



University of Wollongong

Hydraulic Services Commissioning Standard
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2. HYDRAULIC SERVICES

The hydraulic services provide University of Wollongong (UOW) with the supply and reticulation of water and gas. Following are the hydraulic services primary systems:

- Potable Water;
- Non-Potable Cold Water;
- Sewerage;
- Stormwater;
- Gas; and
- Rainwater Harvesting.

2.1 OVERVIEW

The commissioning standard for the hydraulic services involves the following stages:

Stages	Description	Parties Involved
Stage 1	Unit Testing - Performed by the manufacturer at a component level.	Manufacturer
Stage 2	Installation Inspections - Performed by the project manager during the installation process. The objective is to identify poorly installed equipment or parts of the installation that do not comply 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 hydraulic services operate correctly. It is UOW's objective to complete the commissioning tests with zero defects remaining in the system.

The hydraulic services commissioning tests have been designed to test the integrity of the equipment.



2.2 COMMISSIONING PROCESS

The following flow diagram depicts the commissioning process:

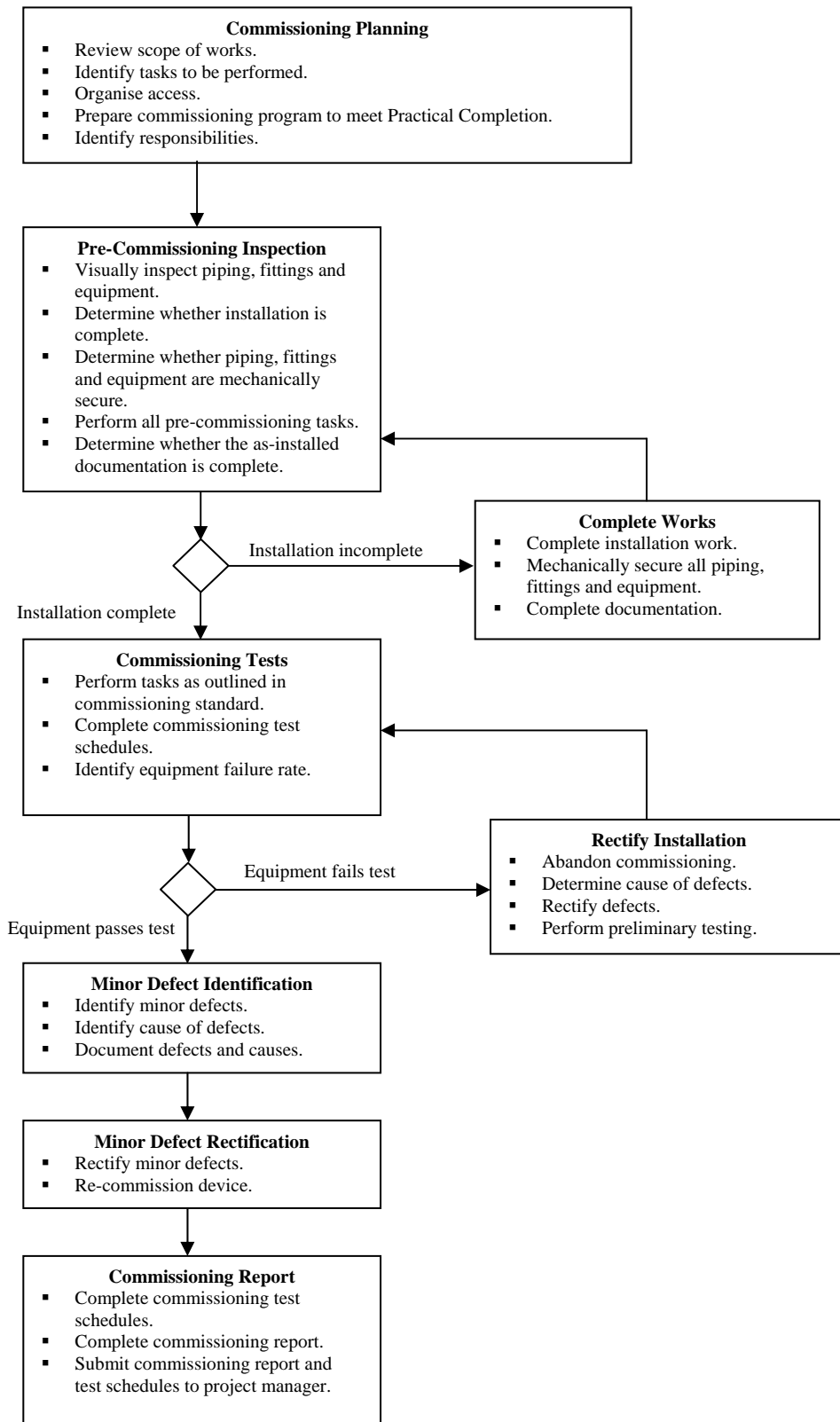


Figure 1 - Commissioning Process Flowchart



2.3 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. Trade waste forms.

