THE UNIVERSITY OF SYDNEY

Vertical Transportation Standard

Design, Engineering, Planning & Sustainability

University Infrastructure

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Contents

1 Purpose

The Vertical Transportation Standard sets out the University of Sydney's minimum requirements for the design, construction and maintenance of lifts. It ensures new and refurbished lifts are fit-for-purpose, made from durable good-quality materials, cost effective to operate and maintain and energy efficient.

Applicable requirements documented in Workplace Health and Safety legislation, Disability Discrimination legislation, State Environmental Planning legislation, Commonwealth and State legislation, National Construction Codes (NCC), the Building Code of Australia (BCA) and Australian and New Zealand Standards (AS/NZS) are the minimum and mandatory compliance requirements.

Where any ambiguity exists between this standard and the aforementioned mandatory requirements then:

a. The highest performance requirements must apply.
b. Applicable requirements must follow this order of precedence:
    1. Workplace Health and Safety legislation.
    2. Safety in Design legislation.
    3. Disability Discrimination legislation.
    4. State Environmental Planning and Assessment legislation.
    5. All other Commonwealth and State legislation.
    6. NCC and BCA.
    7. CIBSE.
    8. AS/NZS.
    9. This standard and other University of Sydney standards.

Use versions of all references current at the time of project certification. Where references are changed during the course of a project, provide an impact statement and request confirmation to implement.

2 Scope

This standard describes minimum requirements for design, purchase, construction, and operation and maintenance of lifts and associated plant, equipment and infrastructure for buildings and spaces owned, operated, maintained and/or managed by the University of Sydney. It applies to:

a. New building construction.
b. Refurbishment projects for University-owned spaces.
c. Refurbishments of spaces that form part of a broader medium-term (less than five years) programme/plan of progressive upgrades to a University-owned building.
d. Refurbishment projects for long-term University-leased spaces.
e. Facilities maintenance services.

The standard applies to architects, planners, project managers, consultants, contractors, sub-contractors, tenants, managing agents, University staff and others involved in the design, construction, installation, operation and maintenance of existing, new and proposed University buildings and facilities.

The Vertical Transportation Standard provides:

a. A reference document to enable consistency with the design and engineering objectives.

b. Details of the minimum performance requirements for planning, architectural design and maintenance.
c. Support of the University vision for the built environment and best practice.

The Standard addresses key objectives:
a. Quality design which responds, enhances and complements the environment.
b. Appreciation of the heritage context and cultural history of the campuses.
c. Value for money in all aspects of the project.
d. The design of low maintenance buildings and environments.
e. Longevity of construction approach to design.
f. Standardization of key flashing and ancillary details.
g. Flexible design, to future proof building usage for expansion or adaption to new uses.
h. Safety in design.

All vertical transportation systems, products and services provided or specified by designers, consultants, staff and contractors must conform to this standard.

Where specific applications are not explicitly covered, or ambiguity exists, the intent of the design standard must be satisfied. In such cases a return design brief must be provided for review and approval by the issuer of this standard or their appointed delegate who must have relevant technical competence in the subject matter.

3 Glossary of Terms

AC	Alternating Current
COS	Central Operation Services
Goods lift	lift primarily designed to carry goods and passengers
Hoist	device primarily designed to carry goods only
MRL	A Machine Room Less lift where all drive and control equipment is located within the lift shaft negating the need for a machine room.
"Non-standard" operating conditions	weather (e.g. in external applications), water (e.g. external applications, kitchens, etc), direct sunlight (e.g. glass lift shafts), excessive heat loading (e.g. glass or metal clad lift shafts) or any other adverse condition
Part 14, 15, and 16 lifts	lift primarily designed to carry passengers with limited mobility and no goods
Part 3 lift	lift that uses a hydraulic medium to raise and lower the lift car
Passenger lift	lift primarily designed to carry passenger
UI	University Infrastructure
VVVF	Variable Voltage Variable Frequency

4 Roles and Responsibilities

This standard is issued by UI. It is approved and signed-off by the Chief University Infrastructure Officer. The UI Engineering and Sustainability Unit is responsible for maintaining the standard and keeping it up to date.

5 Existing Buildings

The design for projects within existing buildings must be assessed on a case by case basis and developed in conjunction with this standard. The project scope will drive the design requirements.

Any items not included in the scope must not be priced into the overall project to achieve the following aim:

a. To reduce the need to value engineer any services.

New projects within existing buildings must assess what the expectation of the refurbishment will be. This will enable the right outcome for the given project.

These specific requirements must be included in the scope of works specification for design and construction of Vertical Transportation services.

Obtain the Gate Paper from the Project Manager and understand the scope of works in relation to the space and fit out requirements including building structural issues, power supply issues. Understand the expectation from the end user.

5.1 Reuse of Equipment

Reuse existing services where identified in the Gateway Paper scope of works and the approved Return Brief.

Equipment must be suitable for the intended new purpose and life expectancy of the works, comply with current codes and achieve energy targets.

Equipment must be cleaned, have consumables replaced, tested, relabeled and re-commissioned.

Remove redundant lifts, oils, ancillary equipment, wiring, including inaccessible ceiling spaces, and make good exposed surfaces before commencing the installation of new services.

Remove redundant underground services unless otherwise approved by the project superintendent.

