

## **E.5. LIFT DESIGN STANDARDS**

### **E.5.1. General**

All new or refurbished lifts must meet or exceed the following minimum basic requirements:

- a) The lifts must be safe and comply with all relevant codes and standards.
- b) The lifts must be easily maintained, with minimal problems, by multiple (other than the original manufacturer) lift maintenance contractors.
- c) The lifts are to be as flexible and versatile in operation as possible.
- d) The lifts must have a proven, local history of reliability and maintainability.
- e) The lifts must meet minimum requirements of handling capacity and waiting time for passenger lifts and materials for goods lifts.
- f) The lifts must meet the minimum requirements for use of persons with disabilities as defined by the Building Code of Australia.

The information detailing lift installations described in this brief is to be used as the minimum standard for all new or refurbished lift installations, as well as major building upgrades on the UNSW University's campuses.

#### **E.5.1.1. Requirements**

A competent, well-established, lift contractor with at least 10 years local lift installation experience shall only install or modernise lifts.

The lifts must comply fully with all local rules, regulations, codes and practices as well as gain approval and certification from the local lift inspectorate prior to the lift being placed into service.

All passenger lifts shall be, as a minimum, compliant for use by people with disabilities and in particular with the Building Code of Australia. Full compliance to the lift code AS 1735.12 will be required and as detailed further in later clauses.

Consideration shall be given to lift power systems that are energy efficient and environmentally friendly. Any lift power system that can be proven to be more efficient or less power consuming and environmentally friendly shall have preference over a less efficient system.

Only non proprietary lift equipment or lift equipment that has been available locally for at least 5 years in Australia, or lift equipment that has a ready supply of spare parts to local lift companies, other than the original manufacturer, may be used. Lift equipment shall mean any and all parts of the entire lift installation, in particular the controllers, drivers and its various component parts.

A detailed list of how many lifts of the same type and model and in particular with the same control system that have been installed over the past 5 years is required to be supplied by intended installers in order to be considered at the time of tender. The list is to show the address of the lift installations and if the original manufacturer or installer is now maintaining the lift. Preference shall be given to well established lift systems that have a proven track record of reliability and ease of maintenance.

All lifts shall have a self contained fully automatic self rescue feature that, as a minimum, shall run the lift to the nearest floor and allow passengers to exit the lift car if electrical mains power fails.

All signage in the lift car and on the landings (i.e. fire warning signs) must be engraved, no stick on labels will be accepted.

The lift car emergency lighting must comply with or exceed AS 1735.2 - 2001 Clause 23.25.2.9 (not AS1735.1 Amendment 2006). EN81 compliance is not acceptable. In particular there must be a minimum of 20 lux on each control panel.

Protective curtains shall be supplied for one lift (and interchangeable for the other lifts if more than 1 lift is installed). They shall be hung in the lift machine room (if there is one) on brackets and hooks supplied and installed by the lift contractor.

#### E.5.1.2. Standards

All new installations and lift modernisations must comply with the current Australian Standards and Codes:

- a) AS 1735 - Lift Code
- b) AS 3000 - Wiring Rules
- c) Building Code of Australia (BCA)
- d) Work Cover NSW, any other Local regulation and the requirements of the Inspection Authority.

#### E.5.1.3. Minimum Lift Services

For 2 or more storey buildings there is a minimum requirement to provide a lift for the vertical movement of furniture, goods and persons with disabilities.

Where the height of a building exceeds 10.5 metres or there is more than 3 floors served, consideration should be given to more than one lift being installed.

All lift pits must have a 300 mm x 300 mm x 300 mm dry sump with a chequer plate steel cover. The sump must be placed so as to not interfere with the lift equipment or personnel. The pit floor shall slightly slope to the sump and floor waste.

#### E.5.1.4. Minimum Requirements for Persons with Disabilities

All new installations and lift modernisations at any of the University campuses shall comply with at least the Building Code of Australia requirement for Facilities for People with Disabilities Clause E3.6 plus all lift car control buttons shall comply with clause 8.3.4 Tactual Labelling of AS 1735.12.

