

## 11 – Vertical Transport

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Version	Date	Authors	Summary of Changes
0.0	17 July 2020	John Tibbitts	Generally revised.
0.1	27 August 2020	John Tibbitts	Electro-hydraulic drives removed, communication systems more detailed, Number of breakdowns revised.

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### 11.1. Introduction

The Australian National University (ANU or the University) has a number of lifts on its main Campuses. These existing lifts are of various ages, designs and manufacture. In order to maximise operational availability of lifts, the service contractor is to provide adequate technical logistic support and is also required to have in stock at all times, serviceable spare parts and be able to provide for an alternative technical solution as the need arises.

The ANU wishes to standardise, as much as possible, any new lift system to meet, but not be limited to, the following minimum basic requirements: -

- a. The lifts must be safe and comply with all relevant codes, standards and local authority requirements;
- b. The lifts must be easily maintained, by a single lift maintenance contactor (other than the original manufacturer);
- c. The lifts must be maintained such that problems, breakdowns or callouts are kept to a minimum. Breakdowns/callouts to be kept to a minimum average of 5 breakdowns/callouts per lift per annum;
- d. The lifts must have a proven, local history of reliability;
- e. The lifts are to be as flexible and versatile in operation as possible;
- f. All controls and car finishes must be robust and vandal resistant;
- g. The lifts must meet the minimum standards for waiting times and handling capacities;
- h. The lifts must meet the requirements for use of persons with disabilities as defined by the latest version of AS1735.12 and the National Construction Code of Australia.

The CBRM is intended to be read and distributed electronically. This does not preclude printing sections of the Requirements; however, the University takes no responsibility for the completeness and currency of printed/hard copy material distributed amongst the Consultant team. Notwithstanding any Consultant's particular discipline or area of responsibility, each Consultant and/or designer shall consider the document in its entirety.

The complete CBRM consists of the following Sections which may be referred to within this Section: -

Campus & Building Requirements Manual	
Section 01	General Requirements
Section 02	Architectural Requirements
Section 03	Roads, Car Parking & Civil Works

Section 04	Soft Landscaping
Section 05	Roofing, Roof Fabric & Roof Safety
Section 06	Building Management Systems
Section 07	Electrical Services
Section 08	Fire Protection Systems
Section 09	Hydraulic Systems
Section 10	Mechanical Services
Section 11	Vertical Transport
Section 12	Security, CCTV & Access Control

## 11.2. Requirements

The requirements of this manual shall be used as the minimum standard for all new or refurbished lift installations on ANU campus.

Any new installation shall be installed by a competent, well-established, lift contractor with at least 10 years local lift installation experience and must have an office in the State (or region) in which the lift is to be installed.

The lifts must comply with all relevant Standards, Regulations, Codes of Practice and local rules as well as being certified as being compliant with such and certified as safe to use prior to the lift being placed into service.

All new lifts shall comply with the latest version of AS1735.12 and the National Construction Code of Australia. Existing lifts when modernised shall comply with the latest version of AS1735.12 and the National Construction Code of Australia where practical.

Consideration should 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 consume less power and/or is more environmentally friendly, shall have preference over a less efficient system.

Electro-hydraulic passenger lifts are not considered as an acceptable type of lift for the movement of passengers.

All lifts shall be housed in a lift shaft which has a waterproof pit with a 300mm x 300mm x 300mm dry pit covered by a chequer plate cover.

As numerous high passenger up peaks, two-way traffic peaks and down peaks may be placed on the vertical transportation system throughout each day, the system must be able to provide a very high level of service at all times particularly during these peaks.

Vertical transportation services for classrooms, laboratories, lecture theatres, etc.; shall provide a level of service to ensure that at no time (even under the most intensive demand), a passenger has to wait more than 5 minutes for a lift. Only well-established lift systems that have a proven track record of reliability and ease of maintenance should be considered.