6 Technical Requirements

6.1 General Requirements for Lifts

Lifts must be safe, reliable, durable, efficient, cost-effective to maintain, and comply with all NSW and national relevant codes and AS/NZS. The University requires:

a. Lifts to be easily maintained by multiple local lift maintenance contractors other than the original manufacturer.
b. Lifts to be flexible and versatile in operation.
c. Lifts of the exact same componentry to have a proven 5-year local history of reliability.

6.2 Lift Performance

Passenger lifts to meet the requirements of handling capacity and waiting time, depending on the lift's expected usage and the building type, as defined by the latest version of the Transportation Systems in Buildings Guide "D", Chartered Institute of Building Services Engineers (CIBSE).

The passenger lift/s must achieve the fastest floor-to-floor performance possible without unduly affecting the quality of the lift car ride. The following performance parameters must not be exceeded:

a. Passenger lifts to meet the requirements of handling capacity and waiting time, depending on the lift's expected usage and the building type, as defined by the latest version of the Transportation Systems in Buildings Guide "D", Chartered Institute of Building Services Engineers (CIBSE).
b. Lifts to meet the requirements for use by persons with disabilities as defined AS/NZS and current building codes.
c. Provision for safe handling of hazardous goods.
d. Lifts installed in potentially explosive areas to be appropriately certified for that area.
e. Lifts directly exposed to "non-standard" operating conditions or any other adverse condition to be appropriately protected, designed, detailed and constructed.
f. Maximum acceleration rate of 1.0 m/s^2.
g. Maximum deceleration rate of 1.0 m/s^2.
h. Maximum jerk rate of 1.5 m/s^3.
i. Maximum lateral and vertical movement 20 milli-g (10Hz filtered A95).
j. Rated lift car speed +/- 5% (up/down, full/no load).
k. Floor levelling accuracy +/- 6mm.
l. Noise levels in a lift car in motion at must not exceed 55db(A) taken in the middle of the lift car at approximately 1 metre above the floor.
m. Door operation noise must not be more than 60 db(A).
n. Lift car fan noise levels must not be more than 60 db(A).
o. Lift Car Lighting must comply with AS/NZS 1735.12:1999 Clause 10 and have a minimum of 100 lux.
p. Lift Car Emergency Lighting must comply with AS/NZS 1735.2:2001 Clause 23.25.2.9 and have of a minimum of 20 lux on each control panel.

To reduce noise and vibration, lift equipment such as hoisting machines, controller, and if appropriate, switchgear, sheave, guide shoes, door mechanism and rope hitch must be mounted on appropriate isolating pads or mountings.

6.3 Lift Contractor Requirements

Only a competent, well-established, lift contractor with at least 10 years local lift installation experience may install or modify lifts. The lift contractor must have proven and demonstrated experience and capability in installing and maintaining:

a. Similar types and sizes of lifts operating in environments similar to the University.
b. Lifts with the same control and drive systems operating at the University.

The lift contractor must comply fully with all local rules, regulations, codes and practices as well as gain approval (e.g. design registration) and certification from the local lift inspectorate e.g. SafeWork prior to the lifts being offered for tender.

The tender return documents must include a copy of the Design Registration Certificate issued by a recognised SafeWork Authority for each lift or type of lift proposed and a minimum of 4

local reference sites where the proposed lifts have been operating for at least 5 years must be provided for references and approval purposes.

Only contractors that can provide a comprehensive reference list of lifts of the same type, control systems and drive systems installed over the past 5 years may be considered for lift installation projects at the University. Prospective lift contractors must supply information in **Attachment 1**.

6.4 Lift Equipment and Serviceability

Lift equipment with a 5 year local track record of reliable performance and a ready supply of locally available spare parts from a range of lift companies must be used. Availability of all parts must be guaranteed for a minimum of 20 years. Lift equipment includes all parts of the entire lift installation, in particular the controller and its various parts including software and hardware and any equipment required for servicing of the lift equipment.

The lift contractor must provide any proprietary equipment or components included in the proposal must be supplied complete with all and any proprietary or unique tools (i.e. manufactured only by the OEM supplier) required for the adjustment, removal or installation of such components.

Compliance with the above must include the provision of electronic test and software access tools required to allow the adjustment and resetting of any software parameters. These must be provided under the contract and must remain available as a spare part for purchase by any maintenance provider under instruction from the University of Sydney, for a minimum period of 20 years from practical completion. Such tools must be free of any electronic locks, software controls or other systems intended to lock or prevent full use of the tool after a predetermined time period.

6.5 Lift Types

All University lifts must be robust, durable and well-suited to intensive use. Only high efficiency AC gearless lifts with Variable Voltage Variable Frequency (VVVF) drives are permissible for new lift installations and full replacements. Geared machines with modern AC motors are acceptable for upgrades and modernisations after review and approval by the issuer of this standard.

The following lift types may be considered:

a. Conventional overhead lift motor room traction lifts.
b. Machine Room-Less (MRL) lifts.

Conventional overhead lift motor room traction lifts must be used for speeds exceeding 2.5m/s and must also be considered where a high rated load is required e.g. large goods lifts. MRL lifts may be considered for passenger lifts where speeds are 1 to 2.5m/s.

Lifts complying with AS/NZS 1735.14, AS/NZS1735.15 and AS/NZS 1735.16 must be key-restricted to limit access and use and clearly labelled "not for goods use".