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

2.4 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.

2.5 COMMISSIONING TESTS

Commissioning tests shall be performed to assess the integrity of the hydraulic services. Each commissioning test is specific to the hydraulic service being tested.

All commissioning tasks shall be performed by persons having qualifications and experience suitable for the testing and inspection tasks and all 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 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.



2.5.1 General

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

Following are the general commissioning procedures that apply to all systems and equipment:

- a. Verify that all systems and equipment have been installed at the location and in the configuration specified in the design documentation;
- b. For all hydraulic commissioning tests, a record of the test results shall be maintained (refer section 2.7 Commissioning Schedules);
- d. For all defects identified, the corrective action must be recorded and the equipment shall be retested.

2.5.2 Potable Water Reticulation

The following commissioning tasks shall be performed for all potable water reticulation systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that piping connections and joints are of the specified type;
- e. Verify that piping connections and joints have been correctly sealed;
- f. Verify that piping has been concealed where possible in ceiling spaces, wall cavities or risers;
- g. Verify that piping has been correctly insulated where necessary;
- h. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;
- i. Verify that isolation valves function correctly;
- j. Verify that stop valves function correctly;
- k. Verify that water flows and drains from taps and showers correctly.



2.5.3 Non-Potable Water Reticulation

The following commissioning tasks shall be performed for all non-potable water reticulation systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that piping connections and joints are of the specified type;
- e. Verify that piping connections and joints have been correctly sealed;
- f. Verify that piping has been concealed where possible in ceiling spaces, wall cavities or risers;
- g. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;
- h. Verify that the non-potable water treatment plant has been correctly installed/connected;
- i. Verify the operation of protection devices for potable water, e.g. air gaps and backflow protection devices;
- j. Verify operation of sewer discharge function;
- k. Verify the operation of pressure control stations;
- l. Verify that control valves function correctly;
- m. Verify that isolation valves function correctly;
- n. Verify that stop valves function correctly;

2.5.4 Hot Water

The following commissioning tasks shall be performed for hot water systems and equipment:

- a. Verify hot water equipment has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- b. Verify the equipment has been clearly labelled to comply with UOW's labelling convention;



- c. Verify that gas burners ignite and burn safely and correctly;
- d. Verify that boiling water flows correctly and safely from the boiling water units;
- e. Verify that the temperature of the hot water provided at the outlet is in accordance with the design specifications.

2.5.5 Gas Reticulation

The following commissioning tasks shall be performed for all gas reticulation systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that piping connections and joints are of the specified type;
- e. Verify that piping connections and joints have been correctly sealed;
- f. Verify that piping has been concealed where possible in ceiling spaces, wall cavities or risers;
- g. Verify that flues have been correctly fitted and terminated;
- h. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;
- i. Verify that control valves function correctly;
- j. Verify that pressure regulators function correctly;
- k. Verify that control devices produce the correct signal and where a BMCS is installed ensure that the correct data is transmitted.

2.5.6 Sewer System

The following commissioning tasks shall be performed for all sewer systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;



- d. Verify that all piping connections and joints are of the specified type;
- e. Verify the integrity of piping connections and joints;
- f. Verify that piping has been concealed where possible in ceiling spaces, wall cavities or risers;
- g. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;
- h. Verify that pit covers are of the specified material and have been correctly installed;
- i. Verify that water saving devices have been installed;
- j. Verify automatic flushing for urinals functions as specified in the design specification;
- k. Verify full and half flush for water closets operate correctly;

2.5.7 Trade Waste Drainage

The following commissioning tasks shall be performed for all trade waste systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that provisions have been made for thermal expansion and contraction;
- e. Verify that all piping connections and joints are of the specified type;
- f. Verify the integrity of piping connections and joints;
- g. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;

2.5.8 Stormwater Drainage

The following commissioning tasks shall be performed for all stormwater drainage systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;



- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that drainage lines meet the minimum specified requirement for levels and gradients;
- e. Verify that all piping connections and joints are of the specified type;
- f. Verify the integrity of piping connections and joints;
- g. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention;
- h. Verify that pit covers are of the specified material and have been correctly installed.

