



University of Wollongong

Vertical Transport Commissioning Standard
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9. VERTICAL TRANSPORTATION

The primary functions of vertical transportation are to facilitate non-emergency pedestrian flows within the building, provide disability access and provide conveyance of heavy or bulky goods.

Vertical transport systems comprise:

- a. Lift car;
- b. Lift controls;
- c. Trailing cables;
- d. Lift communications;
- e. Lift interfaces.

9.1 OVERVIEW

The quality control process for the mechanical services involves the following stages:

Stages	Description	Parties Involved
Stage 1	Unit Testing - Performed by the manufacturer of the equipment.	Manufacturer
Stage 2	Installation Inspections - Performed by the project manager during the installation process. The objective is to identify poorly installed equipment or areas of non-compliance with the provisions of the design specifications. Provided the defect is identified at an early stage, the cost of remedial work and delays to the project program can be minimised.	Project Manager
Stage 3	Final Commissioning - Performed by the installation contractor and witnessed by the project manager.	Contractor, Project Manager

Table 1 - Commissioning Stages

Final commissioning is the most important part of the quality control process. It is at this stage of the project that the project manager will determine whether the system is ready to be approved for Practical Completion.

All commissioning tests are critical and shall be performed to ensure that all vertical transport systems operate correctly. It is UOW's objective to complete the commissioning tests with zero defects remaining in the system.

The commissioning tests have been designed to test the functionality and performance of the vertical transportation equipment and controls. It is important to ensure that the vertical transport systems operate efficiently and safely and comply with the design specification.



9.2 COMMISSIONING PROCESS

The following flow diagram depicts the commissioning process:

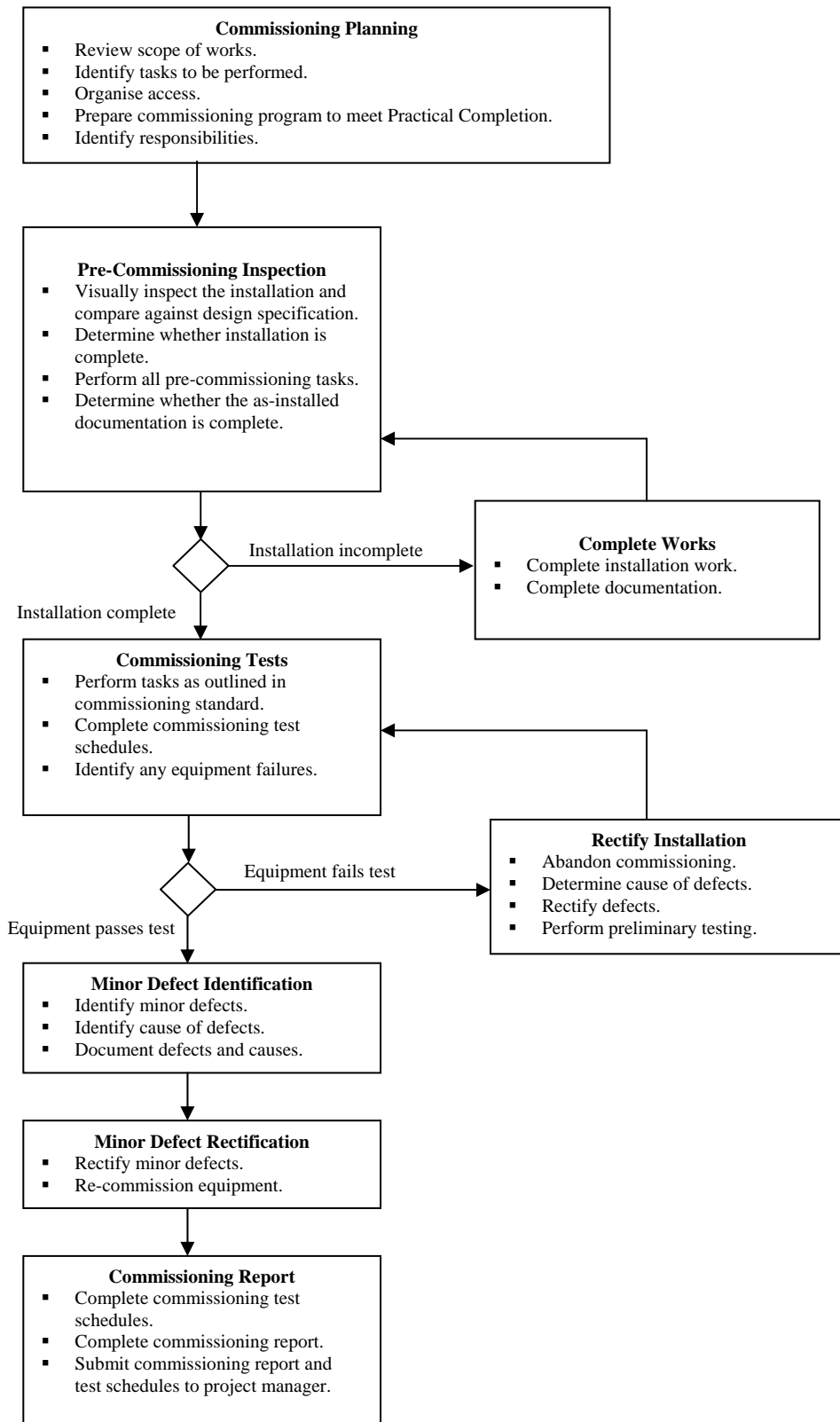


Figure 1 - Commissioning Process Flowchart



9.3 DOCUMENTATION

The contractor shall submit a complete set of documentation to the project manager no later than one (1) week prior to the planned commissioning date. As a minimum the documentation shall comprise:

- a. As-installed drawings;
- b. Equipment technical manuals;
- c. Equipment operation manuals;
- d. Software manuals.

The contractor shall obtain written approval of the documentation from the project manager before commencing the commissioning tests.

9.4 COMMISSIONING TIME AND DATE

The contractor shall submit a program to the project manager containing the proposed time and date for each commissioning test at least two (2) weeks prior to the planned commissioning date. The program must contain allowances for defect rectification and remedial works.

The contractor shall obtain written approval of the program from the project manager before commencing the commissioning tests.

9.5 COMMISSIONING TESTS

Commissioning tests shall be performed to assess the functionality and performance of the vertical transport system. Each commissioning test is specific to the equipment being tested.

Persons with qualifications and experience suitable for the testing and inspection tasks shall perform all commissioning tasks and associated remedial work.

As each commissioning test is performed, the results shall be recorded on the appropriate commissioning test schedule. Any comments regarding abnormal operation in particular to failed tests shall be recorded in the comments section of the commissioning schedule.

If the equipment fails a test then the commissioning process shall be abandoned. The contractor shall determine the cause of the defects and retest the equipment. A report shall be provided to the project manager outlining the cause of the failure and the action taken to ensure that the remainder of the installation shall not experience the same failure.

All tests shall be performed in accordance with relevant codes, regulations and standards. Appropriate safety precautions and procedures must be followed at all times.



9.5.1 Electrical & Communications Cabling

The contractor shall perform the following commissioning tasks for all electrical and communications cabling:

- a. Verify that cabling has been correctly sized;
- b. Verify the correct type of cabling has been selected;
- c. Verify that cabling has been protected from mechanical damage;
- d. Verify that cabling has been concealed wherever possible in ceiling spaces, wall cavities, risers and the like;
- e. Verify that all cabling has been correctly labelled in accordance with UOW's labelling convention.

9.5.2 Hoistway

The contractor shall perform the following commissioning tasks for all hoistways:

- a. Verify by visual inspection that the hoistway has been completely and correctly constructed;
- b. Verify by visual inspection that the hoistway is clean and dry;
- c. Verify that the lift shaft is easily accessible for maintenance;
- d. Verify that adequate lighting has been provided in the lift shaft;
- e. Verify that a top of car inspection unit has been installed;
- f. Verify that the top of car inspection unit has full control of the lift for maintenance purposes;
- g. Verify that emergency stop switches have been provided at the top and bottom of the lift pit access ladder;
- h. Verify the operation the emergency stop switches;
- i. Verify that counterweight guards have been installed in the lift pit;
- j. Verify that adequate ventilation has been provided to prevent undesirable air flows from lift car movement;
- k. Verify that adequate insulation has been provided to prevent noise from travelling between floors through the lift shaft.