All passenger lifts must have lift car audio (voice, not just a sound) position indication regardless of how many floors are served.

Only lifts complying with, AS 1735 Parts 1 or 2 shall be used for providing access for people with disabilities.

Unless prior approval from the University in writing is provided the following lifts **shall not be used** for the access of people with disabilities:

AS 1735.07	Stairway Lifts
AS 1735.13	Lifts for persons with limited mobility - manually powered
AS 1735.14	Lifts for persons with limited mobility - restricted use - low rise platforms
AS 1735.15	Lifts for persons with limited mobility - restricted use - non- automatically controller lifts
AS 1735.16	Lifts for persons with limited mobility - restricted use - automatically controlled

Where the need is clearly identified for providing access for people with disabilities then Part 12 of AS 1735 must be applied.

#### E.5.1.5. Provision of Stretchers and Emergency Lifts

Provision shall be made for the use of stretchers and emergency lifts as detailed in the latest version of the Building Code of Australia

#### E.5.1.6. Performance Requirements

##### a) *Administrative and Office Buildings*

If a normal passenger lift service, as distinct from goods service or Facilities for Disabled Persons lift, is deemed necessary under the design concept it shall be designed to meet the following design criteria:

Interval - the maximum up peak departure interval from the main lowest floor landing for administrative and office buildings.

1 to 4 floors served	45 seconds
5 to 8 floors served	35 seconds
8 and higher floors served	30 seconds

Handling Capacity - Minimum 5 minute handling capacity expressed as a percentage of building population above the main lowest floor landing for administrative and office buildings:

1 to 4 floors served	10.0 %
5 to 8 floors served	12.5 %
8 and higher floors served	15.0 %

- b) *Tutorial Rooms, Class Rooms, & Lecture Theatres,*  
Lift installation in a buildings or parts of buildings of this type requires a accurate theoretical traffic analysis. A detailed study is to be carried out and a full written report is to be provided by an appropriate independent consultant or at least 3 separate studies supplied by 3 potential tendering lift companies.

The basic requirement for classrooms up to 4 floors served shall have a waiting interval as a maximum of 45 seconds with a handling capacity of a minimum of 15% up to a maximum of 50%.

For classrooms in buildings over 5 floors special consideration will be required for the correct lift system and layout for the particular application. The use of escalators at least in part, shall be seriously considered.

#### E.5.1.7. Performance Criteria Parameters

The following performance criteria shall apply to all passenger lifts:

- a) *Door Times - Speeds (+ or - 5%)*

Open Doors	2.0 Seconds
Close Doors	2.5 Seconds

Door time measurement shall be made manually by stopwatch and shall be measured from start of door movement to completion of the opening or closing function, as the case may be.

- b) *Door Times - Dwells (maximum)*

Car Call	3.0 Seconds
Lobby Call	3.0 Seconds

- c) *Floor Levelling Accuracy*

6 mm +/- (maximum in either direction and with varying loads)

- d) *Noise*

Ambient inside the lift car no greater than **55dba**

Door operation or other lift noise no greater than **60dba**

#### E.5.1.8. Type Of Lift Drive & Escalators

The type of lift and drive shall be based on the following:

Lifts with overhead machine rooms are preferred by the UNSW. The use of MRL (Machine Room Less) lifts in any application will require the prior approval of UNSW.

All drives are to be high efficiency Variable Voltage Variable Frequency.

Regenerative drives are not mandatory but, if proven beneficial and appropriate for a particular installation, will be encouraged.

The lifts shall also have a self contained emergency operation feature to allow the lift to travel to the nearest floor and release passengers in the event of loss of power supply from the street.

