

Vertical Transport Services

Design Standard

TAFE NSW would like to pay our respect and acknowledge Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of the Land, Rivers and Sea. We acknowledge and pay our respect to the Elders; past, present and emerging of all Nations.



TAFE NSW Deniliquin Connected Learning Centre - Media Lounge

When printed this document is uncontrolled.

This document was commissioned by TAFE NSW and prepared by JHA Consulting Engineers (NSW) Pty Ltd.

For enquiries please send email to: designteam@tafensw.edu.au

TAFE Infrastructure NSW Design Team
 Level 2, Building A, 1 Mary Ann Street
 Ultimo NSW 2007
 PO BOX 707, Broadway NSW 2007
 02 9338 6600
tafensw.edu.au

Rev	Issue date	Issue	Amendments since previous issue
A	06 June 2022	Approval	Updates as per comments
B	31 August 2022	Final	Updates as per feedback

The project team retains responsibility for the coordination, design, procurement, and delivery of vertical transport systems which will include taking all reasonable steps to make sure that the vertical transport system design, and selection complies with all applicable Australian Standards required by the NCC, WHS Legislation, Statutory planning approval processes, TAFE NSW Procedures & Policies, and all other relevant statutory requirements.



BE
AMBITIOUS

DENILIQUIN

Deniliquin
The Deniliquin
The Deniliquin
The Deniliquin

Contents

■ Introduction

1.1	Overview	07
1.2	Audience	08
1.3	Standards & Documents	09
1.4	Definitions	12

■ Applications

2.1	Vertical Transport Systems Covered By This Standard	15
2.2	Project Application	16
2.3	Project Design Documents	18



Design Strategies

3.1	General	25
-----	---------	----

Technical Sections

4.1	Vertical Transport Equipment	28
4.2	Existing Buildings	29
4.3	Passenger Lifts	30
4.4	Goods Lifts	32
4.5	General Requirements	34
4.6	Special Requirements	39



Work Health & Safety

5.1	General Requirements	41
5.2	Common Work Health & Safety Concerns	42

Introduction

1 Introduction

1.1 Overview

The Vertical Transport Design Standard is intended to improve the quality and consistency of vertical transport systems and selections across TAFE NSW.

This Design Standard provides specific guidelines for the planning, design, operation and maintenance of Vertical Transport systems design within built environment projects across TAFE NSW.

This Design Standard applies to new or existing buildings.

1 Introduction

1.2 Audience

The table below broadly defines the diverse audience this Design Standard is written for and the roles they play through the design, selection and delivery process.

Table 1 Who should use this Design Standard?

Group	Members	Group's Roles
Consultants	<ul style="list-style-type: none">ArchitectsEngineers and specialist consultantsProject Managers	<ul style="list-style-type: none">Design and develop VT systems to suit project needs and meet the requirements of this Design StandardConsult and collaborate with the TAFE NSW project team, stakeholders and end usersManage any sub-consultants or sub-contractors to deliver the VT design in accordance with this Design Standard and the Project BriefUnderstand VT design strategies and undertake VT design as part of a holistic design and vertical circulation strategy
TAFE NSW Project Team	<ul style="list-style-type: none">Investment and Capital DeliveryDesign ManagersStrategic Asset PlanningProcurementFacility ManagementSustainabilityLogisticsSystems GroupWork Health Safety	<ul style="list-style-type: none">Manage the design and development of VT systems to suit project needsAssist with project VT briefing requirementsManage the design consultants and contractors to deliver the VT design in accordance with this Design StandardReview the VT design & deliverables to ensure compliance with this Design StandardGuide project stakeholders through design development & facilitate collaboration with VT designers
TAFE NSW Operations & End Users	<ul style="list-style-type: none">Teaching SpecialistsStudent Experience GroupProduct GroupChange Management GroupCustomer and stakeholder relationsLearner support groupsPhysical Access Advisory GroupDiversity and Inclusion TeamIndustry Partners	<ul style="list-style-type: none">Understand VT design requirements and assist in developing the brief for specialist VT systemsCollaborate with VT designers and provide feedback on VT designsUnderstand design principles
Contractors	<ul style="list-style-type: none">Construction Contractors	<ul style="list-style-type: none">Manage any sub-consultants or sub-contractors to deliver the VT design in accordance with this Design Standard and the Project Brief
Suppliers	<ul style="list-style-type: none">VT system suppliersVT system manufacturers	<ul style="list-style-type: none">Understand TAFE NSW requirements for VT systemsProvide advice to project or VT designers regarding products or systems that comply with this standard

1 Introduction

1.3 Standards & Documents

The following standards and documents, as relevant to the project, should be read in conjunction with this Design Standard when designing, documenting & delivering Vertical Transport systems. This list is not exhaustive and other documents may apply.

1.3.1 External Requirements

Statutory Requirements

The planning and design must incorporate the relevant requirements as stipulated by the following Statutory Authority bodies:

- State Environmental Planning and Assessment Legislation
- All Commonwealth, State and Local Government Legislation
- Insurance Council of Australia
- Fire & Rescue NSW
- Australian Communication Authority
- National Construction Code/Building Code of Australia
- Principal Certifying Authority (person qualified to conduct a Certification of Crown Building Works)
- Work Health and Safety Act
- Disability Discrimination Act
- Safe Work NSW Authority Requirements
- Disability (Access to Premises -Buildings) Standards
- Disability Standards for Education
- NSW Anti-Discrimination Act
- Any other authority having jurisdiction

External Certification Schemes

- Green Building Council of Australia (GreenStar) and other recognised certification schemes (e.g. GECA, etc)

NSW Government Policies

- NSW Department of Planning, Industry and Environment
 - NSW Government Resource Efficiency Policy (GREP)
 - Net Zero Plan Stage 1 2020-2030
 - Workplace Design Principles (NSW Department of Planning, Industry and Environment)
- Government Architects NSW Better Placed –a Strategic Design Policy for the Built Environment of NSW
- Department of Commerce and Justice –NSW Disabilities Inclusion Plan 2021-2025

1 Introduction

1.3 Standards & Documents

1.3.2 TAFE NSW Requirements

Tafe Nsw Design Standards

- Any other Design Standards relevant to the project

TAFE NSW Policies

- Environmental Sustainability Policy
- Reconciliation Action Plan
- Diversity and Inclusion Policy
- Work Health and Safety Policy
- Disability Inclusion Action Plan and Implementation Guide