9.5.3 Machine Room

The contractor shall perform the following commissioning tasks for the lift machine room:

- a. Verify that adequate ventilation and cooling has been provided to prevent equipment overheating;
- b. Verify that adequate lighting has been provided in the lift machine room;
- c. Verify walls, floor and ceiling have been finished with a high gloss paint for ease of cleaning;
- d. Verify that the machine room equipment has been labelled in accordance with UOW's asset register convention;
- e. Verify that signage has been provided to identify the machine room access door and that the signage is in accordance with UOW's signage convention.

9.5.4 Lift Cars

The contractor shall perform the following commissioning tasks for all lift cars:

- a. Verify that all lift cars (passenger, goods and restricted use transportation) have been constructed to the specified dimensions and load bearing capacity in the design documentation;
- b. Verify that lift cars have been provided with adequate lighting;
- c. Verify that an exhaust fan has been installed and operates correctly in all enclosed lift cars;
- d. Verify that an emergency phone with an automatic connection to the lift monitoring facility has been provided in each lift car;
- e. Verify that passenger lift cars are wheel chair accessible.

9.5.5 Lift Controls

The contractor shall perform the following commissioning tasks for all lift controls. The contractor shall perform all tests during peak demand periods whenever possible.

- a. Verify that all buttons have been installed at the correct height;
- b. Verify that all buttons have been correctly embossed with Braille equivalents;



- c. Verify that down buttons have been illuminated with red LEDs;
- d. Verify that up buttons have been illuminated with green LEDs;
- e. Verify that indicator signs have been provided outside each lift entrance on each floor and that signs indicate direction of travel, floor location and operational messages such as "Out of Service";
- f. Verify that the voice annunciation feature is clear and audible;
- g. Press the call button for a lift and verify that the lift arrives within 65 seconds. Record the waiting time in the commissioning schedule;
- h. Press the button to each floor and verify that the lift stops at each floor, doors open to allow passengers to alight or enter lift and doors close automatically after passenger flow has ceased;
- i. Verify that the emergency stop button stops the lift and applies emergency brakes. Verify that an alarm is received at the operator terminal to indicate that the emergency stop action has been activated;
- j. Verify the operation of the door open button;
- k. Verify the operation of the door close button;
- l. Verify that the lift doors will not close while an object or person is between the lift doors.

9.5.6 Operator Terminal

The contractor shall perform the following commissioning tasks for the lift operator terminal:

- a. Verify that all hardware and peripherals have been supplied and correctly connected, including a central processing unit and an LCD monitor;
- b. Verify that all drivers and software control and monitoring programs have been correctly installed and configured;
- c. Verify that a backup copy of the latest version of the application software is available at the operator terminal;
- d. Verify that the operator terminal has been programmed to perform the following functions:
 - Alarm management;
 - Control strategy programming;
 - Lift car access programming;
 - Manual control of lift cars;



- Interfaced communication with BMCS, EMAC and fire systems;
 - Reporting.
- e. Verify that the operator terminal can produce the following reports:
- Lift Alarm Report;
 - Out of Service Report;
 - System Communications Fault Report;
 - Operator Activity Report;
 - Lift Activity Report.

9.6 MINOR DEFECTS

As minor defects are identified during the commissioning tests, each defect shall be rectified before proceeding to the next test. The equipment that was found to be defective will be recorded in the commissioning report.

Once rectification is complete, the equipment shall be retested and the results recorded in the commissioning schedules.

9.7 COMMISSIONING SCHEDULES

The commissioning schedules shall be completed in accordance with this standard. Where equipment needs to be retested, the retest results shall be recorded. At the completion of the commissioning tests, UOW shall have one complete set of commissioning schedules containing all vertical transportation equipment that is free of defects.