The following lifts must not be used unless approved by the issuer of this standard:

a. Platform lifts meeting AS/NZS 1735.14 or 15 (for short rise very low use applications only).
b. Hydraulic lifts meeting AS/NZS 1735.14, AS/NZS 1735.15, AS/NZS 1735.16 and AS/NZS 1735.3.

Lifts must be provided with regenerative drives where the rated speed and travel allows justifiable power generation and where no adverse power quality problems are likely. Any installation incorporating regenerative drives must also be provided with braking resistor banks to dissipate the regenerated power during periods of little or no grid demand.

The lift contractor must provide a 20 year whole-of-life cost analysis and present this to the issuer of this standard for review. The cost analysis must include an indicative cost breakdown of the whole-of-life costs showing plant, labour, power and material costs for the following items:

a. Capital Cost.
b. Comprehensive maintenance.

6.6 Lift Design

Designers must incorporate these general requirements into lift designs:

a. Lifts must be durable and easy to operate and maintain.
b. Passenger lifts must have wide doors for ease of ingress and egress.
c. Stretcher requirements of the BCA must be met where required.
d. Where a dedicated goods lift is not being provided, a clear internal height of at least 3m must be provided in the lift car.
e. Duty of the lifts must handle peak periods typically occurring at class/lecture changeover periods.
f. A dedicated goods lift of appropriate design must be considered for buildings needing specialist goods movement. Suitable goods lifts must be used for heavy loading conditions.
g. Hazardous goods operating feature must be provided in at least 1 lift that operates in a laboratory, classroom or similar building.
h. All MRL type lifts must be provided with an automatic rescue device to allow the lift to travel to the nearest floor and open its doors so passengers can exit if electrical mains power is lost.
i. Access control provisions for possible future connection.
j. BMS monitoring provisions for possible future connection.
k. Access into the lift well pit/overrun must be provided.
l. All MRL lifts must have a trap door in the lift car roof in compliance with AS1735.2-2001 Clause 23.14 (a).
m. Two-way lift shafting lighting switches must be provided at all terminal landings, within the lift pit and on the car top.

6.7 Lift Car Details

Lift cars must comprise low maintenance and long term, durable finishes with scratch resistant, textured surfaces designed to minimise minor damage.

6.7.1 Lift Car Finishes

The finishes must comply with the following requirements:

a. Vandal-resistant and patterned stainless steel to side walls and lower half of rear wall.
b. Aluminium-framed silver mirror to upper half of rear wall.
c. Fixed “white” coloured laminated lift car ceiling.
d. A single 600 mm long finished stainless-steel hand rail to one side of the lift car adjacent to or under the auxiliary car operating panel and securely fixed to sustain heavy loads. No other hand rail is required.
e. Quality LED down lights as per the Lighting Standard.
f. Finished stainless steel car door, car front and skirting
g. Durable, long-wearing, sustainable and readily replaceable floor covering which is GECA-Certified or Eco-specifier certified.

h. Car control panels - main and auxiliary must be stainless steel, satin finish and complying with AS/NZS 1735.12 and mounted in vertical alignment.
i. Car and landing buttons must be commercially available “third party supplier” items that comply with AS/NZS1735.12 and with White/Blue Illumination. Lift company standard buttons are not acceptable.
j. Car and landing indicators must be commercially available “third party supplier” items that comply with AS/NZS 1735.12. Generic lift company manufactured indictors are not acceptable The main entry level/street level landing button must be labelled by engraving “Street Level” next to the relevant floor level button in situations where the where the button corresponding to the main entry level/street level is not labelled “G”.
k. Goods lifts must have similar finishes with the addition of low, mid and high-level hardwood bump rails 300 mm x 20 mm thick with a durable environmentally friendly coating.
l. Lift car mirror must be omitted from goods lifts.
m. Special application goods lift e.g. for chemicals, animals, etc must use specific fit-for-purpose durable and resistant finishes to resist exposure damage.
n. Lift key switches and locks, including the lift machine room or landing control panel must comply with the Sydney University Key Register.
o. The light and fan are to turn on and off automatically. Lift car light switches are to be provided with a 3-position key switch with OFF/ON/TEST functionality in the lift car.

6.7.2 Hazardous Goods Lifts

All and any lift that may carry hazardous goods, e.g. liquid nitrogen, must had a fully compliant Sydney University hazardous goods feature installed, ref Attachment 2.

The hazardous goods feature must be fully compliant so every lift on campus with this feature can be provided with a user’s manual and clear instruction on its use. Even small issues such as the number of, signage on and operation of key switches must be exactly the same as the Sydney University requirements as detailed in Attachment 2.

6.7.3 Prevention of Electromagnetic Interference

Equipment likely to be incompatible with emission levels, harmonics and power quality requirements in the building e.g. light fittings, apparatus, appliances, wiring, etc must have electromagnetic interference filtering.