1 Introduction

1.3 Standards & Documents

1.3.3 Standards

The following Australian and New Zealand standards must be incorporated within the Vertical Transport services design:

Code Standards	Description
AS 1735	Lifts, escalators and moving walks
AS 1735.1:2016	Part 1: General Requirements
AS 1735.4:2020	Part 4: Safety rules for the construction and installation of lifts - Electric and hydraulic service lifts
AS 1735.9 – 1994	Part 9: Special purpose industrial lifts
AS 1735.11 – 1986	Part 11: Fire-rated landing doors
AS 1530.4:2014	Methods for fire tests on building materials, components and structures
AS 1735.12:1999	Part 12: Facilities for persons with disabilities
AS 1735.19:2019	Part 19: Safety rule for the construction and installation of lifts - Lifts for the transport of persons and goods - Remote alarm on passenger and goods passenger lifts [EN 81-28:2018+AC:2019]
AS 1735.20:2020	Part 20: Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - New passenger and goods passenger lifts in existing building
AS 4431:2019	Guidelines for safe working on new lift installations in new constructions
AS 1418.8 – 2008	Cranes, hoists and winches - special purpose appliances
EN 81-20:2020	Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts in existing buildings
EN 81-50:2020	Safety rules for the construction and installation of lifts. Examinations and tests Design rules, calculations, examinations and tests of lift components
EN 81-21:2018	Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods New passenger and goods passenger lifts in existing building
AS 1428.1 – 2021	Design for Access and Mobility; Part One: General requirements for access – New building work
AS 1428.2 – 1992	Design for Access and Mobility; Part Two: Enhanced and Additional Requirements - Buildings and Facilities
AS 3000:2018	Electrical installations (Wiring Rules)
AS 1170.4 – 2007	Earthquake actions in Australia
AS 1670.4:2018	Fire detection, warning, control and intercom systems - System design, installation and commissioning - Sound systems and intercom systems for emergency purposes
AS 1657:2018	Fixed platforms, walkways, stairways and ladders - Design, construction and installation
AS 1668.1:2015	Ventilation and Air-conditioning in Buildings – Fire and Smoke Control
AS 1668.2:2012	Acceptable Ventilation Guidelines
AS 2118.1:2017	Automatic fire sprinkler systems Part 1: General systems
ISO 9001	Quality management systems - Requirements

1 Introduction

1.4 Definitions

1.4.1 Abbreviations

Abbreviations	Description
AFFL	Above Finished Floor Level
ARD	Automatic Rescue Device
AS	Australian Standard
AS/NZS	Australian/New Zealand Standard
BMCS	Building Management and Control System
CI	Car Indicator
COP	Car Operating Panel
DB	Distribution Board
EMS	Energy Management System
GUI	Graphic User Interface
HGO	Hazardous Goods Operation
HL	Hall Lantern
HLI	Hall Lantern & Indicator
IP	Ingress Protection rating is a numerical two-digit code to indicate the degree of dust and moisture provided by an enclosure of electrical switchboard, outlets or equipment
LCS	Landing Call Station
LI	Landing Indicator
LS	Landing Signalisation
LV	Low Voltage
MEN	Main Earth Neutral
MRL	Machine-Roomless-Lift
MSB	Main Switchboard
MDB	Main Distribution Board
MV/LV	Medium Voltage/Low Voltage
NATA	National Association of Testing Authorities
NCC	National Construction Code of Australia
OEM	Original Equipment Manufacturer
OHT	Overhead Traction lift
QA	Quality Assurance
RCD	Residual Current Device
UPS	Uninterruptable Power Supply
USB	Universal Serial Bus
VT	Vertical Transport
VTC	Vertical Transport Contractor
WAP	Wireless Access Point
WHS	Workplace Health and Safety

1 Introduction

1.4 Definitions

1.4.2 Terms

Terms	Description
Supply	"Supply", "furnish" and similar expressions mean "supply only".
Provide	"Provide" and similar expressions mean "supply, install and commission".
Approved	"Approved", "reviewed", "directed", "rejected", "endorsed" and similar expressions mean "approved (reviewed, directed, rejected, endorsed) in writing by the TAFE NSW appointed delegate".
Give notice	"Give notice", "submit", "advise", "inform" and similar expressions mean "give notice (submit, advise, inform) in writing to the TAFE NSW appointed delegate".
Obtain	"Obtain", "seek" and similar expressions mean "obtain (seek) in writing from the TAFE NSW appointed delegate".
Proprietary	"Proprietary" mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue, or reference number.
Samples	Includes samples, prototypes and sample panels.
this Design Standard	TAFE NSW Vertical Transport Design Standard

Applications

2 Applications

2.1 Vertical Transport Systems Covered By This Standard

This standard outlines the general Vertical Transport services scope as follows:

- Design criteria
- Types of vertical transport equipment
- Principles of flow and Circulation Spaces
- Considerations for new and existing buildings
- Accessibility and universal design requirements
- Interfaces
- Work Health & Safety

In addition to general Vertical Transport design covered by this Design Standard, VT designers must liaise, consult and collaborate with TAFE NSW stakeholders and user groups to include specific VT design and operation requirements for the following areas:

- Any relevant faculty specialist area which need to transport equipment or materials above ground or delivery level
- Any campus or region based groups responsible for the movement of equipment or materials
- Facilities Management
- Logistics
- Physical Access Advisory Group
- Systems Group
- Security

2 Applications

2.2 Project Application

2.2.1 Project Types and Stages

This Design Standard is intended to support the VT services design and delivery across the whole life cycle of the project. This design standard has been written to apply to a variety of physical environments including but not limited to the following project types:

New Buildings

All new building with new lifts must comply with this Design Standard.

Existing Buildings

Any works to existing buildings and existing lifts must comply with section 4.1 Vertical Transport Equipment, section 4.2 Existing Buildings, section 4.5 General requirements and section 4.6 Special Requirements. These projects should comply with the remainder of the design standard where possible, and identify any non-compliances to the TAFE NSW Project Lead.

2.2.2 Project Designer

The VT designer or consultant must be an experienced and suitably qualified VT services designer covered by professional indemnity and public liability insurance in accordance with the TAFE NSW contract and relevant industry requirements.