### 11.3. Standards

All new lift installations must comply with at least, but not only, the latest versions of the following standards and requirements: -

- a. AS1735.1 — Lifts, Escalators, & Moving walks — Part 1: General Requirements;
- b. AS1735.4 — Lifts, Escalators, & Moving walks — Part 4: Electric and hydraulic service lifts. For Electric Service lifts (previously termed Dumb Waiters) only. Hydraulic service lifts are considered unacceptable;
- c. AS1735.5.1 — Lifts, Escalators, & Moving walks — Part 5.1: General requirements;
- d. AS1735.5.2 — Lifts, Escalators, & Moving walks — Part 5.2: Rules for the improvement of existing escalators and moving walks;
- e. AS1735.5.3 — Lifts, Escalators, & Moving walks — Part 5.3: Correlation between previous and current EN115;
- f. AS1735.5.4 — Lifts, Escalators, & Moving walks — Part 5.4: Interpretations;
- g. AS1735.7 — Lifts, Escalators, & Moving walks — Part 7: Stairway lifts (Stairway lifts only);
- h. AS1735.11 — Lifts, Escalators, & Moving walks — Part 11: Fire rated landing doors;
- i. AS1735.12 — Lifts, Escalators, & Moving walks — Part 12: Facilities for persons with disabilities;
- j. AS1735.19 — Lifts, Escalators, & Moving walks — Part 19: Lifts for the transport of persons and goods - Remote alarm on passenger and goods passenger lifts;
- k. ISO 8100 – 32 Planning and selection of passenger lifts to be installed in office, hotel and residential buildings;
- l. AS/NZS 3000— Electrical Installations (Australian/New Zealand Wiring Rules);
- m. National Construction Code of Australia;
- n. AS 1428.1 — Design for access and mobility-General requirements for access-Building and facilities;
- o. AS 1428.2 — Design for access and mobility-General requirements for access-New building work;
- p. EN — 81.20 — Safety Rules for the Construction and Installation of Lifts;
- q. Requirements of the State Fire Brigade and
- r. Any applicable local Safety Inspectorate or local Council requirements.

### 11.4. Minimum Vertical Transportation Services

For 2 and 3 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 meters or there are more than 3 floors served, consideration should be given to more than one lift being installed.

Where classrooms, lecture theatres, laboratories, etc. are involved, the use of escalators, at least in part, should be seriously considered.

### 11.5. Requirements and Standards for Persons with Disabilities

All lifts installed at any of the ANU campus shall comply with the National Construction Code of Australia requirement for People with Disabilities and the latest version of AS1735.12.

Only lifts complying with EN 81.20 shall be used for providing access for people with disabilities.

The following lifts shall not be used to provide access for people with disabilities.

- AS1735.14 Lifts, escalators & moving walks - Low rise platforms for passengers;
- AS1735.15 Lifts, escalators & moving walks - Low rise passenger lifts - Non-automatically controlled lifts.

### 11.6. Provision for Stretchers and Emergency Lifts

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

### 11.7. Performance Requirements (Administrative and Office Buildings Only)

Normal passenger lift service in administrative or office buildings, as distinct from lifts for classrooms, lecture theatres, laboratories, goods service or lifts provided exclusively as a facility for Persons with a disability, shall be designed in accordance with ISO 8100 – 32.

#### For lift groups of less than three lifts: -

- a. The control system shall be of the full collective type with up and down direction call buttons in the lift lobbies and destination floor buttons located in the car operating panel within the lift car;
- b. The maximum up peak waiting interval shall be 30 seconds;
- c. The minimum 5-minute up peak handling capacity shall be 12% of the building population above the main/lowest floor landing.

#### For lift groups of three or more lifts: -

- a. The control system shall be of the destination control system (DCS) type with means to select the destination floor in the lift lobbies and no floor buttons accessible to the public in the lift car;
- b. Passengers to select their destination floor from the lift lobby and be directed to the particular lift in which to travel, to reach their destination floor;
- c. The maximum average up peak waiting time shall be 30 seconds;

- d. The minimum 5-minute up peak handling capacity shall be 12% of the building population above the main/lowest floor landing;
- e. The maximum average lunch peak waiting time shall be 40 seconds;
- f. The minimum 5-minute lunch time handling capacity shall be 11% of the building population above the main/lowest floor landing.

