 'low velocity' to reduce noise, avoid drafts and avoid moving light objects within the space
- Diffusers to be high induction to reduce drafts in space
- Minimum air change rate of 6 air changes per hour to be achieved (for 4m floor-to-ceiling within studio).

### **Type A Clean studio space**

- Basic painting functions may be performed in Type A Studio Space. As such, adequate ventilation should be provided to exhaust paint fumes from the space as required.
  - If spray painting will be performed, a partitioned spray booth should be provided with a dedicated extract system in line with AS1668.2
  - For hand painting, provide extract ventilation in line with AS1668.2. Sufficient makeup air should be provided to offset air extracted from the space.

### **Type B Wet studio space**

- Type B Studio Spaces will be "wet" spaces, containing sinks and paint traps. For these spaces, the mechanical system should be adequate to serve the particular functions within the space.
  - For fume-producing processes, adequate extract ventilation should be provided, with a preference for partitioned or enclosed areas where fumes are produced
  - If spray painting will be performed, a partitioned spray booth should be provided with a dedicated extract system in line with AS1668.2
  - For hand painting, provide extract ventilation in line with AS1668.2.
- Consider increased ventilation rates for drying areas if required
- Provide ventilated flammables cabinet for storage and a paint cabinet. It is recommended a dangerous goods consultant is engaged to determine number and grade of cabinets. Provide suitable ventilation where paints and other flammable/toxic substances are stored.

### **Model making workshop**

- Provide suitable ventilation in line with AS1668.2 requirements. Consider whether the workshop will require specialist dust or other extract. Provide appropriate filtration on extract systems to protect upstream mechanical equipment.
- If large equipment with significant heat loads are to be located in the workshop, additional cooling may be required.

### **Clean assembly space**

The Clean Assembly Space provides a space away from the "wet" studio work. Consider air pressurisation cascade such that air travels from clean to dirty spaces to avoid contamination and dust settling on wet objects.

- Provide suitable ventilation in line with AS1668.2 requirements. Consider whether the workshop will require specialist dust or other extract
- If large equipment with significant heat loads are to be located in the workshop, additional cooling may be required.

### **Kitchenette**

Provide sufficient exhaust ventilation to offset small heat gains from food preparation and dishwasher. As the kitchen is not a full-scale commercial kitchen, no dedicated kitchen exhaust is required.

### **Loading area**

The loading area should be adequately ventilated to prevent ingress of vehicle fumes into the enclosed spaces. If the loading area is under cover, ventilation should be provided in line with AS1668.2.

## Storage spaces

- Storage rooms which house high value equipment and instruments may require humidity control, requirements to be confirmed by major stakeholders, operators and user groups. Humidity and temperature sensors may be required to be redundant to ensure room conditions deviate minimally. Rooms requiring close control of conditions should be located internally and not against the façade or adjacent to unconditioned spaces. They should be served by dedicated units and utilise code minimum outside air to reduce temperature deviations (refer AS1668.2).
- Appropriate grilles and access panels (if required) should be incorporated within high value storage areas such that the security of the area is maintained.
- Major stakeholders to confirm plant redundancy requirements, temperature & RH conditions and maximum temperature/RH fluctuations allowed within the storage rooms. Refer AICCM (Australian Institute for the Conservation of Cultural Material) guidance as a baseline. Suggesting starting point is as follows:
  - Short term fluctuations of no greater than 4°C for ≤24 hours duration within the total temperature range of 15–25 °C
  - RH to be maintained 45–55% for the majority of the time for Sydney’s temperate climate. Short term, ±5% fluctuations ≤24 hours duration into the outer limits of the total RH ranges (i.e. can swing 40–60% RH for ≤24 hours)
- Rooms should be provided with outside air in line with AS1668.2, or battery ventilation in line with AS2676 if housing any type of batteries.
- If actively cooled by an air conditioning unit, the unit should be dedicated and be provisioned in a duty/standby arrangement if

required by the owner/operator of the space.

- If the unit is a direct expansion (DX) unit, design and installation is to be in line with AS5149.

## Print room

- Equipment within print room should be provided with sufficient cooling and/or ventilation to offset the loads and maintain the equipment at manufacturers’ recommended temperatures.
- The main stakeholders are to advise significant equipment loads in line with their technical requirements
- Rooms should be provided with outside and/or extract air in line with AS1668.2

## Other areas

- Cleaners store to be exhausted directly to outside in line with AS1668.2 requirements
- Ventilation of toilets and change rooms to be in line with AS1668.2 requirements (change rooms may be conditioned by a small FCU/PAC if desired to provide additional comfort for occupants). It is recommended extract ventilation is 200% of code minimum to ensure odours are effectively removed from the space

## Fire engineering/smoke control

If smoke exhaust is required, all components are to be compliant with AS1668.1 requirements and Spec E2.2b of the NCC, except where deviated by a Performance Based Fire Engineering strategy developed by a Fire Safety Engineer.

