## SECTION 11: VERTICAL TRANSPORT
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### DESIGN STANDARDS CHANGE LOG FEBRUARY 2013

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11.1 INTRODUCTION

When selecting and designing vertical transport services to be installed at ‘The University of Melbourne’, the lift designer shall take into account the requirements of this Design Standard.

This design standard details the minimum requirements applicable to certain components of the lift installation and details the design intent.

The designer shall also base the design on normal good engineering practices and appropriate commercial and educational institution design standards and practices.

11.2 APPLICABLE STANDARDS

The design of the lift systems shall include consideration of the current regulations and requirements of the Authorities having jurisdiction over the project.

The lift system shall be designed and installed in accordance with the following codes and regulations:

- Building Code of Australia;
- AS1735 Lifts, Escalators and Moving Walks (including full compliance with AS1735.12);
- AS3000 Wiring Rules;
- Authorities having jurisdiction over the works;
- Occupational Health and Safety Authority (WorkSafe Victoria).

The lift designer shall also design the lifts in line with other University of Melbourne design standards.

11.3 LIFT CONTROL SYSTEMS

As a minimum all lifts shall operate on the principal of a two button collective control system having at least the following features.

- Exclusive service;
- Fireman’s service, as per the requirements of AS1735;
- Load-weighing control;
- Door nudging system;
- Anti-nuisance feature;
- Emergency Power operation, applicable where emergency power is provided to the lift system;
- Access control provisions, applicable where access control is provided to the lift.

Where applicable lift group control systems shall be high speed micro-processor and software based and incorporate the latest proven demand based traffic management algorithms to optimise system response times and operating/energy efficiencies.

It is a particular requirement of the University that all equipment be of a non-proprietary (open architecture) nature. Equipment requiring proprietary service tools or user guides/codes will not be accepted unless specific written authorisation is obtained from the University’s Manager (Engineering and Infrastructure) for the project in question.

The lift system shall incorporate a software protocol that allows the maintenance, servicing, tuning and adjustment of the equipment by third party service providers.
The lift system hardware and software shall be provided so that the complete installation is capable of continuous unrestricted operation from the date the lift becomes the property of the University and for the life of the installation. The system must be capable of being readily maintained and adjusted on site, without the need for the use of codes, locks, external devices, external information, re-activation sequences, or the like.

Drive systems shall be permanent magnet VFAC drives. Preferably of the high efficiency gearless type.

Where stand-by power is being provided to the building consideration shall be given to operating at least one lift to assist in the movement of people with disabilities.

### 11.4 LIFT TYPES

When selecting the type of lift to be used the following lift types are to be considered:
- Machine Room-Less (MRL) lifts;
- Conventional overhead lift motor room traction lifts;
- Hydraulic lifts shall not be considered unless required for a particular problem solving application or where MRL lifts cannot be provided;
- Disabled platform lifts in accordance with AS1735.14 or 15 (for short rise very low use applications only);
- Where possible and appropriate lifts shall be provided with regenerative drives.

MRL lifts shall be considered for passenger lifts where speeds of 1.0 to 2.5m/s are required. When a lift speed of 2.5m/s and above is required conventional overhead lift motor room traction lifts shall be provided. Overhead lift motor room lifts shall also be considered where a high rated load is required, for example large goods lifts.

The lift designer is required to support the lift selection with a whole life (20 years) cost analysis and present this to the University for review by the Asset Services Infrastructure section. The costs analysis shall include an indicative cost breakdown of the whole lift costs of the life as per the following:
- Power consumption, machine and control system efficiency;
- Consumable items, such as ropes, sheaves, bearings, guides, etc;
- Expected cost for comprehensive maintenance.

### 11.5 LIFT DESIGN

The lift designer shall adopt the following when designing the lifts:
- Passenger lifts shall be wider than they are deep to allow for the ease of passenger movement into and out of the lift car. Note the stretcher requirements of the BCA shall be met where required;
- If a dedicated goods lift is not being provided a boot giving a clear internal height of at least 3m shall be provided in the lift car;
- The duty of the lifts shall be sufficient to handle peak periods which would typically occur at class changeover periods;
- A dedicated goods lift shall be considered for buildings requiring specialist goods movement. Goods lifts shall be designed to the appropriate class as detailed in AS1735. Class C goods lifts shall be nominated where heavy loading conditions apply;
When planning the location of the lift or lift bank Architects shall ensure the lifts are central relative to the building’s circulation and be easily identifiable to assist in way finding.