Hydraulic lifts are not to be used without the prior approval of UNSW.

a) *Geared or Gearless Lifts (with a machine room)*

To be used for all lift applications.

b) *Machine Room Less (MRL)*

Prior approval required and clear benefits provided why an MRL lift is being installed rather than a lift with an overhead machine room. Where approved, their use shall be restricted to applications up to 12 metres rise. The speed shall be no less than 1 metre and no more than 1.75 metres per second.

c) *Escalators.*

1. Step chains shall have a minimum service life of at least 100,000 hours.
2. All step chain rollers are to have roller or ball bearings not bushes
3. The use of nylon or other "soft" materials shall not be used for major items such as drive and handrail sprockets
4. Automatic lubricators, if provided, shall have sufficient capacity to provide lubrication at appropriate levels for periods of at least 1 (one) month without topping up.
5. All handrail returns (newels) are to have roller guides not sliders.
6. Balustrades are to be made of substantial materials other than glass unless otherwise approved by the UNSW.
7. There shall be at least 3 level steps at the entry and exit of each escalator.
8. The speed of any escalator shall be limited to no more than 0.5 mps
9. NT (thermoplastic elastomers with steel cables and slider fabric) handrails shall be used instead of traditional rubber.

#### E.5.1.9. Lift Monitoring

All lifts (excluding Dumb Waiters) and escalators are to have certain functions monitored by a campus Building Management System (BMS). The BMS shall be located in one particular place on campus. It will be run on BACnet, which is a communication protocol for building automation and control networks.

The following functions and operations shall be monitored by the BMS.

- Lift/escalator fail to start

- Lift on Fire Service
- Alarm button pressed (escalator stop button pressed)
- Lift on Independent Service
- Lift/escalator on normal operation
- Lift/escalator on maintenance
- Lift on Hazardous Goods Operation
- Lift car position (escalator direction)
- Lift position (see note)

The interface between the lifts and the BMS shall be by a suitable BACnet gateway and implemented as follows:

1. The lift microprocessor shall be directly linked at a high level interface or gateway to indicate status and fault information to be monitored at real time continuously via the BMS

or

2. Inputs from the lifts to indicate status and fault information to the BMS will be by voltage free relay contacts rated at 240Vac 1A resistive load.

Note Lift Position. This feature is optional and may be only applied to high rise buildings (i.e. more than 10 floors). If a high level interface is not provided between the lifts and BMS the lift position shall be connected via a binary code output supplied by the Lift Contractor. Refer Appendix ### for suggested code and signals.

The Lifts trade shall supply and install all cable and conduit between terminal strips and interface box provided by the Lift Contractor adjacent to each lift machine room (or top landing lobby for MRL lifts) and the BMS for the transfer of signals between the systems. The Lifts trade shall also provide assistance in testing and all other requirements necessary for the commissioning and correct operation and monitoring of the required functions between the lifts and the BMS.

Refer to BMS attachment for full details.

#### **E.5.1.10. Lift Cars**

All controls are to have vandal resistant controls and communication systems.

Any lift car emergency phone system must be a commercially available system e.g. emFone (proprietary systems such as the Otis REM system will not be accepted) that shall be directly connected to the University's Security Office phone system for 24 hour monitoring. Each lift will require a separate telephone line and be allocated a unique phone number.

Full details of the UNSW phone system must be obtained and compatibility confirmed by the lift contractor before installation so that the lift car emergency phone system will work correctly when installed.

All lifts are to be numbered consecutively as per the UNSW lift numbering system.

All lift cars must have a roof trap door compliant with AS1735.2-2001 Clause 23.14 (a), regardless of compliance with parts (b) & (c).

The lift car emergency lighting must comply with or exceed AS 1735.2 - 2001 Clause 23.25.2.9 (not AS1735.1 Amendment 2006). EN81 compliance is not acceptable. In particular there must be a minimum of 20 lux on each control panel.

### **Passenger Lifts**

The minimum size of lift cars shall be 13 persons (1400 mm wide x 1600 mm deep car platform) for all passenger lifts regardless of travel distance and number of floors served.