At the completion of the briefing stage and at every design stage, the VT designer must obtain endorsement of the proposed design from the TAFE NSW project team to proceed to the next stage.

In addition to the project deliverables, the VT designer has the following obligations:

- Review of all documents and specifications provided by the installer to maintain quality of the installation in accordance with the design
- Review of samples provided by the installer to maintain quality of the installation in accordance with the design.
- Inspect the new installation for compliance with the project design documentation, NCC and relevant standards.

2.2.3 Project Contractor

The VT Contractor must be an experienced and suitably qualified VT services installer covered by professional indemnity and public liability insurance in accordance with the TAFE NSW contract and relevant industry requirements.

In addition to the project deliverables, the VT contractor has the following obligations:

- To provide detailed on-site measurement, co-ordination with building elements and other services to establish final set-out, location of equipment allowing for maintenance access envelope requirements
- To provide detailed programs including milestones indicating shutdowns, temporary requirements to maintain occupancy, staging of works and commissioning prior to handover

2 Applications

2.2 Project Application

- To provide manufacturer's workshop, equipment specifications and construction drawings, schedules and details
- To supply, install, test, and commission the VT plant and equipment in accordance with the VT design requirements, the VT manufacturer's requirements, all applicable Australian Standards, Australian Building Codes, and statutory requirements and approvals.

2.2.4 How This Design Standard Applies

Compliance

This Design Standard is intended to support and assist the selection, design and procurement of VT systems.

This Design Standard must also be read in conjunction with:

- Statutory and legislative requirements
- Contractual agreement with TAFE NSW
- The project brief and relevant project requirements
- Any other TAFE NSW Design Standards

Where there is a conflict between this Design Standard and any statutory or legislative requirement, the higher standard applies.

Mandatory/Must

Where the word "must" is used, this indicates that a statement is mandatory.

Preferred/Should

Where the word "should" is used, this indicates that a statement is a recommendation.

Contractual Responsibility

The contents of this Design Standard does not relieve any consultant, contractor or supplier from their contractual responsibility relevant to the project.

It remains the responsibility of the consultant, contractor or supplier to fully complete, coordinate and identify any errors or omissions in the documentation produced for the vertical transport design.

Queries

Any project specific queries are to be raised through the TAFE NSW project lead, or project manager as applicable.

If this document appears to contradict or deviate from good industry practice or any statutory requirements, this is to be brought to the attention of the TAFE NSW project lead responsible for the delivery of the VT design project.

2 Applications

2.3 Project Design Documents

2.3.1 Designer Deliverables

The VT Designer or Consultant must prepare and submit all reports, design documents and certification as required to fully describe the design and to suit the scale and complexity of the project. The minimum documentation is as indicated below, and any specific items noted in the specific technical sections:

Site Investigation and Audit

A detailed site investigation and audit must be undertaken for the entire existing VT services including but not limited to: machine, sheaves and diverters, ropes, guide rails, controller and drive, doors and frames, door operators, signalisation, car interiors, safety devices. This must include:

- An assessment of the condition, available spare capacity and compatibility for the intended existing equipment and/or system and whether it is suitable for re-use.
- A due diligence review of any non-conformances to any applicable standards and authority requirements
- Where existing lift shafts will be re-used, undertake an assessment of the structural integrity of the shaft and proposed rectification works if required
- List all non-compliance items with TAFE NSW standards and/or any other reference documents provided
- Any site constraints, potential hazards or risks
- An outline of the findings, outcomes and recommendations.

Return Services Brief

The return services brief must be prepared and submitted to:

- Identify and qualify the strategic deliverables to be achieved
- Incorporate all site audit investigation findings and outcomes
- Indicate demolition, disconnection, making safe, dismantling and de-commissioning of existing redundant systems
- Identify site storage, disposal and removal of redundant equipment and their associated interfaces including control, wiring, ductwork, piping and drainage etc
- Outline staging of works in accordance with the construction deliverables satisfying stakeholder and user group requirements
- Where existing sections of the building are to remain operational during construction, advise if any temporary services are necessary to maintain accessible services to the building.
- List relevant standards and codes which will be applied to the project.
- Outline VT design criteria, including but not limited to building envelope characteristics, internal occupancies.
- Provide outline of proposed VT design concepts
- Provide VT spatial considerations, and access provisions
- If relevant to the project, identify VT related Green Star initiatives and their design requirements
- Outline any spare capacity allowances
- List any proposed departures from this design standard, or other TAFE NSW standards, including, justification, and implications.

2 Applications

2.3 Project Design Documents

Budget Cost Summary

The budget cost summary must be prepared and submitted identifying costs for all VT services systems at each specific project milestone, in accordance with the project specific program. It is to outline any assumptions and exclusions.

Proposed Alternatives To The Details Outlined In This Standard

Any proposed alternate innovative VT design solutions must undertake a cost/benefit analysis study. This must identify capital costs, ongoing energy and maintenance costs, along with a qualitative analysis illustrating the reliability, longevity, and maintenance regime for the alternative proposal against the option put forward by the standard.

Design Calculations Report

The design calculations report must be prepared to include traffic study simulation to verify compliance with design brief.

Risk Management Report

The Risk Management Report must be prepared and submitted identifying:

- Safety and design requirements for construction, operation and maintenance
- The origin of all identified risks
- Work to be carried out in hazardous and confined spaces
- Asbestos retention and/or removal
- Hazardous goods handling and storage areas
- Any specific stakeholder insurance risk requirements
- Potential latent conditions including the process for early resolution to agree costs involved prior to proceeding with works and to avoid/mitigate construction delays.

Certification

Certification must be submitted to the Principal Certifying Authority/person qualified to conduct a Certificate of Crown Building Works in accordance with the NCC, statutory and regulatory authority requirements, this Design Standard and any other relevant TAFE NSW Standard.

