

University of Wollongong

Mechanical Services Commissioning Standard
Version 3 – 10 May 2012

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6. MECHANICAL SERVICES

The mechanical services comprise heating, ventilation and air conditioning (HVAC) systems and equipment. The mechanical services provide heating and cooling to maintain space conditions within University of Wollongong (UOW) facilities.

The mechanical services comprise:

- a. Cooling Systems;
- b. Heating Systems;
- c. Ventilation Systems; and
- d. Air Conditioning Units.

6.1 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 Mechanical design engineer and the UOW 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.	Mechanical Design Engineer and UOW Project Manager
Stage 3	Final Commissioning - Performed by the installation contractor and witnessed by the Mechanical design engineer and the UOW project manager.	Contractor, Mechanical Design engineer UOW 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 mechanical services operate correctly. It is UOW's objective to complete the commissioning tests with zero defects remaining in the system.

The mechanical services commissioning tests have been designed to test the functionality and performance of all plant, equipment and devices. It is important that the mechanical services be tested under all operational conditions to ensure that the mechanical services operate efficiently and safely and comply with the design specification.

6.2 COMMISSIONING PROCESS

The following flow diagram depicts the commissioning process:

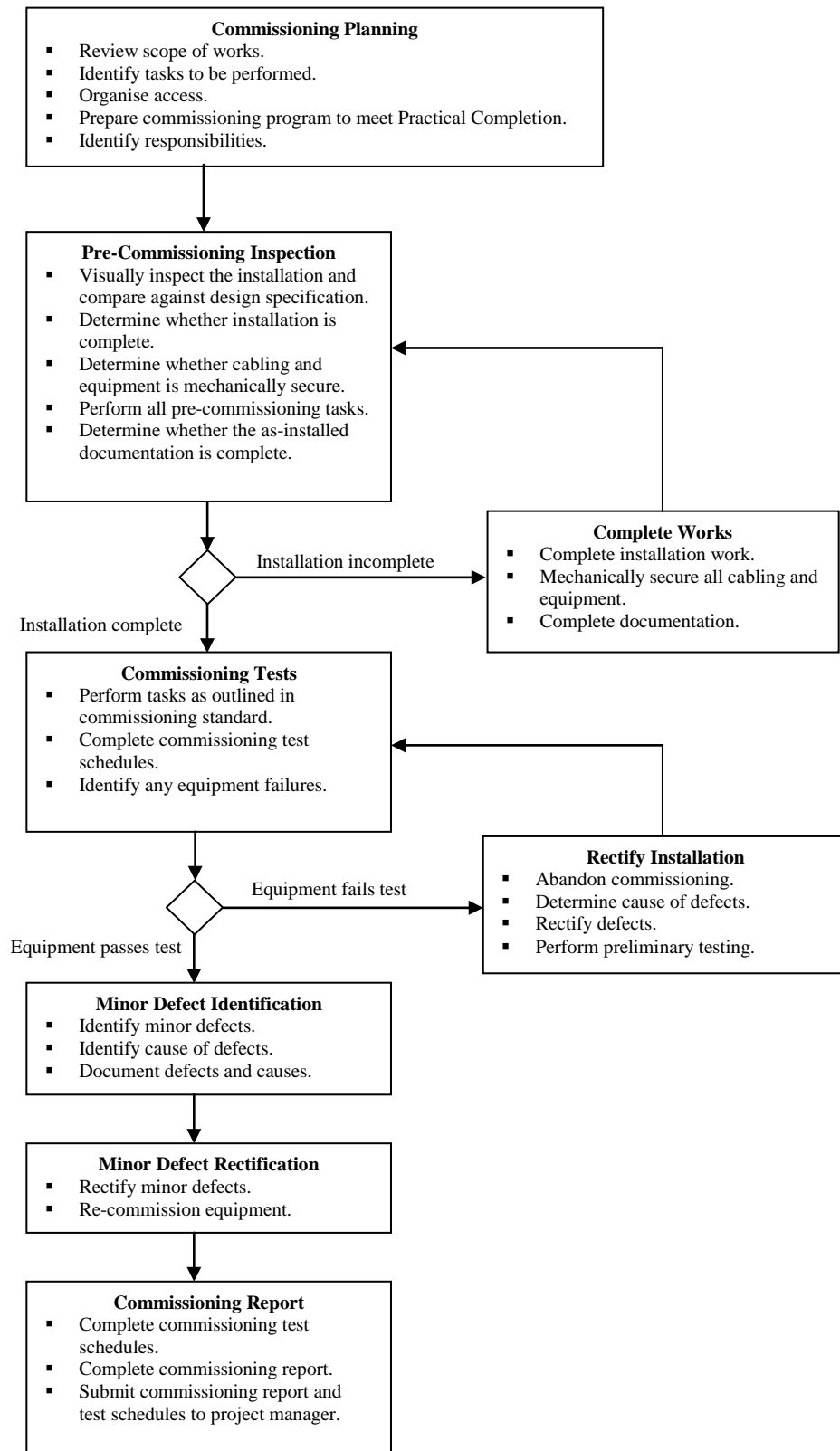


Figure 1 - Commissioning Process Flowchart

6.3 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.

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

6.4 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.

6.5 COMMISSIONING TESTS

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

Where a Building Monitoring and Control System (BMCS) has been installed, it may be more efficient for the BMCS and mechanical services commissioning tests to be run concurrently. Where mechanical services are controlled locally, i.e. by local electric or pneumatic controls, then the controlling equipment or devices must be commissioned in conjunction with the mechanical services.

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 plant, equipment or device 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.

6.5.1 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 plant, equipment and devices:

- a. Verify that all plant and equipment has been installed at the location and is configured as specified in the design documentation;
- b. For all mechanical commissioning tests, a record of the test results shall be maintained (refer section 6.7 Commissioning Schedules);
- c. For all defects identified, the corrective action must be recorded and the equipment shall be retested.

6.5.2 Chillers