6.7.4 DDA Requirements

The minimum facilities to meet the access needs of people with disabilities include the following:

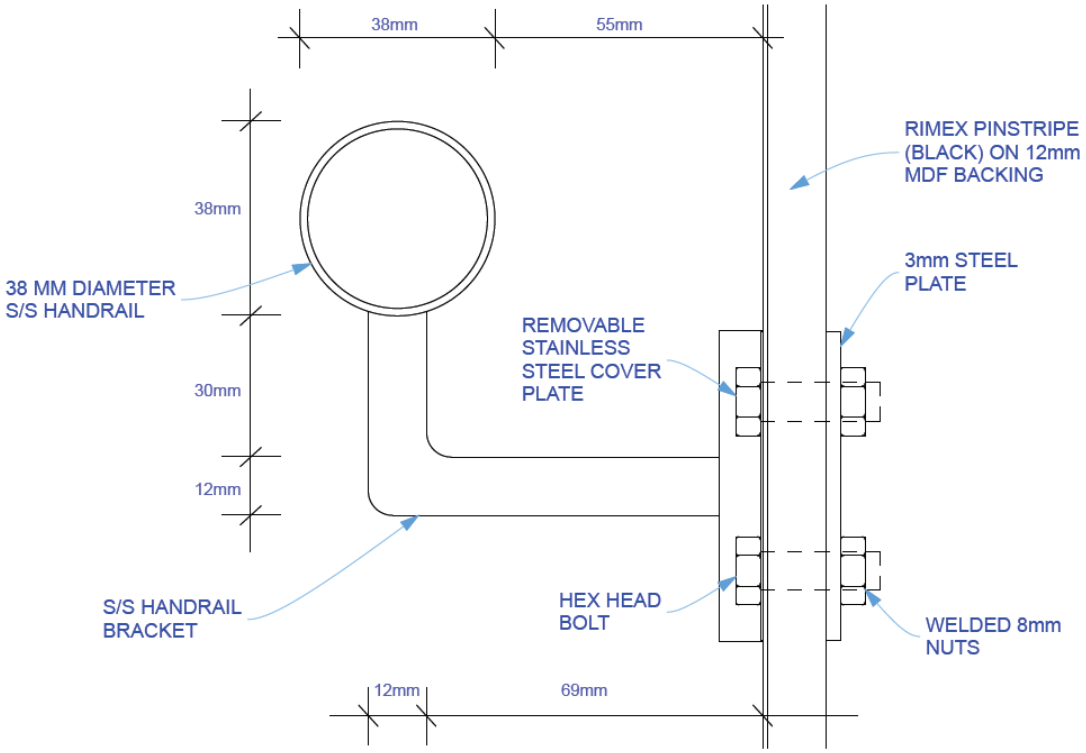
a. Minimum 600mm long handrail located adjacent to the car operating panel in compliance with the requirements of AS/NZS 1735.12 and this standard.
b. Floor dimensions not less than 1100mm wide x 1400mm deep from travels less than 12m and 1400mm wide x 1600mm deep for travels greater than 12m.
c. 3D full height lift door entrance protection system complying with AS/NZS 1735.12.
d. Minimum clear door opening of 900mm wide in accordance with AS/NZS1735.12.
e. Lighting in accordance with AS/NZS1735.12.
f. Emergency lift car lighting must comply with AS 1735.2 – 2001 Clause 23.25.2.9. EN81 compliant lift car emergency lighting will not be accepted. There must be a minimum of 20 lux on each control panel.
g. A hands-free auto-dialling phone must be installed with the main car operating panel. The phone must be an "emFone" or equivalent. Proprietary systems will not be accepted. It must be hard wired in the lift machine room/area (not plug-in) to the 240V supply.
h. Car operating panels designed to meet AS/NZS1735.12 requirements.
i. Levelling accuracy of ± 6mm.
j. Visible, tactile and audible information on landings and within the car.

6.7.5 Lift Fixtures

The main control panel must have the lift car number, load and an additional notice of **"University Security Emergency Phone Number 02 9351 3333"** inscribed with black infill at a height of approximately 1800 mm above floor level. There must be no traditional "Part IV" notice in the lift car.

The number of key switches in a lift car must be kept to a minimum. There must be no key switch in the lift car for lights and fan operation. These features must automatically turn off and on.

Only a minimum length 600 mm long hand rail for disabled use must be used. It must be tubular stainless steel, securely attached to the lift car wall and fully complying with AS/NZS 1735.12 as shown in the section drawing below.



The engraved emergency phone instruction shown below must be provided on the main car operating panel beside or below the button. It must be in white with a minimum font size equivalent to Arial 20 point.

PRESS BUTTON FOR
5 SECONDS
AND AWAIT REPLY

Protective curtains must be supplied for one lift (and interchangeable for the other lifts if more than one lift is installed). They must be hung on brackets and hooks supplied and installed by the lift contractor in the lift machine room or other storage space nominated by UI.

6.8 Lift Phone - Final Distribution Point (Lift FDP)

For effective maintenance of the lift phone line, the University requires a demarcation point between the lift technician and the telephone technician, installed in the top passenger lift lobby where both trades can readily access it. The design philosophy and details for this distributor, called the Lift FDP, are given in the ICT Communications Cabling Standard.

6.8.1 Lift Phone Criteria

Lift installations are broken into two criteria.

- Criteria one (1) includes main campus which is defined as buildings located on Darlington and Camperdown Campuses. These require all Lifts (New and Refurbished) to be connected hard wired to the building via Copper. The copper lines are linked to the University PABX which has battery backup to mitigate power interruptions.

- Criteria two (2) include University Buildings located off main campus. These require lifts to be connected via a dual sim card.

6.8.1.1 New Lifts

For new lifts, the designer of the lift shaft must ensure requirements for the Lift FDP are reflected in all relevant documentation packages. Architectural approval must be obtained for the appearance of the enclosure, any penetrations for conduits must be documented by the structural engineer, and the electrical designer must include the voice grade cable from the main distribution frame (MDF) to the Lift FDP on the communications cabling schematic. It may be necessary to form a recess in the concrete of the lift shaft to accommodate the enclosure elegantly.