### 11.6 LIFT INTERIOR FINISHES

Lift interior finishes shall be robust, low maintenance and vandal resistant. When designing a lift car interior the following should be considered:

- The layout of the car shall meet the requirements of AS1735.12;
- Wall finishes shall be durable. Consideration should be given to using finished stainless steel or rimex patterned stainless steel;
- A pinboard for notices shall be installed along one length of wall where required by the University;
- Car operating panels (COP) shall generally be provided on the side walls, mounted in a vertical alignment;
- Handrails shall be provided adjacent to the main COP as per AS1735.12. Handrails shall generally be of finished stainless steel finish;
- Lift display screens shall generally be provided in the COP;
- Lift car flooring shall be durable and suitable for its application. Excelon vinyl floor tiles provided by Armstrong Commercial Flooring shall be considered;
- Lift car skirting shall be finished stainless steel;
- Lighting within the lift car shall consist of high efficiency T5 fluorescent lamps or LED lamps;
- Ceilings shall be laminate or finished stainless steel;
- For goods lifts the lift car interior shall consist of finished or rimex stainless steel walls with at least two rows of stainless steel bump rails. Ceilings shall be white colour laminate or finished stainless steel. High efficiency T5 fluorescent lighting shall be provided and shall be located within pelmets;
- Where lifts are provided in glass lift shafts the lifts shall incorporate lift car air conditioning;
- Where glass is used it shall comply with the requirements of Appendix H of AS1735.

### 11.7 LIFT APPOINTMENTS

The following requirements are applicable to car and landing appointments:

**Buttons**

Buttons shall be of the Dewhurst US95 or US96 type and shall be dual illuminating white/blue or other approved colour combinations. Buttons shall include Braille and tactile information as per the requirements of AS1735.12.

**Car Operating Panel (COP)**

Car operating panels shall be designed in line with the requirements of AS1735.12 regarding location, type, height and location of buttons.

Lift number and building address details shall be engraved on the COP.

The project architect shall ensure that each level is correctly labelled according to the University’s room numbering system, as per Section 2.6 Signage.
Displays
Displays shall be of the LCD LD-100C type as provided by DesignCom Technologies or approved equivalent. Displays shall be capable of permanently displaying the University’s logo whilst displaying lift direction and level indication. Displays shall also be capable of displaying messages dependant on the lift status including: name of floor at which lift is arriving, “Exclusive Service”, “Fire Service”, “Out of Service”, other fault/status messages as appropriate.

Hall Lanterns
One hall lantern shall be provided per lift entrance and shall indicate direction of travel of arriving lift by visible and audible means. Two sound signals for downward travel of arriving lift and one sound signal for upward travel.

The design of the hall lantern shall be such that it consists of jewels projecting approximately 20mm past the hall lantern faceplate. Jewels shall be illuminated via long-life LEDs.

For up to 3 lifts in a bank, full car position indication shall be provided within the hall indicator and shall indicate direction of travel as well as lift position.

Hall Button Station
Hall button stations shall be located so that the button heights comply with the requirements of AS1735.12. Hall button stations shall incorporate “Do not use ....” signage in accordance with BCA requirements. Signage shall be engraved on the landing button faceplate.

Car Fan
The lift car fan shall be operated via a push button in the car operating panel. A key switch operated fan is not acceptable. Upon activation of the fan the fan shall operate for a period of 2 to 5 minutes, adjustable.

The extractor fan shall be mounted on the car roof with sound isolated supports.

Voice Annunciation
Voice annunciation shall be provided in each lift car to the requirements of AS1735.12. The volume of the voice annunciation shall with adjustable and the voice projection shall be clear and free from accent.

In addition to the above lifts shall be provided with a building evacuation speaker.

Key Switches
Key switches shall be provided at Practical Completion for Fire Service, Exclusive Service and Light Switch. The Fire Service key arrangement must comply with the requirements of AS1735. The Exclusive Service key arrangement shall include ON, OFF and PARK facilities.

The keying system shall be of the highly restricted security type.

Emergency Lights
Each lift shall contain an automatically rechargeable emergency lighting system that operates at least two emergency lights and is capable of providing at least 20 lx for 2 hrs, on each control panel.

This lighting shall come on automatically upon failure of the normal lighting supply.