Specification Documentation

The specification documentation must incorporate and further develop the detail of the VT services design including requirements of all relevant report findings and outcomes, along with the inclusion of the following as a minimum:

- Address the design principles and strategies of this Design Standard
- Address the project specific design strategies
- Clear description of Vertical Transport service scope of works
- List of codes and standards that the project design is in compliance with
- A comprehensive project specific scope of VT services systems, installation details, power and control wirings, controls and BMCS specifications, access and interface requirements, schedules of equipment and all associated technical requirements

2 Applications

2.3 Project Design Documents

- Controls and BMCS
- Detailed demarcation requirements for the specified works with existing installations, and works by others
- Be co-ordinated with the latest reference documents and each trade services design input
- Commissioning, testing and quality monitoring framework during the construction works
- TAFE NSW staff training and handover procedures
- Identify working and final documents and record requirements
- Identify comprehensive Operating and Maintenance Manual requirements
- Installer deliverables as detailed in 2.3.2 Contractor Deliverables

Drawings

The VT drawings shall include (as necessary) the following:

- Title block, drawing lists and legend of symbols.
- Site plan where relevant
- VT services layouts proposed and demolition works
- Schematics - where relevant
- Typical installation details and part plans
- Structural rectification works including structural steel details

2.3.2 Contractor Deliverables

The Vertical Transport Contractor must prepare and submit all reports, design documents and certification as required to suit the scale and complexity of the project. The minimum requirements for deliverables are as indicated below, and as noted in the specific technical sections.

Alternative Design Verification

Where alternatives are proposed, provide an alternative design assessment report indicating compliance with the VT design intent and design criteria. Provide all supporting technical data, and associated installation methodology which must be compliant with statutory requirements.

Workshop Drawings

Submit further developed detailed design drawings, addressing method of installation, mounting and fixing, temporary works and staging, minor alterations in construction, approved value engineering initiatives and alternative designs.

Samples

Submit samples as per the project specific specification, and any items identified in the technical sections of this standard.

Risk Management Report

The Risk Management Report is to be prepared and submitted identifying:

- Safety in Design requirements for construction and installation
- The origin of all identified risk

2 Applications

2.3 Project Design Documents

- Any potential hazards
- Any work to be carried out in hazardous and confined spaces
- Asbestos retention and/or removal
- Hazardous goods handling and storage

Commissioning and Testing

The VT Contractor must develop and submit a project specific commissioning and testing plan in accordance with their quality assurance plan. This must be consistent with the builder's construction program including:

- All defined handovers including staged areas
- All milestones
- Notice for witness upon completion of all acceptance testing and commissioning activities
- Completion of all mandatory site tests in compliance with standards and authority requirements
- Detail of testing for each system and associated sub-component
- All acceptance testing and commissioning records and certificates
- All commissioning and test reports and certificates indicating observations and results of tests, commissioning and compliance or non-compliance with statutory authority requirements
- All final and acceptance test records in suitable format for the inclusion in Operating and Maintenance manuals
- A 24-month tuning process must be provided which commences at handover of the vertical transport systems to TAFE NSW. Vertical transport systems must provide monthly monitoring reporting including from the energy management system. These reports must be assessed every three months and include feedback from TAFE NSW staff.

As-built Drawings

Submit revised As-installed drawings, revised equipment schedules, illustrating as-installed mounting and fixing details and final as installed condition for record and maintenance purposes.

Warranty

Submit a warranty schedule for all installed VT equipment. Refer to technical sections of this specification for any extended warranty requirements.

Operating and Maintenance Manuals

Prepare and submit an operating and maintenance manual with the inclusion of the following project specific detailed requirements:

- Cover Page including Site Name, VTC's company name, and issue date
- Table of contents
- Introduction section stating purpose of the document, definitions, scope of works, and basic information for the Principal.
- Emergency Information: provide VTC contact details, procedure for the release of trapped or injured passenger.
- Equipment description: General description of equipment installed including schedule of main parameters
- Component descriptions: General description of the components installed, function, and normal operating characteristics.

2 Applications

2.3 Project Design Documents

- Operation features: Technical description of the controller features provided including keyswitch and other components.
- Cleaning guidelines: description of cleaning methods and agents to use to maintain external finishes such as car wall panels, mirrors, etc.
- Maintenance:
 - Maintenance instructions
 - Recommended maintenance Schedule
 - Instructions for use of tools and testing equipment
 - List of lubricants and consumables
 - Recommended replacement parts
- Compliance Documents
 - Certificate of compliance letter (design verifications statement)
 - Door fire rating certificate
 - Certificate of electrical safety
 - Plant Registration
 - Safe to Operate Certificate
 - Commissioning Test results
 - Builders Lift Certification and servicing (if applicable)
 - Logbooks, maintenance schedules and servicing information
- Warranty Schedule

Registration of an Item of Plant-application

VTC to prepare the application form and submit to the Principal for completion and submission to SafeWork NSW.

Training

Training must be provided to all relevant site user groups, project delivery groups, and facilities maintenance groups after completion of the testing and commissioning. It must include the operation of the lift and its controls, keys and locks, cleaning of all finishes, operation in an emergency, hanging/cleaning/storage of protective curtains, etc.

Warranty

A regular comprehensive maintenance and breakdown service must be provided during the warranty period. Warranty maintenance must conform to the conditions and maintenance performance parameters set TAFE NSW's maintenance agreement.

Maintenance Post Warranty

TAFE NSW has many lifts under maintenance and requires all new lifts to be as compatible and easily integrated with the existing lifts and lift maintenance contractor. To that end consideration must be given, and documentation must be provided, before accepting any new lift system that clearly identifies it as being easily and effectively maintained by the existing lift maintenance contractor.

2 Applications

2.3 Project Design Documents

Independent Maintainability

All VT systems, equipment, and components must be designed and selected such that:

- They can be repaired, serviced and maintained in accordance with the requirements of the system selected and recommendations of each designer, supplier, manufacturer and installer
- Any qualified and competent lift maintenance contractor can maintain, service, and repair the lift without the need to rely on exclusive dealings, proprietary devices, spare parts or intellectual property inclusive of tools, instruments, passwords, keys and cards
- In the event of a breakdown replacement parts can be sourced and delivered to site within three (3) business days.

Design Strategies

3 Design Strategies

3.1 General

3.1.1 Usability

Create a safe environment for occupants with user friendly interfaces that are readily accessible.