### 11.8. Performance Requirements (Classrooms, Lecture Theatres, etc.)

The basic requirement for classrooms, lecture theatres, etc. shall be a minimum 5-minute handling capacity of 25% (twenty five percent) of the capacity of the classrooms, lecture theatres, etc. served by the lifts. Average waiting times should not exceed 35 seconds.

For any lift installation in a building of this type, careful and thorough theoretical traffic analysis is required.

A detailed study is to be carried out and a full written report is to be provided by an appropriate, independent qualified vertical transport consultant or at least 3 separate studies supplied by 3 potential tendering lift companies.

For buildings containing classrooms, lecture theatres etc. serious consideration should be given to the possible use of 1000mm wide escalators.

### 11.9. Performance Requirements (Special Circumstances and Mixture of Classrooms and Offices)

Where a building has a mix of classrooms and offices, it will be evaluated on an individual basis.

### 11.10. Type of Lift Drive

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

#### Overhead Machine Room Less

To be used for lift groups of less than three lifts and for speeds of up to 2.5 meters per second dependent on rated load.

#### Overhead with Machine Room

To be used for lifts requiring a speed of 2.5 meters per second or over, dependent on rated load and higher speeds.

#### Main drive

Variable Voltage, Variable Frequency, with regenerative drives to be used where possible.

### 11.11. Escalators

Escalators shall be of the heavy duty, cleat step, reversible type, for an ascending and descending transportation service. They shall operate on an incline of 30° from the horizontal and shall be designed for quiet, smooth and reliable operation.

Escalator trusses shall be of such lengths as to contain the driving unit compartments integral in the upper section and to span the length of openings in the respective floors.

Provision shall be made in the pit and truss areas for fire sprinklers and smoke detectors in the machine room by others, as required.

Escalators shall be provided with at least 3 level steps at the entry and exit of each escalator.

The speed of escalators shall be 0.5 meter per second.

Escalators shall be installed such that during periods of low demand, the escalators shall run at slow/standby speed to conserve power. After a nominated period of slow speed operation, the escalators shall come to a controlled stop and cease operation. Upon activation of an approved passenger protection system the escalators' speed shall gradually increase to full operating speed before passengers reach the comb intersection line.

### 11.12. Lift Details

The minimum size of lift cars shall be 12 persons for all passenger lifts.

Lift doors and frames must be finished satin stainless steel to approval for both car and landings.

Internal car finishes must be textured stainless steel or similar approved and are to have provision to hang protective blankets to protect finishes.

Stainless steel bump rails shall be installed on the sides and rear wall of all lift cars, just above the lift car floor.

Goods lifts are to be sized and have features as required for their particular application and usage. All lifts that specifically carry goods shall have durable and appropriate finishes. Handrails shall be kept to a minimum and provided only as required by the Australian Standard AS1735.12.

All lift car and landing controls and communication systems are to be vandal resistant.

### 11.13. Communications

The emergency phone systems shall comply with AS1735.19 and are to be auto dialing, hands free and shall be directly connected to the ANU's Security Office for 24-hour monitoring.

Communication shall be two-way voice type.



Upon initiation of the auto dialing device, the user shall not be able to interrupt the two-way communication. However, the user shall always be able to re-initiate the communication.

The phone shall have dual path 3G or 4G cellular connections via dual SIM cards purchased through the lift service provider.

The phone and the communication medium shall remain operational in the case of a loss of electrical power.

Means shall be provided to automatically inform the ANU's Security Office and/or remove the lift from service when the capacity of the rechargeable electrical power supply is lower than needed to provide one (1) hour of functionality of the communication facility.