9.7.1 Vertical Transportation Commissioning Schedule - Electrical & Communications Cabling

Building Number: _____ Building Name: _____
 Lift Number: _____ Lift Location: _____ Lift Type: _____ Lift Capacity: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Cable Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Cable Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Cabling Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



9.7.2 Vertical Transportation Commissioning Schedule - Hoistway

Building Number: _____ Building Name: _____
 Lift Number: _____ Lift Location: _____ Lift Type: _____ Lift Capacity: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Construction	<input type="checkbox"/>	<input type="checkbox"/>		
Clean & Dry	<input type="checkbox"/>	<input type="checkbox"/>		
Accessibility	<input type="checkbox"/>	<input type="checkbox"/>		
Lighting	<input type="checkbox"/>	<input type="checkbox"/>		
Top of Car Inspection Unit	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Counterweight Guards	<input type="checkbox"/>	<input type="checkbox"/>		
Ventilation	<input type="checkbox"/>	<input type="checkbox"/>		
Insulation	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



9.7.3 Vertical Transportation Commissioning Schedule - Machine Room

Building Number: _____ Building Name: _____
Lift Number: _____ Lift Location: _____ Lift Type: _____ Lift Capacity: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Ventilation & Cooling	<input type="checkbox"/>	<input type="checkbox"/>		
Lighting	<input type="checkbox"/>	<input type="checkbox"/>		
Wall, Floor & Ceiling Finishes	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Signage	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
Commissioning Contractor Representative: _____

Project Manager Name: _____
Project Manager Reference: _____



9.7.4 Vertical Transportation Commissioning Schedule - Lift Cars

Building Number: _____ Building Name: _____
 Lift Number: _____ Lift Location: _____

Lift Type: _____ Lift Capacity: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Construction	<input type="checkbox"/>	<input type="checkbox"/>		
Lighting	<input type="checkbox"/>	<input type="checkbox"/>		
Exhaust Fan	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Phone	<input type="checkbox"/>	<input type="checkbox"/>		
Wheel Chair Accessible	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: __/__/__

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



9.7.5 Vertical Transportation Commissioning Schedule - Lift Controls

Building Number: _____ Building Name: _____
 Lift Number: _____ Lift Location: _____ Lift Type: _____ Lift Capacity: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Button Height	<input type="checkbox"/>	<input type="checkbox"/>		
Braille	<input type="checkbox"/>	<input type="checkbox"/>		
Button Illumination	<input type="checkbox"/>	<input type="checkbox"/>		
Lift Indicator Signs	<input type="checkbox"/>	<input type="checkbox"/>		
Voice Annunciation	<input type="checkbox"/>	<input type="checkbox"/>		
Lift Waiting Time	<input type="checkbox"/>	<input type="checkbox"/>	Time in seconds:	
Floor Buttons	<input type="checkbox"/>	<input type="checkbox"/>		
Doors Open Time	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Doors Open Action	<input type="checkbox"/>	<input type="checkbox"/>		
Doors Close Action	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



9.7.6 Vertical Transportation Commissioning Schedule - Operator Terminal

Building Number: _____ Building Name: _____
Equipment Number: _____ Equipment Location: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Hardware & Peripherals	<input type="checkbox"/>	<input type="checkbox"/>		
Drivers & Software	<input type="checkbox"/>	<input type="checkbox"/>		
Backup Software	<input type="checkbox"/>	<input type="checkbox"/>		
Alarm Management	<input type="checkbox"/>	<input type="checkbox"/>		
Control Strategy Programming	<input type="checkbox"/>	<input type="checkbox"/>		
Lift Car Access Programming	<input type="checkbox"/>	<input type="checkbox"/>		
Manual Control of Lifts	<input type="checkbox"/>	<input type="checkbox"/>		
System Interfacing	<input type="checkbox"/>	<input type="checkbox"/>		
Reporting	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: __/__/__

Commissioning Contractor Name: _____
Commissioning Contractor Representative: _____

Project Manager Name: _____
Project Manager Reference: _____