Strategy	Background	Requirement
Safety	Learners and staff have a right to be safe and protected when attending TAFE NSW. All designs must support the physical and social health and well-being of users.	<ul style="list-style-type: none">Provide a safe access path to the lift and operation for users, including:<ul style="list-style-type: none">Adequate lightingSignage and wayfindingWall and floor finishes
Accessibility	TAFE NSW is fully committed to having an accessible physical and digital environment for staff and learners with disability.	<ul style="list-style-type: none">Create an environment that promotes equitable access for all users regardless of abilityOption for the lifts to have front and rear entrances (through-car) opening on each level to assist with movement in a forward directionUser interfaces, and controls to be accessible and clear from any obstructionsLift car sizes are suitable for wheelchair users (including motorised wheelchairs or electric scooters) with a companion and for motorised wheelchair usersWheelchair users have the ability to leave the lift in a forward direction or do a 3-point turn. An option for a larger passenger/goods lift may be usedIncorporate Universal Design Principles
User Interface	User interfaces on all lifts must support users with a range of abilities and needs. Audible, tactile and visual options should be available for all interfaces.	<ul style="list-style-type: none">Enable easy user-friendly interface with non-technical operating instructions to facilitate intended useLanding call stations to be located on a consistent side of the entrance so that they can be found easilyButtons to be dual illuminating with braille and tactile on the surfaceProvide emergency call options that are usable for all users including visual communication for deaf or hard of hearing usersTouch pads are not to be usedProvide consistent naming of ground floor on all buildingsProvide additional audible information to assist users accessing lifts e.g. lifts in priority or exclusive service
User Choice	All people at TAFE NSW have the ability to use a lift as desired.	<ul style="list-style-type: none">Lifts must be available for staff, learner or visitor use (excluding goods lifts or other priority operation modes)Lift capacity to be sized accordingly for building population

3 Design Strategies

3.1 General

3.1.2 Design Context

Address the design principles for a new and existing buildings.

Strategy	Background	Requirement
Innovation	TAFE NSW supports innovation across all scales of project delivery	<ul style="list-style-type: none"> Where a consultant/contractor identifies an opportunity to implement innovative solutions these may be submitted to the TAFE NSW project lead for review
Environment	VT design eliminates any potential damage from the weather or other environmental factors that may reduce the lifecycle of the lifts and inconvenience learners and staff	<ul style="list-style-type: none"> Preference is for lift lobbies to be located inside the building. If they must be located outside, provide protection from the weather and corrosive environment (such as water ingress or marine environment)
Vertical Circulation	Well-connected spaces support the efficient movement of learners and staff throughout the building, providing better value for money, reduced building footprint, and reducing ongoing operational costs	<ul style="list-style-type: none"> Lifts must be designed as part of the whole building vertical circulation strategy encompassing stairs and lifts Lifts must be located near entrances to the building and serve all floors Lifts should be located close to stairs to encourage stair use with VT use as a supplementary means of access Lift lobbies should be dedicated to its users, e.g. learners or goods movement, and should not be part of a through circulation route to other parts of the building
Material Handling	Efficient use of material handling procedures may reduce the need for larger lifts, providing reduced building costs and ongoing operational costs	<ul style="list-style-type: none"> Workshops requiring heavy machinery or using large materials should be located on-grade and adjacent the loading dock or delivery point where possible
Redundancy	It is important to provide access to all levels above the main entrance to allow learners and staff to continue attending TAFE NSW	<ul style="list-style-type: none"> Ensure access to alternative lifts or means of vertical circulation when lifts are not available e.g. breakdown, repairs, or maintenance
Lift maintenance and replacement parts	Lifts are an integral path in efficiently moving learners, staff, and equipment through the building. It is important they are adequately serviced and supported to ensure continuity of TAFE NSW operations	<ul style="list-style-type: none"> Maintenance and replacement parts must be easily supplied across NSW especially in regional and remote locations
Lift lifecycle	Lift design should review the lifecycle of the design and equipment. Review whole of lifecycle costs and ensure that the lift provides an efficient and reliable service, with minimal disruption to TAFE NSW operations	<ul style="list-style-type: none"> Design systems to minimise whole of lifecycle costs including installation maintenance, repair and replacement Lifecycle planning to be incorporated with initial designing phase Regular condition assessment to be conducted to assess the lift's remaining lifecycle

Technical Sections

4 Technical Sections

4.1 Vertical Transport Equipment

All lifts must be robust, durable, and well suited to intended use; shall have a track record of reliable performance and a ready supply of locally available replacement parts. Lift systems must be designed for a minimum of 20 years.

Only high efficiency AC gearless lifts with Variable Voltage Variable Frequency (VVVF) drives are permissible for new and full-replacement projects. Lift upgrades, retrofit and modernisation projects may use geared machines, where fitted with a rope brake and modern AC motor after review and approval by TAFE NSW.

Regenerative Drives must be provided where the rated speed, loads, and travel allows justifiable power generation and where no adverse power quality problems are likely. Any installation incorporating regenerative drive must also be provided with a braking resistor bank to dissipate the regenerate power during periods of little or no grid demand.

The following lift types must be used for all new buildings, and are preferred for all existing buildings:

- Conventional overhead traction lifts (OHT)
- Traction Machine-Roomless-Lifts (MRL)

The following lift types must not be used without prior approval from the Executive Director, TAFE Infrastructure NSW, and further may only be considered in existing buildings:

- Stairway lifts, AS 1735.7
- Low-rise platform lifts for passengers (unenclosed), AS 1735.14
- Low-rise passenger lifts – Non-automatically controlled (enclosed), AS 1735.15
- Lifts for persons with limited mobility – Restricted use – Automatically controlled, AS 1735.16

4 Technical Sections

4.2 Existing Buildings

Generally, all lifts must have a lifecycle schedule highlighting expected major component replacement, modernisation, and replacement. This will assist with planning capital works to minimise disruption and have funding available.

Lifts in existing buildings shall also be regularly assessed to determine their stage of the lifecycle. The assessment shall be conducted by a suitably qualified and experienced VT Engineer who must provide a report identifying the condition of the lift and corrective actions. Factors to include are:

- Safe to operate, not causing injuries to users,
- Reliable, review of callouts and maintenance reports from VTSP,
- Condition of the lift and components,
- Operating smoothly and quietly, and
- Age of equipment.

Note that, as the lift ages and approaches the end of its designed lifecycle, risk increases for obsolete replacement parts and may render the lift unusable for an unscheduled extended period whilst repairs or the whole lift is replaced.

In addition to the above, if any new infrastructure project or construction works plan for changes to the building population or vertical transport needs, a traffic study must be undertaken to determine if the existing configuration will still satisfy the performance requirements or if additional lifts will be required.