## Design criteria

EXTERNAL DESIGN CRITERIA	ASHRAE OR CIBSE CURRENT GUIDANCE
General ventilation	AS 1668.2:2012
Smoke control ventilation	AS 1668.1:2015
Battery ventilation	AS 2676.1:2020
Refrigerant	AS 5149:2016

In addition, the design should be compliant with the following codes and standards:

- 2019 National Construction Code/ Building Code of Australia (BCA)
- Building Permit conditions
- AS1668.1 (2015) – Fire and Smoke Control in Multi-Compartment Buildings (Amendment 1)
- AS1668.2 (2012) – Mechanical Ventilation in Buildings (Amendment 1 and 2)
- AS1668.4 (2012) – Natural Ventilation of Buildings
- AS 1940 (2004) – The Storage and Handling of Combustible Liquids
- AS/NZS 2107 (2000) – Recommended Design Sound Levels and Reverberation Times for Building Interiors
- AS 3000 – Electrical Installations
- AS 3500 – National Plumbing and Drainage Code
- AS 3666 (2011) – Air-handling and Water Systems of Buildings – Microbial Control
- AS 4254.1 (2012) – Ductwork for Air-Handling Systems in Buildings – Flexible Duct
- AS 4254.1 (2012) – Ductwork for Air-Handling Systems in Buildings – Rigid Duct
- AS/NZS 5601.1 (2013) – Gas Installations – General Installations
- AS5149.1–4 (2016 + latest amendments) – Refrigerating Systems and Heat Pumps
- All other applicable Australian Standards
- WorkCover requirements
- OH&S Regulations
- Safe Work Australia
- Electricity Supply Authority

- requirements
- Fire brigade requirements
- Australian Gas Authority requirements
- All local council regulations
- Fire engineering report

### Pipework velocity and pressure drop

The following values should not be exceeded:

- Pipework pressure drop: 300 Pa/m
- Pipework velocity:

DIAMETER (mm)	VELOCITY (m/s)
25	1
50	1.1
100	1.25
150	1.5
200	2
250	2.2
300	2.5

### Ductwork velocity and pressure drop

The following values should not be exceeded:

- Ductwork Velocity – Variable Volume Systems (Final velocity to be agreed with Acoustic Consultant depending on acoustic requirements of the space)
  - Risers and plant rooms: 7.0 m/s
  - In ceiling secondary ductwork: 5.0 m/s
  - In ceiling tertiary ductwork: 3.5 m/s
  - Flexible ductwork: 2.5 m/s
  - General duct discharges: 6.0 m/s
  - Louvres: 2.5 m/s face velocity
- Ductwork pressure drop
  - General ductwork: 0.8 Pa/m
  - Transfer ducts: 12 Pa
  - Riser take-offs:  $K_t \leq 0.89$
  - Bends:  $K_t \leq 0.25$
  - Rectangular contractions:  $K_t \leq 0.19$

Where the total pressure loss through the fitting is defined as  $P_t = K_t \times P_v$ :

- $P_t$  = Total pressure loss through fitting (Pa)
- $K_t$  = Loss coefficient
- $P_v$  = Velocity pressure (Pa)

### Mechanical equipment and accessories pressure drops

The following values should not be exceeded:

- Sound attenuators: 50 Pa
- Louvres: 20 Pa
- Cooling coils (airside): 150 Pa
- Cooling coils (waterside): 35 kPa

# Glossary

## **Access To Premises Standard**

The Disability (Access to Premises – Buildings) Standards 2010 (Premises Standards) is legislation under the Disability Discrimination Act 1992. The purpose of the Disability Standards for Access to Premises is to make sure: people with disability and their family members, carers and friends, have equal access to public buildings; and building certifiers, developers and managers fulfil their responsibilities to people with disability under the Disability Discrimination Act 1992.

## **AFFL**

Above Finish Floor Level

## **AISC**

American Institute of Steel Construction

## **Amdt**

Amendment

## **amp**

Ampere

## **AS**

Australian Standards are published documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they are intended to. They establish a minimum set of requirements which define quality and safety criteria. Standards Australia develops internationally aligned Australian Standards.

## **AS/NZS**

Australian/New Zealand Standards. Joint standards developed by Standards Australia and Standards New Zealand

## **ASHRAE**

American Society of Heating, Refrigerating and Air-Conditioning Engineers

## **AV**

Audio Visual

## **back of house (BOH)**

A term used to refer to the support spaces for the stage, most often immediately adjacent to the stage. This includes dressing rooms, storage rooms, loading dock. This term can also be used to refer to the rear of the auditorium.

## **BCA**

Prior to the creation of the NCC, building was regulated by the Building Code of Australia (BCA), and had been since 1992. The BCA was the first collection of nationally-consistent building regulations. The BCA was superseded by NCC.

## **catwalk**

A steel structure over the stage, audience area, or both, used by stage personnel to cross from one side of the house to the other, often used to support lighting instruments.

## **CISBE**

Chartered Institution of Building Services Engineers

## **CNC**

Computer Numerical Control router

## **control room**

The dedicated zone or room from which the lighting, sound and AV equipment is operated during a performance.