6.8.1.2 Refurbished Lifts

Where existing lifts are being refurbished, a Lift FDP must be installed if not already present, and the voice grade cable to the MDF must be re-run. Old arrangements such as an existing FDP in the lift motor room, or a connection from a general independent distribution frame (IDF) or FDP, do not comply with the current requirement for a dedicated Lift FDP. To fit a Lift FDP to an existing lift shaft, a surface-mounted enclosure with surface-mounted conduits is usually necessary.

6.8.2 Lift Phone Product

a. Main Campus Lift Phone - emFone or equivalent
b. Off Main Campus - emFone or equivalent

6.8.3 Consultation Process

a. UI as design engineer and Standard Owner
b. ICT as installer of Copper Lines to the Building
c. COS as Owner of Lift post DLP.

6.9 Building Control Maintenance System Monitoring

The lifts must provide connection to the Building Control Management System (BCMS) monitor the following functions:

a. Lift Position

b. Lift fault.
c. Lift on Fire Service.
d. Alarm button pressed.
e. Stop button pressed.
f. Lift on Independent Service.
g. Hazardous Good Service.

Contractor must provide a high level interface (HLI) with MODBUS or BACnet output.

The lift contractor must supply and install all cable and conduit between terminal strips in an interface box adjacent to the lift machine room, or in the top floor lift lobby, and the lift controller for the transfer of signals between the systems.

6.10 Energy Efficiency

Best practice energy efficiency features must be incorporated into lifts, including but not limited to:

a. Use of quality LED luminaires according to the UI lighting Standard.
b. The lift controller must incorporate a standby power feature allowing shut of power to all car lights, car indicators and lift control panels etc. to reduce standby energy consumption. The period of inactivity before standby mode is activated must be initially set to 2 minutes and be easily adjustable on site between 2 and 15 minutes. The standby power feature must not be activated when the lift is in a special operation mode (exclusive, fire, etc) or if the lift is in a failed start or fault condition.
c. Variable frequency AC permanent magnet motor drives.
d. Drives must have a regenerative capability where the rated speed and travel provide justifiable power generation. This is preferable for lifts with a rated speed of up to 2.5 mps and mandatory for lift of higher speed.

6.11 Associated Requirements

All lifts must include these requirements:
a. If fitted with roller guides, spring tension rollers guides with a diameter of at least 150 mm.
b. If fitted with slipper guides, have effective devices to safely contain any oil from the guide rails and prevent oil draining onto the lift pit floor, guides and brackets, under the lift car or on to the lift car.
c. Lift car access control reader, including all wiring between the lift car and a point near the lift machine room or lift controller.
d. A lift car CCTV camera, including all wiring (including 240 Volt supply) between the lift car and a point near the lift machine room or lift controller. The camera must comply with relevant requirements in the University Security Services Standard.
e. 300 mm x 300 mm x 300 mm dry sump with a chequer plate steel cover. The sump must not interfere with the lift equipment or personnel. The pit floor must be graded to the sump.
f. Mains supply cables must not have any interposing switches or circuit breakers installed between the lift main switch in the building's main switch board and the lift circuit breaker in the lift machine room or control cabinet.
g. All cabling (including low voltage and shaft lighting) in the lift machine room, lift pit, top of car, etc. must be mechanically protected in rigid conduit (flexible conduit must not be used except on movable or vibration affected equipment) or ducting or some other protection as approved by the issuer of this Standard.
h. Stick-on labels must not be used in the lift car or landings. All lift car and landing signage must be engraved.

6.12 Maintenance

Requirements for independent and supported maintenance are provided below.

6.12.1 Independent Maintainability

All new lift equipment must be repaired, serviced and maintained, in accordance with the minimum requirements of:

a. Designers.
b. Suppliers.
c. Manufacturers.
d. Installers.
e. Operation and Maintenance Manuals.

The lift contractor must provide any proprietary equipment or components included in the proposal and must be supplied complete with all and any proprietary or unique tools (i.e. manufactured only by the OEM supplier) required for the adjustment, removal or installation of such components. This includes but is not limited to the following.

a. External devices.
b. Spare parts.
c. Tools.
d. Instruments.
e. Codes.
f. Passwords.
g. Keys.
h. Locks.
i. Cards.
j. Reactivation sequences.
k. Software.
l. Information and intellectual property.

Compliance with the above must include the provision of electronic test and software access tools required to allow the adjustment and resetting of any software parameters. These must be provided under the contract and must remain available as a spare part for purchase by any maintenance provider under instruction from the University of Sydney, for a minimum period of 20 years from practical completion. Such tools must be free of any electronic locks, software controls or other systems intended to lock or prevent full use of the tool after a predetermined time period.

Under no circumstance should the University or its maintenance contractor be required to pay and/or enter into contractual arrangements with the designer, supplier, manufacturer or installer of the lift equipment in order to, perform repair, service or maintain the lift equipment.

6.12.2 Defects Liability Period Maintenance

A regular comprehensive maintenance and breakdown service must be provided during the Defects Liabilities Period (DLP). DLP maintenance must conform to the conditions and maintenance performance parameters set by the University of Sydney's current campus wide maintenance agreement.