The lifts are to have provision for protective blankets in all lift cars to protect their finishes.

Lift car finishes shall be or equivalent to the following.

- 6wl rimex 'lucido' on 6mm minimum backing with folds to side walls and lower half of rear wall. Note that the lift car must have an outer shell, backing timber or equivalent of at least 6 mm and then the car finishes applied to the timber. lift car finishes must not be the metal lift car shell or attached directly to the shell.
- bump rails (bump rails shall be installed on both sides and rear wall, hard wood timber estapol finish 150 mm x 20 mm thick) just below the handrails and again 50mm above the lift car floor
- aluminium framed laminated silver mirror to offset portions of side walls only - not directly apposite each other
- fixed "white" coloured laminated lift car ceiling
- 38mm dia. s/steel handrail securely attached to side and rear wall
- lift car lighting, LED
- car door and car front, finished stainless steel
- Floor covering Amtico vinyl tiles - ceramic black
- Car and landing buttons must be commercially available "third party supplier" items (e.g. Dewhurst) fully AS1735.12 compliant with White/Blue Illumination. Generic lift company manufactured items will not be accepted regardless of quality

- Car and landing indication must be commercially available “third party supplier” items (e.g. DesignCom etc) fully AS1735.12 compliant with White/Blue floor illumination. Generic lift company manufactured items will not be accepted regardless of quality

#### **Goods Lifts**

- Goods lifts shall have similar finishes with bump rails (bump rails shall be installed on both sides and rear wall, and again 50mm above the lift car floor, hard wood timber estapol finish 300 mm x 20 mm thick) and possible omission of the lift car mirrors.
- Goods lifts are to have appropriate finishes for the intended use, as a minimum they must be durable and easily cleaned.
- Goods lifts are to be sized and have features as required for their particular application and usage. See section on Hazardous Goods Operation.
- Specialist goods lifts for chemicals, animals, etc may require special finishes that must be co-ordinated with the Project Manager, Designer and End User.

#### **E.5.1.11. Keyed Operation**

- a) Fire service keying is to be: *“Low & Fletcher - Type 701.”*
- b) All other maintenance and service functions (i.e. fan, light, maintenance cabinet, etc) are to be keyed to be:  
  
*“Low & Fletcher – Type 702”.*
- c) Lift machine room doors and MRL controller cabinets are to be keyed to the UNSW bi lock system

#### **E.5.1.12. Assessment, Commissioning & Training**

The University Facilities Management is to be involved in all new lift tender assessments. All documentation must be made available to the University Facilities Management with at least one week prior notice of the assessment date.

University Facilities Management is to be involved in the commissioning of all new lift installations. At least 2 weeks prior notice is to be given to the University Facilities Management of any commissioning of new lifts.

Prior to commissioning of any new lifts (at least 2 week) University Facilities Management is to be provided with at least one Copy of the Operational and Maintenance Manuals for the particular lift.

On completion of the installation a complete set of as-installed documentation is to be provided to the University Facilities Management. A



Safe to Operate Certificate and full/completed WorkCover registration forms must be provided by the lift installer prior to the lift being placed into service.

A training session or sessions is to be provided for the lift users and the University Facilities Management after the testing and commissioning is successfully completed. This training session/s is to be at no additional cost. The training session/s is to include, as a minimum, the operation of the lift and its controls, keys and locks, cleaning of all finishes, operation in an emergency (such as fire or power failure), hanging/cleaning/storage of protective curtains, etc. The Lift contractor is to allow for at least 2 sessions of 2 hours each.

### **E.5.2. Maintenance**

The University has many lifts under maintenance and requires all new lifts to be as compatible and easily integrated with the existing lifts and lift maintenance contract. 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.