The following commissioning tasks shall be performed for all central chiller plant:

- a. Verify that all chiller plant and equipment is mechanically secure and that vibration provisions have been installed;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been correctly sealed to eliminate leakage;
- d. Verify that the make-up has been installed correctly
- e. Verify that the buffer tank has been installed correctly
- f. Verify that air bleeds have installed correctly
- g. Verify that all piping has been correctly insulated;
- h. Verify the operation of all switches, valves (including CHW bypass) and indicating devices;
- i. Verify that all chilled water temperature sensors have been calibrated;
- j. Verify operation of the emergency stop devices;
- k. Verify the start/stop operation;
- l. Verify full load operation;

- m. Verify the operation of chiller staging;
- n. Verify sequencing and control routines;
- o. Verify that the quantity and temperature of the chilled water is sufficient to meet the specified cooling requirement;
- p. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- q. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.3 Cooling Towers

The following commissioning tasks shall be performed for all cooling towers:

- a. Verify that the cooling tower and associated equipment is mechanically secure;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been correctly secured and sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify that tower drain pipe work is installed correctly
- f. Verify the operation of all switches, valves, air bleeds, by-pass valves and indicating devices;
- g. Ensure that all new cooling towers have been pre-treated for corrosion and microbial control;
- h. Verify that the chemical dosing equipment provides chemicals to prohibit microbial growth;
- i. Verify the water temperature sensors have been correctly calibrated;
- j. Verify the operation of variable speed drive controls of cooling tower fans;
- k. Verify that the cooling tower cools the condenser water to the specified design approach for specified load requirements;
- l. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;

- m. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.4 Air Conditioning Units

The following commissioning tasks shall be performed for all air conditioning units:

- a. Verify the equipment is mechanically secure and that vibration provisions have been installed;
- b. Verify the operation of all switches, valves and indicating devices;
- c. Verify the air temperature sensors have been correctly calibrated;
- d. Verify the start/stop operation;
- e. Verify the operation of the heating and cooling components;
- f. Verify the operation of the condenser;
- g. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- h. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.5 Package Units

The following commissioning tasks shall be performed for all package units:

- a. Verify the equipment is mechanically secure and that vibration provisions have been installed;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been secured and sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify that condensate drains have been installed correctly
- f. Verify the operation of all switches, valves and indicating devices;
- g. Verify the air temperature sensors have been correctly calibrated;
- h. Verify the start/stop operation;

- i. Verify the operation of the cooling/heating system;
- j. Verify the operation of the heating coils (where appropriate);
- k. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- l. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.6 Split Systems

The following commissioning tasks shall be performed for all split air conditioning systems:

- a. Verify that the evaporator unit and the condensing unit have been mechanically secured;
- b. Verify all modes of operation operate correctly;
- c. Verify the interconnecting pipework and wiring has been installed correctly;
- d. Verify the condensate drain has been installed correctly;
- e. Verify the roof penetrations are as per UOW design standards (where appropriate);
- h. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- i. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.7 Boilers

The following commissioning tasks shall be performed for all boilers:

- a. Verify that all boiler plant and equipment is mechanically secure;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been correctly sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify the operation of all switches, valves and indicating devices;

- f. Verify that all hot water and/or steam temperature sensors have been calibrated;
- g. Verify controls operation;
- h. Verify that gas and oil burners ignite correctly;
- i. Verify operation of the emergency stop devices;
- j. Verify that the boiler provides heated water at the temperature defined in the design specification;
- k. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- l. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.8 Electric Heaters

The following commissioning tasks shall be performed for all electric heaters:

- a. Verify the equipment has been mechanically secured;
- b. Verify that all cabling has been correctly sized;
- c. Verify that all cabling connections have been correctly terminated;
- d. Verify that all cabling has been correctly insulated;
- e. Verify the start/stop operation;
- f. Verify the operation of all switches and indicating devices;
- g. Verify the air temperature sensors have been calibrated;
- h. Verify the operation of the heating element;
- i. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- j. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.9 Pumps

The following commissioning tasks shall be performed for all pumps:

- a. Verify that the pump and associated piping have been correctly sized to meet peak demand;
- b. Verify that all pumps have been securely mounted and that vibration provisions have been installed where necessary;
- c. Verify that all piping connections have been correctly secured and sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify the operation of all switches, valves and indicating devices;
- f. Verify the pump supplies the necessary flow rate(s) as required in the design specification;
- g. Verify variable speed drive control and pump performance;
- h. Verify that all pumps have been clearly labelled and comply with UOW's labelling convention.

6.5.10 Air Handling Plant

The following commissioning tasks shall be performed for all air handling plant:

- a. Verify that all air handling plant and equipment is mechanically secure and that vibration provisions have been installed;
- b. Verify that all ducts have been mechanically secured;
- c. Verify that all ducts have been correctly sealed to prevent loss of pressure;
- d. Verify that all ducting has been correctly sized;
- e. Verify that diffusers have been correctly sized and installed;
- f. Verify that air filters have been correctly sized and installed;
- g. Verify the operation of all switches and indicating devices;
- h. Verify the air temperature sensors have been calibrated;
- i. Verify that all dampers open and close correctly;

- j. Verify the start/stop operation;
- k. Verify operation of the emergency stop devices;
- l. Verify sequencing and control routines;
- m. Verify that the air handling plant has been correctly sized to meet the required space conditions in the design specification;
- n. Verify that the pressure drops across filters;
- o. Verify that condensate drains have been installed correctly;
- p. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- q. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.11 Variable Air Volume Units

The following commissioning tasks shall be performed for all variable air volume units:

- a. Verify that all variable air volume units are mechanically secure;
- b. Verify that all ducting has been correctly sized;
- c. Verify that diffusers have been correctly sized and installed;
- d. Verify the operation of all switches and indicating devices;
- e. Verify that all associated air temperature sensors and pressure sensors have been calibrated;
- f. Verify that all dampers open and close correctly;
- g. Verify the start/stop operation;
- h. Verify control routines;
- i. Verify that the variable air volume units has been correctly sized and spaced to meet the required space conditions;
- j. Verify that the variable air volume units can produce the airflow required to achieve the desired space conditions;
- k. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;

- l. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.12 Heat Exchangers

The following commissioning tasks shall be performed for all heat exchangers:

- a. Verify heat exchangers have been correctly interconnected with the primary plant;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been correctly sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify the heat exchanger transfers heat at the required rate;
- f. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.13 Compressors

The following commissioning tasks shall be performed for all compressors:

- a. Verify that all compressors are mechanically secure and that vibration provisions have been installed;
- b. Verify that all piping has been correctly sized;
- c. Verify that all piping connections have been correctly sealed to eliminate leakage;
- d. Verify that all piping has been correctly insulated;
- e. Verify that all pressure sensors have been calibrated;
- f. Verify that the compressor produces the pressure required in the design specification;
- g. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.14 Exhaust & Supply Air Fans

The following commissioning tasks shall be performed for all exhaust and supply air fans:

- a. Verify that all fans are mechanically secure and that vibration provisions have been installed;
- b. Verify that all ducts have been mechanically secured and that vibration provisions have been installed;
- c. Verify that all ducts have been correctly sealed to prevent loss of pressure;
- d. Verify that all ducting has been correctly sized;
- e. Verify the operation of all switches and indicating devices;
- f. Verify that dampers open and close correctly;
- g. Verify the start/stop operation;
- h. Verify adequate separation of exhaust discharge from fresh air intakes;
- i. Verify variable speed drive control and fan performance;
- j. Verify that the fan produces the airflow rate requirement in the design specification;
- k. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- l. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.5.15 Fume Cupboards

The following commissioning tasks shall be performed for all fume cupboards:

- a. Verify that all fume cupboard equipment is mechanically secure;
- b. Verify the fume cupboard has been installed in an area with adequate safe escape routes provided;
- c. Verify that all fume cupboard equipment has been correctly sealed to prevent escaping fumes;
- d. Verify the operation of the fume cupboard sash;

- e. Verify start/stop operation;
- f. Perform a smoke test with the fume cupboard empty. Release smoke in and around the fume cupboard and observe the pattern of airflow. Verify that no reverse flows or eddies can escape from the fume cupboard;
- g. Verify that airflow face velocity at sash opening of fume cupboard meets the manufacturers requirements and the standard set in the design specification;
- h. Verify that the fume cupboard does not produce noise levels in excess of the limit specified in the design specification;
- i. Verify that the lux level at the work surface meets the requirement of the design specification;
- j. Simulate a power failure and verify that automatic emergency isolators and indicator devices operate correctly;
- k. Verify adequate separation of exhaust discharge from fresh air intakes;
- l. Verify variable speed drive control and fan performance;
- m. Verify that the fan produces the airflow rate specified by the manufacturer;
- n. Verify that control devices produce the correct signals and where a BMCS is installed ensure that the correct data is transmitted;
- o. Verify that all equipment has been clearly labelled and complies with UOW's labelling convention.

6.6 MINOR DEFECTS

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

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

6.7 COMMISSIONING SCHEDULES

The commissioning schedules shall be completed in accordance with this standard. Where plant 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 sub-systems, equipment and devices that are free of defects.

6.7.1 Mechanical Services Commissioning Schedule - Chillers

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: ___/___/___

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Plant Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation, make-up water, buffer tank & air bleeds	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves including CHW bypass	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Full Load Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Chiller Staging	<input type="checkbox"/>	<input type="checkbox"/>		
Sequencing	<input type="checkbox"/>	<input type="checkbox"/>		
Cooling Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.2 Mechanical Services Commissioning Schedule - Cooling Towers

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Tower Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation, air bleeds & condensate drain	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves including CW bypass	<input type="checkbox"/>	<input type="checkbox"/>		
Chemical Pre-treatment	<input type="checkbox"/>	<input type="checkbox"/>		
Chemical Dosing	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Variable Speed Control	<input type="checkbox"/>	<input type="checkbox"/>		
Cooling Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.3 Mechanical Services Commissioning Schedule - Air Conditioning Units

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Space Conditions Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.4 Mechanical Services Commissioning Schedule - Package Units

Building Number: _____ Building Name: _____

Equipment Number: _____ Equipment Location: _____

Equipment Type: _____ Equipment Rating: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation, condensate drains	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Cooling Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<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: _____