## **CT**

Current Transformer

## **DB**

Distribution Board

## **dB(A)**

The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. It is worth noting that an increase or decrease of approximately 10 dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3 dB is subjectively barely perceptible.

## **DCP**

Development Control Plans. DCPs provide detailed planning and design guidelines to support the planning controls in the Local Environmental Plan.

## **DDA**

Disability Discrimination Act

## **decibel**

Measure of loudness of sound (pressure) level. For convenience, this is calculated on a logarithmic measurement scale.

## **DGPO**

Double General Power Outlets

## **DMX**

Digital Multiplex, a standard for digital communication networks that are commonly used to control stage lighting and effects

## **DSP**

Digital Signal Processor

## **DX**

Direct Expansion

## **EP&A Regulations**

Environmental Planning and Assessment Regulation. The EP&A Regulation contains key operational provisions of any local or state planning system.

## **ESD**

Environmentally Sustainable Design

## **FCU/PAC**

Fan Coil Unit/Packaged Air Conditioning Unit

## **fire curtain**

A non-flammable, vertical travel curtain immediately behind the proscenium, contained in the smoke pocket, used to protect the audience from possible smoke and fire originating from the stage. It is typically rated for 30 minutes of protection.

## **frequency**

The subjective equivalent of frequency in music is pitch. Higher frequency sounds have a higher pitch. The unit of frequency is the Hertz (Hz). Human hearing ranges approximately from 20 Hz to 20 kHz. For design purposes, the octave bands between 63 Hz to 8 kHz are generally used.

## **front of house (FOH)**

A term typically used to collectively refer to the support areas immediately adjacent to the auditorium. This includes the lobbies, restrooms, cloak check, gift shop and box office.

## **GPO**

General Power Outlets

## **Green Star**

A Green Star rating provides independent verification that a building or community project is sustainable. Undertaking voluntary Green Star certification demonstrates leadership, innovation, environmental stewardship and social responsibility.

## **Hz**

Hertz

## **IP**

Ingress Protection rating

## **IStructE**

Institution of Structural Engineers

## **l/s**

Litres per Second

## **LED**

Light Emitting Diode

**loudness**

Loudness provides for an exciting and dramatic aural experience and allows the musical director maximum dynamic range. The loudness of sound varies throughout an auditorium, and is equated to the distance from the stage to a listener.

**m**

Metres

**m/s**

Metres per Second

**NABERS**

National Australian Built Environment Rating System (NABERS). NABERS is a simple, reliable sustainability rating for the built environment. This helps building owners to understand their building's performance versus other similar buildings, providing a benchmark for progress.

**National Construction Code (NCC)**

The National Construction Code is Australia's primary set of technical design and construction provisions for buildings. As a performance-based code, it sets the minimum required level for the safety, health, amenity, accessibility and sustainability of certain buildings. The Australian Building Codes Board, on behalf of the Australian Government and each State and Territory government, produces and maintains the National Construction Code.

**Noise Criteria (NC)**

The Noise Criteria (NC) curves are commonly used to define building services noise limits. The NC value of a noise is obtained by plotting the octave band spectrum on the set of standard curves. The highest value curve which is reached by the spectrum is the NC value. Shown below is a plant noise spectrum that is equivalent to NC 40.

**OH&S regulations**

The Occupational Health and Safety (OH&S) Regulations build on the OHS Act. They set out how to fulfil duties and obligations, and particular processes that support the Occupational Health and Safety Act.

**Preferred Noise Criteria (PNC)**

A set of curves, similar in principle to NC curves, but considered to correlate better to subjective acceptability in very low noise areas such as music auditoria.

**reverberation**

The principal, subjective acoustic quality perceived by the majority of listeners in an auditorium is reverberation. This is most commonly experienced at the end of stop chords as the sustained sound that rings in the space. Reverberance assists the sustain of musical instruments and the blending of the orchestra sections. It also contributes to the feeling of envelopment, i.e. that the sound comes from all around you.

**RMS Compressor**

Root Mean Squared compressor

**sqm**

Square metre

**typical noise levels**

Some typical noise levels are given below:

NOISE LEVEL DB(A)	EXAMPLE
130	Threshold of pain
120	Jet aircraft take-off at 100m
110	Chain saw at 1m
100	Inside disco
90	Heavy trucks at 5m
80	Sidewalk of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heater at 1m
40	Living room
30	Movie Theatre
20	Remote countryside on still night
10	Sound insulated test chamber
0	Threshold of hearing

**UDL**

Uniformly Designed Load, a force that is applied evenly over the distance of a support

**UTP**

Unshielded Twisted Pair Cabling

**WELS**

Water Efficiency Labelling and Standards (WELS). WELS is Australia's water efficiency labelling scheme that requires certain products to be registered and labelled with their water efficiency.

**wings**

Areas on stage left and right of the proscenium opening edge not in direct view of the audience. The wings are used as a space for actors or scenery waiting to go on stage.



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