2.5.9 Landscape Water Reticulation

The following commissioning tasks shall be performed for all landscape water reticulation systems:

- a. Verify that piping is of the specified material;
- b. Verify that piping has been correctly sized;
- c. Verify that piping has been correctly secured and mechanical protection has been provided to minimise the likelihood of physical damage;
- d. Verify that all piping connections and joints are of the specified type;
- e. Verify the integrity of piping connections and joints;
- f. Verify that piping has been clearly labelled (where required) to comply with UOW's labelling convention. It should be clearly signposted that irrigation water is not suitable for drinking;
- g. Verify that all irrigation spray and sprinkler devices distribute water as specified in the design specification;
- h. Verify automatic controls for irrigation systems function as specified in the design specification;
- i. Verify that control devices produce the correct signal and where a BMCS is installed ensure that the correct data is transmitted.



2.5.10 Fixtures

Following is a list of hydraulic fixtures that may be installed in a UOW facility:

- a. Spring action taps;
- b. Electronic taps;
- c. Timed flow taps;
- d. Laboratory taps;
- e. Lever taps;
- f. Single lever mixer taps;
- g. Basins & sinks;
- h. Cisterns & pans;
- i. Safety Showers;

The following commissioning tasks shall be performed for all fixtures:

- a. Verify that all piping connections and joints are of the specified type;
- b. Verify the integrity of piping connections and joints;
- c. Verify that piping has been correctly sealed to prevent leakage;
- d. Verify that all fixtures have been mechanically secured to protect against continuous operational usage;
- e. Verify that taps release water when correctly operated;
- f. Verify that water drains correctly in basins and sinks;
- g. Verify that cisterns flush and refill correctly;
- h. Verify that safety showers have been provided with correct signage;
- i. Verify the operation of safety showers.



2.6 MINOR DEFECTS

As minor defects are identified during the commissioning tests, each defect shall be rectified before proceeding to the next test. The piping or 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.

2.7 COMMISSIONING SCHEDULES

The commissioning schedules shall be completed in accordance with this standard. Where piping or 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 equipment that is free of defects.



2.7.1 Hydraulic Services Commissioning Schedule - Potable Water Reticulation

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Isolation Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Stop Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Taps & Showers	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____

Commissioning Contractor Representative: _____

Project Manager Name: _____

Project Manager Reference: _____



2.7.2 Hydraulic Services Commissioning Schedule - Non-Potable Water Reticulation

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Water Treatment Plant	<input type="checkbox"/>	<input type="checkbox"/>		
Potable Water Protection Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Sewer Discharge Function	<input type="checkbox"/>	<input type="checkbox"/>		
Pressure Regulators	<input type="checkbox"/>	<input type="checkbox"/>		
Control Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Isolation Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Stop Valves	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____

Commissioning Contractor Representative: _____

Project Manager Name: _____

Project Manager Reference: _____



2.7.3 Hydraulic Services Commissioning Schedule - Hot Water

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Hot Water Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Burners	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature	<input type="checkbox"/>	<input type="checkbox"/>		
Boiling Water Units	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
Commissioning Contractor Representative: _____

Project Manager Name: _____
Project Manager Reference: _____



2.7.4 Hydraulic Services Commissioning Schedule - Gas Reticulation

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Flues	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Control Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Pressure Regulators	<input type="checkbox"/>	<input type="checkbox"/>		
Control Devices	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____

Commissioning Contractor Representative: _____

Project Manager Name: _____

Project Manager Reference: _____



2.7.5 Hydraulic Services Commissioning Schedule - Sewer System

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Pit Covers	<input type="checkbox"/>	<input type="checkbox"/>		
Water Saving Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Automatic Flushing	<input type="checkbox"/>	<input type="checkbox"/>		
Full/Half Flush	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



2.7.6 Hydraulic Services Commissioning Schedule - Trade Waste Drainage

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Provisions for Thermal Expansion & Contraction	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<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: _____



2.7.7 Hydraulic Services Commissioning Schedule - Stormwater Drainage

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Drainage Lines	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Pit Covers	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____



2.7.8 Hydraulic Services Commissioning Schedule - Landscape Water Reticulation

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Size & Type	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		
Control Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Irrigation Distribution	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____

Commissioning Contractor Representative: _____

Project Manager Name: _____

Project Manager Reference: _____



2.7.9 Hydraulic Services Commissioning Schedule - Fixtures

Building Number: _____ Building Name: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Connections & Joints	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Taps	<input type="checkbox"/>	<input type="checkbox"/>		
Basins & Sinks	<input type="checkbox"/>	<input type="checkbox"/>		
Cisterns	<input type="checkbox"/>	<input type="checkbox"/>		
Safety Showers	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Date: ___/___/___

Commissioning Contractor Name: _____
Commissioning Contractor Representative: _____

Project Manager Name: _____
Project Manager Reference: _____