In the case of replacing the lift, the liftwell size may not accommodate the sizes nominated in the following sections. Design options include:

- Maximising the car size to suit the existing liftwell sizes,
- Construction work to increase the liftwell size to accommodate the minimum car size, or
- Construction of a new liftwell suitable for the minimum lift car size.

4 Technical Sections

4.3 Passenger Lifts

4.3.1 Performance Requirements

Lifts must be able to be used by learners and staff without restrictions (excluding buildings with specific security requirements). They may also be used to transport furniture, teaching aids, and goods.

Building population, unless provided, shall be based on learners and staff per learning spaces, and number of staff in offices. Estimation of building population using lifts shall be based on the following guideline:

Level above Ground	Lift usage
4 and higher	100% of floor population
3	75% of floor population
2	50% of floor population
1	25% of floor population

Passenger lifts shall be designed to meet the following design criteria:

Average Waiting Time	Handling Capacity 5-min	Passenger Loading	Stair Factor
30-45 s	25% building population	60% maximum	50%

4.3.2 Minimum Car Sizes

Passenger lifts must be designed to support all users including people with manual or motorised mobility aides to move vertically through the building. To satisfy this requirement, one new passenger lift in each building must serve all floors and have the following minimum dimensions:

Car: Width x Depth	Ceiling height	Entrance Width x Depth	Entrance Type
1,700 mm x 2,100 mm	2,400 mm	1,200 mm x 2,100 mm	Two panel centre opening

A lift traffic study should be undertaken to determine the quantity of lifts required and car sizes. Should additional passenger lifts be required, the preferred minimum car size is 1,500 mm x 2,000 mm. However, it may be larger subject to the results of the traffic study.

Notes:

- Car width: Clear distance measured between side wall finishes
- Car depth: Clear distance measured between front and rear wall finishes — not between door panels and/or rear wall
- Ceiling height: Clear distance measured from floor level to underside of suspended ceiling

Car and door sizes may be larger than stated above to suit code requirements, usage types, and lift traffic studies.

Existing Buildings

In cases of existing buildings where the car is being replaced, the car size to be the largest to fit in the existing liftwell.

4 Technical Sections

4.3 Passenger Lifts

4.3.3 Performance Criteria Parameters

The following performance criteria shall apply to all passenger lifts.

Parameter	Value
Lift speed	≥ 1.0 m/s
Vertical acceleration	≤ 0.8 m/s ²
Jerk rate	≤ 0.8 m/s ³
Vertical vibration	≤ 10 mg
Lateral vibration	≤ 15 mg
Noise in car	≤ 55 dBA
Floor levelling accuracy	± 5 mm
Doors open/close Subject to door widths	2.0s/3.0s
Dwell times Car/Lobby	3.0s/3.0s

4.3.4 Car Finishes

The finishes must comply with the following requirements.

Element	Details
Lift car ceiling	Suspended with integrated lighting. Selection from manufacturer's range
Lift car lighting	LED low voltage down lights to operate on initiation of landing call button and remain on for five minutes of inactivity
Lift car front returns & header	Finished stainless-steel
Lift car side walls	Stainless steel (brushed, textured, etched), selected from manufacturer's range
Lift car rear wall (single entrance car)	Stainless steel (brushed, textured, etched), selected from manufacturer's range
Lift car rear returns & header (through-car)	Finished stainless-steel
Handrail	AS1735.12 complying. One (1) side wall, stainless steel
Skirting	Stainless steel selected from manufacturer's range
Lift car flooring	Black vinyl from manufacturer's range
Lift car and landing doors	Finished stainless steel
Lift landing door frames	Finished stainless steel
Lift car and landing sills	Aluminium for passenger lifts
Lift car fan	Include 2-hour backup power supply in case of power failure

4 Technical Sections

4.4 Goods Lifts

4.4.1 General

Goods lifts must be designed to suit site specific requirements. The designer must investigate functional and operational needs for the learning environments proposed to be located in the building and confirm requirements with the TAFE Infrastructure NSW project lead. Examples of material to transport are furniture, sheets of wood, sheets of metal, pipes, machinery, or vehicles.

Types of goods lifts to be considered:

- Goods/passenger lift
- Vehicle lift, or
- Heavy Goods with forklift loading.

4.4.2 Performance Requirements

Lift shall be designed to meet the following design criteria.

Requirement	Value
Round Trip Time	< 60 s

4.4.3 Performance Criteria Parameters

The following performance criteria shall apply to all goods lifts.

Parameter	Value
Lift speed	1.0 m/s
Vertical acceleration	$\leq 0.8 \text{ m/s}^2$
Jerk rate	$\leq 0.8 \text{ m/s}^3$
Vertical vibration	$\leq 10 \text{ mg}$
Lateral vibration	$\leq 15 \text{ mg}$
Noise in car	$\leq 55\text{dBA}$
Floor levelling accuracy	$\pm 5 \text{ mm}$
Doors open/close Subject to door size	2.0s/3.0s
Dwell times Car/Lobby	3.0s/3.0s

4.4.4 Minimum Car Sizes

For new buildings, the car sizes should satisfy the requirement documented as part of the investigation carried out and as noted in section 4.3.2 Minimum Car Sizes for passenger lifts.

In cases of existing buildings where the car is being replaced, the car size to be the largest to fit in the existing liftwell.

4 Technical Sections

4.4 Goods Lifts

4.4.5 Car Finishes

The finishes must comply with the following requirements.

Element	Details
Lift car ceiling	Suspended with integrated lighting. Selected from manufacturer's range
Lift car lighting	LED low voltage down lights to operate on initiation of landing call button and remain on for five minutes of inactivity
Lift car front returns & header	Finished stainless steel
Lift car side walls	Patterned stainless steel
Lift car rear wall (single entrance car)	Patterned stainless steel
Lift car rear returns & header (through-car)	Finished stainless steel
Handrail	AS1735.12 complying. One (1) side wall selected from manufacturer's range
Skirting	Stainless steel
Bump rail	Three (3) rows of stainless-steel, nominally 150 mm x 150 mm, located on both sides and rear walls, incorporate tapered section on return walls to prevent collision/damage from trolleys
Lift car flooring	Chequer-plate, stainless steel
Lift car and landing doors	Finished stainless steel
Lift landing door frames	Chequer-plate, stainless steel
Lift car and landing sills	Stainless steel
Lift car fan	Include 2-hour backup power supply in case of power failure

4 Technical Sections

4.5 General Requirements

4.5.1 Liftwell

All lift pits must be waterproof and have a dry sump (300 mm square x 300 mm deep) with a steel chequer plate cover.