Fixings
Fixings for all appointments shall be of the hidden type if possible. Alternatively and visible fixings shall be of the security type and shall match the finish of the faceplate.
**Entrance Protection**

All lift entrances shall be provided with a Memco Panachrome, or approved equivalent, 3D entrance monitoring system consisting of infra-red beams continually monitoring the clear opening from 50mm above floor level to at least 1550 above floor level. The system shall be unaffected by dust, moisture, vibration and ambient light and shall comply with AS1735.12.

The system shall incorporate coloured indicators that operate on door movement. The detectors shall illuminate green in the doors are opening, flash red as they start to close, and stay red as the doors move together.

11.8 **LIFTWELL**

Access to the lift pit shall be in accordance with BCA Part D, through the lift entrance door if the pit is less than 3m deep, or alternatively through a pit access door complying with the requirements of the BCA and AS1735 if the pit is greater than 3m deep.

Lift pits shall be provided with pit sumps with a minimum size of 300x300x300 and shall include a sump cover. Lift pits shall slope towards the pit sump.

11.9 **DDA REQUIREMENTS**

The lifts shall meet the full requirements of AS1735.12. The minimum facilities considered necessary to meet the access needs of people with disabilities as required by the BCA and AS1735.12 1999 for the passenger lifts, include the following:

- Minimum 600mm long handrail located adjacent to the COP in compliance with the requirements of AS1735.12;
- Floor dimensions not less than 1,100mm x 1,400mm;
- Lift entrance protection system complying with AS1735.12;
- Minimum clear door opening on 900mm wide in accordance with AS1735.12;
- Lighting in accordance with AS1735.12;
- Emergency hands-free self dialling push button initiated communication system with audible feedback;
- Car operating panels designed to meet AS1735.12 requirements;
- Levelling accuracy of ± 12mm;
- Visible, tactile and audible information on landings and within the car.

11.10 **CAR AND LANDING DOORS**

Lift car and landing doors shall be of the two panel centre opening type where possible and practical. Door opening widths and heights shall be designed to suit the lifts application. Doors shall be finished stainless steel. Full depth door jams that project past the lobby finish shall be provided to all lifts. Goods lift door jambs shall be solidly grouted.

11.11 **ACCESS CONTROL SECURITY**

Access control provisions shall be provided to all lifts. The lift designer shall specify for the provision of access control even if there is no project requirement to do so. This is for possible future connection.
The card reader shall be provided behind a cut-out with perspex cover and shall be located on the COP.

11.12 EMERGENCY COMMUNICATION SYSTEM

The lift emergency communication system shall consist of a DesignCom LX self-dialling hands free telephone mounted in the car operating panel. The telephone shall be activated by means of pressing the phone button (to illuminate on pressing) on the car operating panel for 3 seconds, and shall automatically dial a permanently attended location. The phone system shall also be capable of receiving calls, and automatically deactivating upon time-out (adjustable), busy tone, etc.

Compliance with AS1735.12 is required.

The phone system shall dial the University campus security centre.

The lift car and liftwell communication system shall be self-diagnostic and compatible with the current university standard emergency phone system.

11.13 LIFT WELL

Access to the lift pit is to be in accordance with Part D of the BCA.

A sump pump pit and cover shall be installed. Concrete plinths or equal and approved equivalent for support of buffers, etc shall be specified.

Means of access into the pit / overrun shall be provided.

11.14 ELECTROMAGNETIC COMPATIBILITY

Where equipment including fittings, apparatus, appliances, wiring and the like is likely to be incompatible with emission levels, harmonics and power quality for other areas of the building, all such equipment shall be provided with suitable filtering to ensure correct operation in the environment.

11.15 LIFT MONITORING

Lifts shall be provided with BAS signals that detail when the lift alarm has been pressed or when the lift is in a fault condition.

For large buildings where the lift designer considers it is warranted, a lift management system (LMS) shall be provided. The system shall allow the operator to select units by group and individually, and give status of major normal operating characteristics, including access control status, as well as major defects and alarms. It shall also be capable of recording the incidence of demands on all units and responses in such a way as to allow ready analysis by individual units, groups, and selected time intervals.