7 Commissioning

Comprehensive pre-commissioning, commissioning and quality monitoring must be specified by the consultant/designer to certify that the lifts meet or exceed the required performance criteria of this standard. This will apply to transformational projects.

A project specific commissioning plan is to be developed and provided to the University for review and approval.

Detailed testing and commissioning records must be provided for each system and each component as appropriate. All such records must be witnessed and verified by the project consultant/head contractor prior to witness commissioning by UI Engineers

A project handover plan must be developed by the consultant/designer to allow the system to be handed over to The University. A 12 month building tuning process will commence at Project handover with systems monitored monthly, reported and assessed quarterly, and include assessment of feedback from the occupants.

UI have developed a **Vertical Transportation Commissioning Checklist (CIS-ENG-F031)** which should be used as a minimum guide when preparing the project specific commissioning plan.

7.1.1 Testing and Commissioning Requirements

Detailed testing and commissioning requirements must be specified for each lift by the consultant/designer and include all statutory requirements. Testing and commissioning records must be provided for each lift and each component as appropriate. All such records must be witnessed and verified by the project consultant/designer.

7.1.2 Training

Training must be provided to the issuer of this standard and nominated user's 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.

7.1.3 Certification

A Safe-to-Operate Certificate must be provided prior to any lift going into service.

8 Shop Drawings

The Contractor must submit the following shop drawings, document and samples for the approval of the issuer of this standard prior to commencement of installation:

a. Proposed vertical transportation drawings (1:100 scale) and electrical schematic diagrams.
b. Short-circuit and Overcurrent protection calculations by PowerCAD with digital printouts and selection of switchgears.
c. Technical catalogue and documents for electrical installation, power and equipment.
d. Compliance certifications from accredited qualified Vertical Transportation Consulting Engineer.
e. Sample of all proposed electrical installation, power and equipment.

9 Safety in Design

The contractor must consider risk during the design. A design safety report must be submitted to the relevant UI Project Manager for every design project. Contractors must confirm, so far as it is reasonably practicable (SFAIRP), that the structure is without risks to health and safety.

Design risks must be considered for the asset lifecycle covering construction, operational and maintenance, refurbishments and decommissioning.

The design safety report must include the following:
a. Description of design element.
b. Description of potential risks and hazards associated with the design element.
c. A low/medium/high risk assessment considering likelihood and consequence.
d. Proposed measures to eliminate risks where practicable.
e. Control measures to mitigate and manage design risks.
f. Nominating responsibilities for managing the design risks.

This may be provided as a design risk register where appropriate and must include results of any calculations, testing and analysis etc.

10 Documentation and Records

10.1 Design Documentation

On completion of the installation a complete set of as-installed documentation is to be provided to the issuer of this standard.

The following design documents must be provided:
a. Lift layouts.
b. Lift car interiors.
c. Lift landing entrances.
d. Lift car and landing faceplate details.
e. Lift labels, notices and signage.
f. Project specifications check sheets for each major component detailing each lift plant and equipment item that needs to be checked, tested and verified during the installation process.
g. Return Brief defining the systems proposed and any deviations from this specification.
h. Applications to Supply authorities, and their responses.
i. Designer's statutory compliance certificates.
j. Complete the Design & Construct Checklist Form (UI-ENG-F009).

The following documents must be provided at practical completion:
a. Completed project specification check sheets for lift plant and equipment verified by the project consultant/designer, including the rectification of identified defects including:
    i. Ride quality results.
    ii. Door open and close times.
    iii. Door dwell times.
    iv. Floor levelling accuracy.
    v. Acceleration and deceleration rates.
    vi. Jerk rate.
    vii. Contract speed.
    viii. Flight times (door open to door open) for one, two and four floor runs.
    ix. Power consumption.

b. Operation and Maintenance manuals.
c. Commissioning records.
d. Product Manufacturer specific information.
e. System schematics.
f. Complete As-built workshop drawings.
g. Electrical and wiring diagrams.
h. Lift functionality and operation description.
i. Plant registration documentation.
j. Hazard and risk assessment provided by lift contactor.
k. Work Cover registration.
l. Installers Statutory certificates.
m. Safe-to-Operate certification.

10.2 Completion Documents

At the completion of the project, the following documentation must be provided as part of the project works:

a. O&M manual(s).
b. As-built drawings (including schematics and block plans).
c. Statutory Certification (indicating BCA clauses & Australian Standards year/amendment).
d. Asset schedules and labelling (as per the Asset Identification and Labelling Standard).
e. Commissioning test results.
f. Product manufacturer specific information.
g. Warranty schedules for all major items of equipment.
h. Maintenance requirements for all items of equipment.
i. Building User Guide.
j. Installers Statutory certificates.
k. Certification of compliance to the design standard.
l. This documentation must be provided by the contractor in both electronic and hard copy formats and approved by the University prior to Practical Completion being granted.

Similar completion documentation must be provided by the Fire Safety Engineer, in the form of a Fire Safety Strategy Handover Report, confirming full details of certification, commissioning and specific ongoing maintenance and operational management issues required for all approved Performance Solutions.

11 Assets and Warranties

Assets are to be tagged in accordance with the COS Universities Asset & Labelling Standard for the purpose of maintenance and operation of University Assets. For refurbishment projects the project manager is to provide the existing asset list to the contractor to ensure modified and redundant equipment are captured in the contractors submitted asset list.