Liftwell must be effectively ventilated in accordance with NCC and EN 81-20, with a ventilation louver, designed to be weather and vermin proof.

The lift installation must be painted upon completion of the works:

- Lift pits: light grey (paving paint)
- Lift motor room ceiling: white (Wash & Wear or equivalent)
- Lift motor room walls: white (Wash & Wear or equivalent)
- Lift motor room floor: light grey (paving paint)

4.5.2 Pit Drainage

Ensure that considerations for lift pit drainage are included in the VT system design. Review access provisions for pipes, hoses or other pumping equipment, and ease of connections to external drains.

4.5.3 Landing Signalisation

Landing call station and indicator to be flush mounted, vandal resistant and installed on the lobby wall. They must not be surface mounted or installed on door frames. Fixings must be security screws or from back of shaft.

Landing call stations must be installed on the left hand side of the entrance in a single lift arrangement. For two or more lifts in a bank, landing call stations must be installed between lift entrances. Landing call stations to remain 500 mm away from any internal corner on the landings.

4.5.4 Car

Two Car Operating Panels must be provided — Main and Auxiliary, located on each side.

Car doors must be fitted with 3D infrared scanners incorporating red and green passenger warning indication. In situations where the lobby is outdoors or is exposed to direct sunlight, 2D infrared scanners are acceptable.

Handrails must be in accordance with AS 1735.12 — 1996.

Car to include ventilation fan with two-hour backup power supply in case of power failure.

Lift cars to be provisioned with protective blankets, one set per building.

4 Technical Sections

4.5 General Requirements

4.5.5 Controller Features

The following performance criteria shall apply to all passenger lifts.

Feature	Passenger	Goods
CCTV	Provision	Provision
Access Control –Car	Provision	Provision
Access Control –Landing	Option	Option
Automatic Rescue Device	Yes	Yes
Exclusive Service	Yes	Yes
Priority Service	Yes	Yes
Building Management System	Yes	Yes
Hazardous Goods Operation	No	Option

Closed Circuit Television (CCTV)

VT Contractor to include CAT6a cable provision for CCTV between lift car and lift controller or motor room.

Supply and installation of CCTV and associated equipment by electrical/security contractor.

Access Control

VT Contractor to include CAT6a cable provision for access control between lift car and lift controller or motor room, and between each landing call stations and lift controller or motor room. Installation of card reader and associated equipment by electrical/security contractor.

Automatic Rescue Device (ARD)

An ARD shall be provided to move the lift car to the nearest floor when the car has stopped between floors due to normal power failure. When the car has reached a floor, the doors shall be opened to allow passengers to leave then the doors will close. When normal power is restored, the lift will return to normal operation automatically and in their original group control.

4 Technical Sections

4.5 General Requirements

Exclusive Service (Independent Service)

Exclusive Service must be provided and to be used by authorised staff. This consists of one keyswitch located on the Car Operating Panel (COP) with two positions: 'Off' and 'On'. When in the 'Off'; position the lift is in normal service; when the key is switched to the 'On' position this lift is removed from normal service and placed in Exclusive Service, the lift will only be operated by a person in the lift car and will not respond to landing calls. When a car call is registered, the doors will close and the lift will travel directly to the destination floor, it will wait there with doors open until another car call is registered. When the switch is returned to 'Off' the lift will return to normal service.

A digital voice annunciation shall be provided and announce 'The lift is in Exclusive Service' when a user registers a landing call whilst the lift is in Exclusive Service.

Low Priority Service

Low Priority Service to be provided to authorised staff or learners. When an assigned proximity card is read at the landing the lift will be removed from normal service, complete the current car calls, and travel directly to the calling floor. The card holder will enter the lift and swipe the proximity card over the card reader and select the destination floor. The lift will travel directly to the destination floor where the card holder will leave the lift and it will return to normal service.

During Priority Service, when a user registers a landing call, the voice will announce 'The lift is in Priority Service'.

Building Management System (BMS)

Where BMS is applicable, the lift system must provide interface with BMS for the following lift alarms:

- Lift failed to start
- Lift on fire service
- Alarm button pressed
- Lift on independent service
- Lift on normal service
- Lift on maintenance
- Lift on Hazardous Goods Operation

Cabling between lift controller or motor room by electrical contractor.

4 Technical Sections

4.5 General Requirements

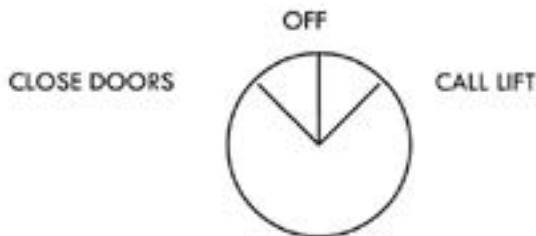
Hazardous Goods Operation

Hazardous goods operation (HGO) must be operated by authorised personnel and restricted by access control. The VT Contractor must liaise with TAFE NSW to ensure that all required features of the system match the building requirement.

Description of HGO

The hazardous goods operation lift control feature enables staff to send hazardous goods to a destination floor by a lift without riding in it. The lift is controlled by keyswitches located at the landing and in the lift car. Once the items have been loaded into the lift, the staff member will use an alternative route to meet the lift at the destination floor, which may include another lift or stairs.

All landing call stations (LCS) for the selected lift will be provided with a three-position key operated switch labelled “HAZARDOUS GOODS OPERATION” with the positions labelled as follows:



The lock will be spring return to the “OFF” position from both other positions. In addition to normal switches, there will be a two-position switch in the car operating panel (COP) labelled “HAZARDOUS GOODS OPERATION”. The two positions will be labelled “OFF” and “ON” and the key can be withdrawn in either position.

The keyswitches in both the COP and the LCS will be of the Bi-Lock type.

When the HGO keyswitch is switched to the ‘CALL LIFT’ position, the following steps occur:

- An in-car announcement is made.
 - “Please exit at the next stop, this lift is required for special service”.
Note, this audio announcement will repeat approximately every 10 seconds
 - An illuminated flashing sign in the lift COP will light “Special service operation”
- The lift will not accept new landing calls
- The lift will travel to answer the next registered lift car call in its direction of travel, the doors will open, all other lift car calls will be cancelled and new lift car calls will not be accepted. All passengers are expected to leave the lift car. The doors will close and the lift travel directly to answer the HGO keyswitch. If the lift is idle it will immediately travel directly in response to the HGO keyswitch.
- The lift will travel (non-stop) to the “calling” floor (at which the HGO keyswitch is selected.)
- Open its doors.
- The lift will remain at that floor with the doors open.