6.7.5 Mechanical Services Commissioning Schedule - Split Systems

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Switches & wiring	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Pipework, condensate drain	<input type="checkbox"/>	<input type="checkbox"/>		
Roof penetrations	<input type="checkbox"/>	<input type="checkbox"/>		
Modes of Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Space Conditions Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.6 Mechanical Services Commissioning Schedule - Boilers

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Plant Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Ignition System	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Heating Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.7 Mechanical Services Commissioning Schedule - Electric Heaters

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Cabling Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Cabling Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Heating Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.8 Mechanical Services Commissioning Schedule - Pumps

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Pump Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Pump Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Valves	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Flow Rate Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Variable Speed Control	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.9 Mechanical Services Commissioning Schedule - Air Handling Plant

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: ___/___/___

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Plant Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Diffusers	<input type="checkbox"/>	<input type="checkbox"/>		
Air Filters	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Pressure Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Dampers	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Sequencing	<input type="checkbox"/>	<input type="checkbox"/>		
Operational Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.10 Mechanical Services Commissioning Schedule - Variable Air Volume Units

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Plant Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Diffusers	<input type="checkbox"/>	<input type="checkbox"/>		
Air Filters	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Pressure Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Temperature Sensors	<input type="checkbox"/>	<input type="checkbox"/>		
Dampers	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Stop	<input type="checkbox"/>	<input type="checkbox"/>		
Sequencing	<input type="checkbox"/>	<input type="checkbox"/>		
Unit Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Space Conditions	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<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: _____

6.7.11 Mechanical Services Commissioning Schedule - Heat Exchangers

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Heat Transfer	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.12 Mechanical Services Commissioning Schedule - Compressors

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Piping Insulation	<input type="checkbox"/>	<input type="checkbox"/>		
Pressure Sensors				
Pressure Output	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.13 Mechanical Services Commissioning Schedule - Exhaust & Supply Fans

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____ Equipment Rating: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Fan Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Mechanical Protection	<input type="checkbox"/>	<input type="checkbox"/>		
Duct Sizing	<input type="checkbox"/>	<input type="checkbox"/>		
Switches	<input type="checkbox"/>	<input type="checkbox"/>		
Indicating Devices	<input type="checkbox"/>	<input type="checkbox"/>		
Dampers	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Separation From Air Intake	<input type="checkbox"/>	<input type="checkbox"/>		
Variable Speed Control	<input type="checkbox"/>	<input type="checkbox"/>		
Flow Rate Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____

6.7.14 Mechanical Services Commissioning Schedule - Fume Cupboards

Building Number: _____ Building Name: _____
 Equipment Number: _____ Equipment Location: _____ Equipment Type: _____
 Commissioning Date: __/__/__

Test	Commissioning Results		Test Reference Notes	Defect Details
	Pass	Fail		
Equipment Installation	<input type="checkbox"/>	<input type="checkbox"/>		
Airtight Seals	<input type="checkbox"/>	<input type="checkbox"/>		
Safe Escape Routes	<input type="checkbox"/>	<input type="checkbox"/>		
Sash Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Start/Stop Operation	<input type="checkbox"/>	<input type="checkbox"/>		
Smoke Test	<input type="checkbox"/>	<input type="checkbox"/>		
Face Velocity	<input type="checkbox"/>	<input type="checkbox"/>		
Noise Levels	<input type="checkbox"/>	<input type="checkbox"/>		
Luminous	<input type="checkbox"/>	<input type="checkbox"/>		
Isolators & Indicators	<input type="checkbox"/>	<input type="checkbox"/>		
Separation From Air Intakes	<input type="checkbox"/>	<input type="checkbox"/>		
Variable Speed Control	<input type="checkbox"/>	<input type="checkbox"/>		
Flow Rate Requirement	<input type="checkbox"/>	<input type="checkbox"/>		
Control Signals	<input type="checkbox"/>	<input type="checkbox"/>		
Labelling	<input type="checkbox"/>	<input type="checkbox"/>		

Commissioning Contractor Name: _____
 Commissioning Contractor Representative: _____

Project Manager Name: _____
 Project Manager Reference: _____