11.16 LIFT MACHINE ROOM DESIGN REQUIREMENTS

The design of the lift machine room shall comply with the following:

- Lift machine rooms, where provided, shall be designed in accordance with the requirements of AS1735.2 Section 5;
- Be suitably ventilated or air conditioned in accordance with the control and alarm requirements detailed in AS1735.2 Clause 5.15. Fresh air intake, if provided, shall be adequately filtered;
- Be suitably lit in accordance with AS1735.2 Clause 5.13. Lights shall consist of twin florescent reflector type fittings with protective guards. Emergency lighting shall be of the non-maintained type;
- Entrances shall be 2-hr fire rated and shall be keyed with a B2.2 cylinder. A suitably labelled access key box shall be provided adjacent to the lift entrance. Lift machine room entrances shall be provided with a ‘Danger…..’ notice in accordance with AS1735.2 Section 5;
- Fire extinguishers and detection shall be provided in lift machine rooms;
- A permanent 415/240V 3-phase and neutral fire-rated power supply connected to a dedicated lift switchboard;
- Finishes to walls, floor and ceiling shall be durable and painted in full gloss enamel for easy cleaning. The ceiling colour shall be white and walls off-white. Floors shall be properly sealed and receive two coats of grey coloured paving paint;
- Any required lifting beams or lifting eyes shall be fitted with SWL notices;
- Lift shop drawings shall be laminated and hung on the LMR wall. Lift wiring diagrams shall be provided in bound booklets and shall be stored in the lift controller;
- On handover the lift machine room shall be clean and free of tools and redundant equipment.

11.17 RIDE QUALITY AND ACOUSTIC TREATMENT

As a minimum the lifts shall meet the following ride quality requirements:
- Acceleration: 0.8 – 1.1 m/s²;
- Jerk: 1.8 m/s³;
- Lateral Vibration: \( \leq 20 \text{ m-g (10 Hz filtered A95)} \);
- Noise level inside car with lift running at contract speed: 55 dB(A);
- Levelling accuracy of \( \pm 6\text{mm} \) (specific university requirement).

Lift guide shoes shall be of the roller guide type.

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

11.18 LIFT CONTRACTOR LIST

Prior to the issuing of a specification the builder or University’s Manager (Engineering and Infrastructure) shall submit a list of lift contractors they intend to price the works to the Asset Services Infrastructure Section of the University for their review and acceptance.

11.19 ENERGY CONSIDERATIONS

The lift designer shall consider the reduction of lift energy usage when designing the lift system. The following shall be considered for all lift applications:
- Automated switching of light fittings and screens in lift cars and on landings, to reduce the electrical load to the minimum allowable when lifts are idle. Lights and screens shall automatically be switched off whenever the lift has been idle for 2
minutes, except when the lift is in a special operation mode (exclusive, fire, etc), or if the lift is in a failed start or fault condition;

- The lift drives shall be based on variable frequency AC permanent magnet motors;
- Drives shall have a regenerative capability that recovers excess energy in an overhauling condition to be returned to the electrical mains rather than dumped as heat.

11.20 LIST OF REQUIRED DRAWINGS

During the shop drawing phase of the project the following drawings shall be submitted to the University for their review:

- Lift layouts;
- Lift car interiors;
- Lift landing entrances;
- Lift car and landing faceplate appointments;
- Lift notices, labels and signs; and
- Any other item of equipment visible to a normal user of the finally installed equipment.

11.21 SUBMISSIONS REQUIRED TO BE PROVIDED TO THE UNIVERSITY

Upon completion of the project the University shall receive copies of the following documentation:

- Project specification;
- As installed shop drawings;
- Operation and Maintenance Manuals;
- Certificate of Electrical Safety;
- Plant Registration documentation;
- Plant Design Notification documentation;
- Hazard and Risk Assessment as provided by the lift contractor;
- All hardware, software & documentation required for diagnostics and maintenance activities;
- Details of the following performance at the point of handover:
  - Ride Quality results
  - Door open and close times
  - Door dwell times
  - Floor levelling accuracy
  - Acceleration and deceleration rates
  - Jerk rate
  - Contract speed
  - Flight times (door open to door open) for one, two and four floor runs
11.22 MAINTENANCE RECORDS

A comprehensive record of maintenance carried out during the defects liability period shall be kept on site for all preventative maintenance, breakdown calls and repairs carried out. Copies of these records shall be forwarded to the Engineering Services Manager.

At the end of the initial six-month maintenance period the maintenance contractor shall produce a performance report giving details of operation versus design parameters.

All maintenance records shall be submitted to the University on expiration of the defects liability period.

11.23 DESIGN CHANGE AUTHORISATION

Any changes from this design standard shall be made in consultation with the University and approved in writing by the Asset Services Infrastructure section.