Each asset required to be collected can be found in the Asset Form **COS-ASSET-F001**, each asset required to be coded will be identified by a unique equipment code.

The equipment code will be one the three following types:
a. Virtual asset (This is a concatenation ***Building Code*** - ***Floor*** - ***Room Number***)
b. Item count asset (This is a concatenation ***Building Code - Floor - Room number***)
c. Unique bar code asset (Unique bar code in the million series number affixed to the asset)

Asset lists are to be submitted prior to practical completion of the project for review and approval by COS.

Equipment Warranties are to be provided for a minimum of 12 months from the date of practical completion. Warranties are to be provided as certificates as part of the O&M from the supplier of the equipment. It is the responsibility of the installation contractor to ensure all maintenance/servicing required to the equipment is provided to ensure warranties are valid at the end of the project DLP period.

12 Defects and Liability Period

Consultants/designers must include in the project specification detailed requirements for the defects and liability period following completion of the fire services installation.

The contractor must include and allow for recommissioning of all major plant and equipment in the last month of the 12 month defects and liability period and confirm they achieve the original design requirements. In addition, all commissioning must be witnessed by UI Engineering staff with commissioning reports/results formally submitted to UI Engineering.

12.1 Maintenance and Testing

For Vertical Transportation installed as part of a refurbishment project of an existing building, regular statutory maintenance and testing must be carried out by the University essential services maintenance contractor during the Defects Liability Period (DLP). The installation contractor must provide a comprehensive handover and the required completion documentation at Practical Completion.

All defects arising from regular statutory maintenance and testing performed during the DLP will be documented and passed onto the installation contractor for rectification. The installation contractor must be responsible for all defect rectification works identified during the DLP.

For new buildings, the installation contractor must provide statutory maintenance and testing of all Vertical Transportation systems listed on the Final Fire Safety Certificate for the building, throughout the DLP. Prior to the completion of the DLP, the installation contractor will perform all annual maintenance procedures in the presence of the University essential services maintenance contractor and provide documentation confirming the provision of all statutory maintenance has been performed during the DLP.

Any details which will affect the future maintenance and performance of the new or upgraded equipment must be supplied by the installation contractor at Practical Completion.

Prior to completion of the DLP, a final inspection of the installed systems will be carried out by the: installation contractor, appropriate UI staff, and University essential services maintenance contractor, in order to reconcile the performance of the equipment during DLP to produce a final list of project defects. All project defects identified must be rectified by the installation contractor prior to finalisation of the DLP.

13 Operations and Maintenance Manuals

Consultants/designers must include in the project specification detailed requirements for operation and maintenance manuals, including system description, operation procedures, testing and commissioning records, maintenance instructions, product support information and recovery protocols for any computer related systems.

Operation and maintenance manuals are to include instructions on how to use or apply tools, instruments, passwords, keys, cards, spare parts and intellectual property, etc. Contractors must provide these to the satisfaction of the consultant/designer. Providing a collection of manufacturers' brochures and catalogues is not acceptable.

Contractors must provide these to the satisfaction of the consultant/designer. Providing a collection of manufacturers' brochures and catalogues is not acceptable to the University. Discuss with UI to understand what format to submit the O&M Manuals. Typical submissions come via soft copy (editable) and used via a system like Aconex.

Contractors must submit the university designed Sydney University Asset Register for recording operational and maintenance activities including materials used, test results, comments for future maintenance actions and notes covering asset condition. Completed log book pages recording the operational and maintenance activities undertaken for Practical Completion and during the Defects Liability Period must also be provided.

Facilities Maintenance must establish, document and implement procedures for operation and maintenance of lift services, plant and equipment to ensure fire services are fit-for-purpose, provide secure, efficient, safe and reliable electrical power, and comply with requirements of this standard.

14 Authorisation of Variations

Project managers, consultants, contractors, commissioning agents and facilities maintenance personnel must ensure compliance with these requirements is achieved.

Variations to this standard must only be considered where:

a. The University Standard's requirement cannot physically or technically be achieved.
b. The alternative solution delivers demonstrated and proven superior performance for the same capital and life cycle cost or better.

Consultants and contractors must identify and justify requirements of the standard that do not apply to the project or which need to be varied and these which must be approved by the issuer of this standard. Formal requests for all variations to this Standard must be submitted using the **UI Request Dispensation from Standard Form (UI-ENG-F001)**. The issuer of this standard or their delegated authority must review and consider requirements of stakeholders from clients, projects and facilities management before deciding whether to approve variations. Their formal sign-off is required for acceptance of any non-compliances and departures from this standard's requirements.

15 Quality Control

15.1 Design Standard Compliance

Compliance with requirements of this standard must be checked throughout the design, construction and commissioning phases of projects by UI's services consultant. Any issues or deviations from this standard must be reviewed and approved in writing by the author of this standard.

Competent UI consultants and representatives must check compliance with this standard during design reviews and formal site inspections. Any non-conformances with requirements of this standard must be documented and provided to the UI Project Manager for issue to contractors and their consultants.

Project Managers must maintain a formal register of non-conformances and manage close out of outstanding non-conformances. Contractors and their consultants issued with non-conformances must take appropriate corrective actions. The UI Project Manager must ensure:

a. Proposed corrective actions are implemented.
b. Close out of non-conformances in relation to this standard is formally approved and signed off by the author of the standard or their delegate.