4 Technical Sections

4.5 General Requirements

- The attendant will remove the keyswitch from the landing fixture in the “OFF” position.
- The lift will remain “captive” in the HGO mode of operation for 60 seconds. If the process does not proceed to the next stage, the lift will return to normal service.)
- The HGO COP keyswitch is turned to the “ON” position.
- The key is removed in the “ON” position.
- The goods are loaded.
- The key is inserted into the landing HGO keyswitch and turned counter clockwise to the “CLOSE DOORS” POSITION. The doors close and the key returns to the central “OFF” position and withdrawn.
- The attendant travels via other lift or stairs, to the “destination” floor.
- The attendant then turns the landing HGO keyswitch LCS to the “CALL LIFT” position at the “destination” floor.
- The lift travels to the “destination” floor.
- The doors open.
- The goods are removed.
- The key is removed from the “destination” landing HGO keyswitch.
- The COP HGO keyswitch is returned to the “OFF” position.
- The key is removed.
- The lift doorway scanners are fully operational before the doors close
- The lift returns to normal service.

The HGO mode of operation will not initiate if:

- The Hall or Car Fire Service is operated. (HFS & CFS)
- The lift is in Inspection mode. (INS)
- The lift is on Independent Service. (INDS)

Selection of the Hall Fire Service mode while the lift is on HGO will return the lift to a designated floor for unloading. If the HGO mode is selected while the lift is on HGO, there will be an announcement in the lift car, advising the attendant (passenger) to abandon the use of the lift and exit the lift before the doors close and the lift returns to the designated floor.

Keys

All fire service keys are to be TOK 3; all other lift control keys are to be TOK 6.

4 Technical Sections

4.6 Special Requirements

4.6.1 Lift lobbies Exposed to the Weather

Where lift equipment such as lift control panel, landing controls and entrances are located externally, provide the following:

- Liftwell protection from direct/indirect weather and water ingress (e.g. air-lock)
- Floor level to be at least 50 mm higher than surrounding area, graded away from the lift at maximum 1:40 fall
- Heelguard grates across lift entrances
- Landing door panels and jambs to be 316 stainless-steel
- Landing call station panels to be 316 stainless-steel, and
- All steelwork supporting door sills galvanised.

4.6.2 Atmospheric Corrosivity Zone

If the proximity of the project to the sea is less than 1 km, it places it in the high corrosive marine environment C5-M (AS 4312). Consequently, the lift and its components are required to be suitably protected for installation in a marine environment. Manufacturer's standard finishes may not be suitable and may require modification or additional protection. Where stainless steel is used, it shall be grade AISI 316.

4.6.3 Additional Callout Requirements

There may be users with additional needs that may be trapped in the lift, e.g. hearing impairment. In addition to dispatching a technician to investigate the call, the call staff are to notify the facility management to investigate the callout.

VTC is to provide visual communication means, in addition to the code requirements, to assist Auslan users to communicate with call staff.

Work Health & Safety

5 Work Health & Safety

5.1 General Requirements

The "Common Work Health & Safety Concerns" table identifies common Work Health & Safety concerns arising from Vertical Transport services that have been identified from past TAFE NSW projects. Each project team must demonstrate that all safety concerns raised have been addressed as part of their involvement with any project to which this Design Standard applies. The safety concerns listed in the table must be included in project-specific Safety-in-Design Registers to ensure that project teams demonstrate how they have been addressed through all phases of any project.

Please note the information in the table is:

- For guidance only,
- Not exhaustive and does not take into account specific circumstances and should not be relied on in that way, and
- Does not alleviate the respective TAFE NSW team, designer, supplier or contractor from their own Work Health and Safety obligations and duties.

Legend	Level of Risk	Action Required
H	High	Implement cost effective risk control measures, and formalise procedures or management responsibility for reducing risk. Amend design to reduce risk, or seek alternative option. Only accept option if justifiable on other grounds.
M	Moderate	Incorporate cost effective risk control measures within the scope of long-term planning. Management responsibility must be specified. Check that risks cannot be further reduced by simple design changes.
L	Low	Manage by routine procedures. Check that risks cannot be further reduced by simple design changes.

5 Work Health & Safety

5.2 Common Work Health & Safety Concerns

Safety Issue Raised	Potential Control or Treatment measure	Reference to Design Standards/ Statutory Requirements	Level of Risk	Phase: Project Delivery	Phase: Construct, Supply, Install	Phase: Operation and End Use
Risk of lift doors closing whilst users entering or leaving the lift	Door protection system with flashing lights added to doors.	AS 1735	M	Y	Y	Y
Risk of contact with sharp edges	Ensure all edges are chamfered and finished.	AS 1735	M	Y	Y	Y
Risk to trip hazard	Lift to include re-levelling function and safety devices for the uncontrolled movement of the lift car.	AS 1735	H	Y	Y	Y
Risk of heat stroke in lifts	The mechanical design is to include adequate ventilation, and for exposed glazed shafts air conditioning to comply with NCC lift shaft design requirements.	NCC	M	Y	Y	Y
Risk to falls from heights	During maintenance, VTC to provide gates at landing.	AS 1735	H	Y	Y	Y
Risk of contact with machinery or electrocution	Limit access to space to qualified personnel only. Provide safety signage alerting hazard.	AS 1735	H	Y	Y	Y
Risk of fire within lift car	Car finishes to be in compliance with BCA Section C. Electrical components to incorporate thermal overload circuit protection. Liftwell to include smoke detection and dry head sprinkler system. Lobbies to include safety signage complying to BCA.	NCC & AS 1735	H	Y	Y	Y
Risk of carbon dioxide build-up in lift car during breakdown with trapped passenger	VT design to include ventilation fan.	AS 1735	M	Y	Y	Y



TAFE Infrastructure NSW
Level 2, Building A, 1 Mary Ann Street,
Ultimo NSW 2007
PO BOX 707, Broadway NSW 2007
02 9338 6600
tafensw.edu.au