#### 11.14. Maintenance

The ANU has many lifts under maintenance. All new lifts shall be compatible with and easily integrated into the ANU's preventive maintenance programs.

To that end, consideration must be given to the ease with which the proposed lift/s can be integrated into the ANU's preventive maintenance programs and be maintained by the existing period contractor.

Documentation for the emergency communication system, included in new lift specifications, must include a requirement that with any a change in Lift Service maintenance providers, the Cellular Gateway System is to remain the property of The Australian National University. The outgoing Lift Service Maintenance Provider shall cancel the SIM cards after a predetermined timeframe and the newly appointed Lift Service Maintenance Provider will replace the SIM Cards in the Cellular Gateway System on the commencement of the new Lift Service Agreement, with no loss of service.

Documentation that clearly identifies the lift/s as being easily and effectively maintained by the existing period contractor, must be provided before any new lift system can be accepted.

#### 11.15. Integration with Existing Maintenance Procedures

The following conditions are to be included in all new lift construction specifications so as to assist the integration of any new lifts into the existing lift maintenance program.

- a. The ANU's Facilities & Services Division will be involved in all new vertical transportation tender assessments. All tender documentation must be made available to the SMM at least 1 week prior to the assessment date.
- b. The ANU's Facilities & Services Division is to be involved in the commissioning of all new lift installations. At least 2 weeks prior notice of any commissioning of new lifts shall be given to the Facilities & Services Division.

- c. At least one week prior to the commissioning of any new lift/s the SMM shall be given, at least one (1) hard copy + one electronic copy of the Operational and Maintenance Manuals for the particular lift/s.
- d. The manual must contain the ACT Work cover lift registration number and design number.
- e. All lifts placed into a Defects Liability Period registrar must comply with the Procedures for recording and reporting of existing lifts that are in place for the ANU at the time of tender.

### 11.16. Passenger Lift Interiors

Lift car floors shall be carpet or vinyl. In no case is stone to be used as part of the lift car interiors.

All stainless-steel linings on the side and rear walls shall have a textured finish to limit damage.

The use of handrails shall be kept to a minimum in lift cars and comply with the latest version of AS1735.12.

### 11.17. Training

Training sessions for the lift users and the SMM, shall be provided at no additional cost, following the testing and commissioning being successfully completed. The training is to include 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.

### 11.18. Lift Keys

All lift key operated controls and locks must be keyed to comply with the ANU key register. This is to include lift machine room doors, controller cabinets, lift operating procedures, etc.

### 11.19. Completion

Refer to previous relevant section of this Manual.

## Cranes

### 11.20. General

The Acton Campus, NARU, Mt Stromlo Observatory, Siding Spring Observatory have a variety of cranes, hoists & winches in various buildings.

The cranes are maintained by the relevant schools and/or technical departments of the schools.

All documentation for servicing/testing of this equipment shall be forwarded to Facilities & Services to be placed in the relevant building files

All cranes, hoist & winches will comply with the relevant parts of AS1418.

### 11.21. Standards

All new crane installations must comply with at least, but not only, the following standards and requirements: -

#### Australian Standards

- a. AS1055 Acoustics - Description and measurement of environmental noise;
- b. AS1170 relevant parts, including AS1170.3 Part 3: Snow loads;
- c. AS1360 Rotating electrical machines of particular types or for particular applications
- d. AS2752 Preferred numbers and their use
- e. AS2759 Steel wire rope—Use, operation and maintenance
- f. AS2938 Gears - Spur and helical - Guide to specification and rating
- g. AS3569 Steel wire ropes - Product specification

#### British Standards

- a. BS2573 Rules for the design of cranes including AS2573.1 Part 1: Specification for classification, stress calculations and design criteria for structures
- b. AS8004 Code of practice for foundations

#### DIN (German Standards)

DIN50100 Load controlled fatigue testing - Execution and evaluation of cyclic tests at constant load amplitudes on metallic specimens and components  
VDE 0109 Part 10: Insulation coordination within low-voltage systems.