15.2 Design Standard Certification

Contractors and their consultants must certify compliance to the design standard and Australian Standards submitting to the UI Project Manager at each of the following project phases:

a. Design and Documentation.
b. Tender.
c. Construction.

Notwithstanding UI's internal quality control processes, contractors and their consultants must implement their own robust quality assurance and control procedures to ensure compliance with requirements of this standard.

16 Lift Registration Process

At the completion of any lift project and prior to handover of the lift to UI the Lift Contractor must provide the UI Project Manager with a partially completed SafeWork Plant Registration form including the technical information of the lift. The following process must be competed:

a. UI Project Manager will complete the SafeWork Plant Registration form including Details of the Applicant (UI Director).
b. UI Project Manager will complete the payment of the registration for new and refurbished lifts.
c. UI Project Manager must log a service request to the COS Lock Smith prior to PC to change over the project keys and lift bi-lock.
d. At the completion of the lift installation the Lift Contractor must provide a 'Safe to Operate' certificate to the UI Project Manager.
e. UI Project Manager must submit the completed SafeWork Plant Registration form to SafeWork, together with the 'Safe to Operate' certificate and must pay the registration fee.

f. SafeWork will issue a Certificate of Registration (6-8 weeks) to the Applicant. The Applicant will forward the Certificate of Registration to the UI Project Manager.
g. The UI Project Manager must use a single birthday for all lift registrations (12 November) and register lifts annually. Some lifts may be registered earlier in the year but must be re-registered again on the 12 November.
h. COS must pay all appropriate ongoing fees for lift registrations once the first year has been paid by the relevant UI Project Manager.

17 Document Amendment History

Version (Revision)	Amendment	Commencing
001	First Issue	16 August 2013
002	Second Issue - Amendments a. Clause 5.2 now includes some items moved from clause 5.1 b. Clause 5.3 now includes a reference to tender return documents required to be submitted to UI. c. Clause 5.4 includes details of the proprietary equipment or components required for submissions and electronic test and software compliance. d. Clause 5.5 includes details on regenerative drives. e. Clause 5.6 includes hazardous goods, BMS monitoring and trap door references. f. Clause 5.7.1 includes reference to car and landing indicators, key switches and locks and automatic light and fan within the lift car. g. Clause 5.7.4 includes Emergency lift car lighting compliance, hands free auto-dialling phone and full height lift door scanners. h. Clause 5.10 includes a standby power feature. i. Supported Maintainability clause deleted from Rev 001. j. Shop drawing clause 6 added. k. Safety in Design clause 7 added. l. Lift Registration process clause 13 added. New Forms added to the website a. UI Design & Construct Services Checklist Form (CIS-ENG-F009).	18 September 2015
3.0	a. General formatting. b. Added requirements for existing buildings and refurbishments. c. Updated commissioning requirements.	18 August 2020

18 Attachments

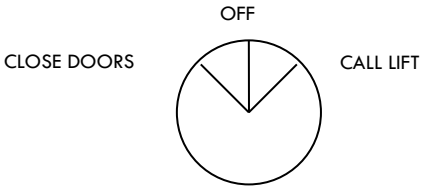
Attachment 1 Lift Contractor References
Attachment 2 Hazardous Goods Service

18.1 Attachment 1 Lift Contractor References

Building Address	Year Installed	Manufacturer	Client Name	Drive system	Control system	Maintenance Contractor

18.2 Attachment 2 Hazardous Goods Service

All landing button panels (LOP) for the goods 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 key switches in both the COP and the LOP will be of the Bi-Lock type:

1. When the hazardous goods service (**HGS)** key switch is in the "**OFF"** position the designated lift will operate normally and where applicable as part of a lift group.
2. The attendant turns the key switch in the landing operating panel (LOP) clockwise from the **"OFF"** to the **"CALL LIFT"** position.
3. 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".
4. Hall call response is inhibited.
5. 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 **HSG** key switch. If the lift is idle it will immediately travel directly in answer to the **HSG** key switch.
6. The lift will travel (non Stop) to the ***"calling"*** floor (at which the **HGS** switch is selected).
7. Open its doors.
8. The lift will remain at that floor with the doors open.
9. The attendant will remove the key switch from the landing fixture in the **"OFF"** position.
10. The lift will remain "captive" in the **HGS** mode of operation for **60 seconds.** If the process does not proceed to the next stage, the lift will return to normal service.
11. The HGS car operating panel (COP) key switch is turned to the "ON" position.
12. The key is removed in the "ON" position.
13. The goods are loaded.
14. The key is inserted into the hall switch and turned counter clockwise to the "CLOSE DOORS" POSITION. The doors close and the key returns to the central "OFF" position and withdrawn.
15. The attendant travels via other lift or stairs, to the "destination" floor.
16. The attendant then turns the HGS key switch in the LOP to the "CALL LIFT" position at the "destination" floor.
17. The lift travels to the "destination" floor.
18. The doors open.
19. The goods are removed.
20. The key is removed from the "***destination"*** landing **HGS** key switch.
21. The **COP HGS** key switch is returned to the **"OFF"** position.

22. The key is removed.
23. The lift doorway scanners are fully operational before the doors close.
24. The lift returns to normal service.

The **HGS** 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 **HGS** will return the lift to a designated floor for unloading.
If the **HFS** mode is selected while the lift is on **HGS,** 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.