#### **E.5.2.1. Maintainability**

##### **Independent Maintainability**

All new lift equipment must be able to be fully and effectively repaired, serviced and maintained, in accordance with the requirements and recommendations of each designer, supplier, manufacturer and installer of the lift equipment (including as set out in the Operation and Maintenance Manuals required under the contract), by any qualified and competent lift maintenance contractor without the need to rely on or use devices, spare parts or intellectual property of a proprietary nature such as, but not limited to, tools, instruments, pass words, software, keys and cards, even if only required on very infrequent occasions.

Without limiting the foregoing, the lift equipment will be deemed to be not compliant with this requirement if it is reasonably necessary for UNSW or its maintenance contractor to, at any time during the life of the lift equipment, to pay and/or to enter into contractual arrangements with, a designer, supplier, manufacturer or installer of the lift equipment, for access to, or for the use of, any thing or any intellectual property in order to effectively repair, service or maintain the lift equipment.

##### **Supported Maintainability**

The University will consider new lift equipment, which is not compliant with the independent maintainability requirement in Independent Maintainability above if:

- a) all devices, spare parts and intellectual property required for independent maintainability will be provided to or made available to the University at, and as part of the requirements for, practical completion; and
- b) no additional amount will be payable at any time to the contractor or any third party for the University or its contractors to receive or to have access to the relevant devices, spare parts or intellectual property. All Operation and Maintenance manuals are to include instructions on how to use or apply these tools, instruments, pass words, keys, cards, spare parts and intellectual property.etc.

#### E.5.2.2. Integration With Existing Maintenance Procedures

The following procedures shall be included into any new lift construction specification to assist the integration of any new lifts into the existing lift maintenance program.

- a) FM Engineering Operations is to be involved in all new lift tender assessments. All documentation must be made available to the Section with at least one week prior notice of the assessment date.
- b) FM Engineering Operations is to be involved in the commissioning of all new lift installations. At least 2 weeks prior notice is to be given to the Section of any commissioning of new lifts.
- c) Prior to commissioning of any new lifts (at least 1 week) FM Engineering Operations is to be provided with at least one copy of the Operational and Maintenance Manuals for the particular lift.
- d) The contact for FM Engineering Operations is the Manager Engineering Operations, Mathews Building F23, Kensington. Telephone: 9385 4299
- e) The Defects Liability Period for new and refurbished lifts will be at least 12 months in duration. The maintenance must comply with the procedures for recording and reporting of the existing lifts that are in place for the University at the time of tender. Copy of reporting procedure attached. It is the contractor's responsibility to ensure that the procedures being applied are current and the latest available.

#### E.5.2.3. Lift Lighting

Maintenance of lift car, shaft, pit and machine room lighting is to be included as part of the lift maintenance contract for each lift installation.

Lift shaft lights must be provided by 36 Watt florescent light fittings at a maximum spacing of 6 metres. The lights are to have metal mesh guarding and the wiring between fittings is to be enclosed in at least plastic conduit supported by metal saddles at 1.5 metre intervals.

#### E.5.2.4. Reporting, Logging Of Visits and Inspections

The Contractor must seamlessly integrate with UNSW's computerised maintenance management system – ARCHIBUS including the input and maintenance of detailed and current information in ARCHIBUS including Work and Service Requests, repairs, maintenance schedules, maintenance tasks, invoicing, asset register changes, asbestos register, work flow tracking, close out reports, consumables and costs etc. These details and information requirements may vary from time to time as directed by UNSW Facilities Management.

In addition to ARCHIBUS the following documentation may be required:

- a) The Contractor shall provide the University Representative with an approved Breakdown Calls Log, which must be kept on site in a designated location, and the Contractor must enter in the Breakdown Calls Log a record of each visit made in response to a Breakdown.
- b) Breakdown Calls Log entries must be made at the time that the visits, service calls or repairs are made.
- c) The Contractor must present the Breakdown Calls Log to the University Representative for signature at regular intervals of not more than 1 month.
- d) The Contractor must record the following details in the Breakdown Calls Log:
  - (i) *Time of arrival;*
  - (ii) *Time of departure;*
  - (iii) *Details of repairs or replacements carried out;*
  - (iv) *Details of all call out attendances and nature of fault rectified;*
  - (v) *Details of all tests and adjustments carried out;*
  - (vi) *Mechanics names.*
- e) The Contractor shall on the first day of each month forward to the University Representative a detailed list of all maintenance visits, Breakdowns, or stoppages and rectification effected. The Breakdown report shall be in "Spreadsheet" form in a format, which will enable the University Representative to assess the number of Breakdowns per lift per month. A sample proforma is attached as Annexure C, for the Contractor's guidance.

#### E.5.2.5. Maintenance Schedule

In addition to the logging of visits all routine maintenance items as scheduled are to be initialled and dated in the appropriate column in the Maintenance Schedule by the person carrying out the work.

#### E.5.2.6. Lift Performance Reports

On the first day of each Quarter the Contractor must provide the lift performance information in Annexure A to the University Representative. The format in Annexure B is to be used as a guide to the setting out of the information, in spreadsheet format.

#### E.5.2.7. Inspections

a) The Contractor shall when required by the University's Representative and at no greater than 12 monthly intervals inspect the entire elevator equipment in company with the University's Representative to ascertain the condition in which the equipment is being maintained. Such an inspection shall not in any way relieve the Contractor of its obligations to perform the Lift Services.

b) The Contractor shall immediately prior to the completion of the Defects Liability Period inspect the entire elevator equipment in company with the University's Representative to ascertain the condition in which the equipment is being maintained.

The responsibility for arranging such inspections shall rest with the Contractor. The Contractor must give a minimum of two (2) weeks notice to the University Representative of such any inspection.

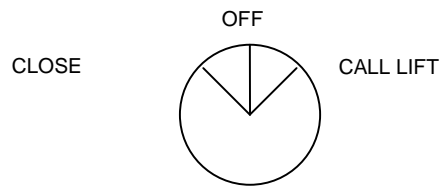
Final completion at the end of the Defects Liability Period will not be granted without this inspection being satisfactorily completed and all defects rectified.

### E.5.3. **Hazardous Goods Operation**

Lifts required to have the Hazardous Goods feature (HGS) will generally operate in the following fashion although the lift installer will need to confirm in each case the details with FM Engineering as some features, such as the return floor for fire service, may vary from lift to lift.

#### **LANDING PANELS (LOP)**

All landing panels 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.

### **CAR OPERATING PANEL (COP)**

In addition to normal switches, there will be a two position switch 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 Car Operating panel and the landing will be of the Bi-Lock type.

### **METHOD OF OPERATION**

1. When the **HGS** key switch is in the “**OFF**” position the designated elevator will operate normally and where applicable as part of an elevator group.
2. The attendant turns the key switch in the LOP clockwise from the “**OFF**” to the “**CALL LIFT**” position.
3. An in car announcement is made.
  - a. “**Please exit at the next stop, this elevator is required for special service**”. Note, this audio announcement will repeat approximately every 10 seconds
  - b. An illuminated flashing sign in the elevator COP will light “**Special service operation**”
4. Hall call response is inhibited
5. The elevator 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 elevator will travel (non Stop) to the “calling” floor (at which the **HGS** switch is selected.)
7. Open its doors.
8. The elevator 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 elevator will remain “captive” in the **HGS** mode of operation for **60 seconds**.
  - a. (If the process does not proceed to the next stage, the elevator will return to normal service.)
11. The **HGS 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 elevator 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 elevator 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 elevator returns to normal service.

## NOTES

The **HGS** mode of operation will not **initiate** if

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

### When the **HGS** mode is activated

Selection of the **HFS** mode 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 elevator car, advising the attendant (passenger) to abandon the use of the elevator and exit the elevator before the doors close and the lift returns to the designated floor.

Note. The UNSW CBACS will be programmed to raise an alarm if the lift is in **HGS** for more than **60** minutes.