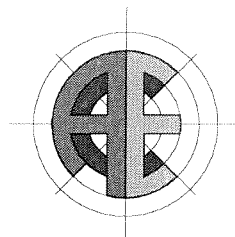


Melbourne City  
Council CH2

**Independent  
Commissioning  
Brief**

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design advice  
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## 1 INTRODUCTION

### 1.1 The Project

The Tivoli Carpark development site is located at 218-242 Lt Collins Street, Melbourne and is to house the proposed Melbourne City Council headquarters.

CH<sub>2</sub> is the acronym for the new Council House to accommodate City of Melbourne Staff. CH<sub>2</sub> is a commercial office building comprising of basement carparking, ground floor retail, nine levels of commercial office floors and roof top plant room and garden.

The driving vision for this project is to provide a landmark sustainable building that will provide a healthy stimulating workplace that supports organisational excellence and cultural change. This will be a benchmark building development that contributes positively to the urban character of Melbourne.

As a landmark of sustainable design, the new building is aimed at becoming a lighthouse for future central city development in Melbourne. CH<sub>2</sub> will be a building that will lead by example, it will be a re-examination of office building design and use in terms of its relationship to the environment, the health of its users, and the cost effectiveness of ecologically sustainable design.

The project is well known for its approach towards achieving an ecologically sustainable development being the first project to potentially achieve a six star development according to the Green Building Council of Australia's new GreenStar rating tool.

To maintain the integrated approach that the design team has adopted to date, it is vital that the project's design intents are maintained throughout the construction phase of the project.

This brief details the scope of works for the appointment of an independent commissioning agent to act on behalf of the client to ensure that the sustainable agenda is maintained through the correct commissioning of the building.

### 1.2 Role and Responsibilities

The role of the independent commissioner will be to work with the client, design and construction team to monitor and verify the commissioning of the CH<sub>2</sub> building's HVAC, electrical, hydraulic and building control systems.

The independent commissioning agent (ICA) will report directly to the client and will be responsible for planning and management of the overall commissioning process. The primary goal of the ICA is to independently identify system deficiencies as early in the project as possible and track their status until corrected.

The ICA's role and responsibilities include:

- Being an objective advocate of the client.
- Create a commissioning plan and direct the commissioning process.
- Introduce standards and strategies, with respect to the commissioning process.

## Independent Commissioning Brief

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- Set target requirements within the commissioning documents to ensure implementation of measures required to satisfy design intent.
- Co-ordinate with the client, design team and contractors throughout the commissioning testing and adjustment phases.
- Observe all testing, review and approve contractor test results.
- Prepare final commissioning report including recommendations to the client regarding the performance of commissioned building systems.

## 2 DESCRIPTION AND EXTENT OF WORKS

This document is to be read in conjunction with the CH<sub>2</sub>: Tivoli Carpark Site Development, 218-242 Little Collins Street tender documentation and all associated tender drawings. All system descriptions, design criteria and general design intent described within the Architectural, Mechanical, Electrical and Hydraulic Services Technical Specifications are to be observed within this contract.

### 2.1 Extent of Works

The Works comprise the witnessing and management of the commissioning and testing of mechanical, electrical, hydraulic and architectural services and includes, but is not limited to the following systems:

#### 2.1.1 Mechanical

Further description of these systems are detailed within the CH<sub>2</sub> Mechanical Services Technical Specification.

- a) **100% Outside Air Displacement Air Conditioning System** which incorporates two identical air handling units with multiple cooling coils, heating coils, variable speed drives, air filters, distribution ductwork, floor air outlets, fire dampers and motorised dampers.
- b) **Chilled Water Plant** which incorporates absorption and dx chillers, cooling towers, pumps, variable speed drives, heat exchangers, piping and water treatment system.
- c) **Hot Water Plant** which incorporates heating hot water boilers, heat exchangers, pumps, variable speed drives, piping and water treatment system. The Hot Water Plant will be connected to a microturbine heat exchanger.
- d) **Chilled Beam System** incorporating both chilled beams and chilled ceiling panels. System includes distribution pipework and valving.
- e) **Thermal Storage Plant** which incorporates Phase Change Storage Modules, heat exchangers, piping and pumps.
- f) **Supplementary Cooling Loop** incorporating cooling tower, heat exchangers, pumps, variable speed drives, piping, flow meters and valves.
- g) **Passive Heating System** consisting of finned heating convectors, distribution pipework and valves.
- h) **Wind Turbines Stack Relief System** incorporating wind turbine shutoff dampers, wind turbine make up dampers and natural ventilation dampers.
- i) **Tea Room Exhaust System** incorporating fan, variable speed drive, ductwork and outlets.
- j) **Communications Room Exhaust System** incorporating fan, ductwork and outlets.
- k) **Lift Motor Room Ventilation Systems** incorporating fans, ductwork, air to air phase change panels and grilles.

- l) **Smoke Management System** incorporating roof mounted exhaust fans, variable speed drives, relief air/smoke spill subducts, ductwork and smoke spill rated motorized dampers.
- m) **Stair Pressurisation System** incorporating fans, variable speed drives, ductwork, subducts and grilles.
- n) **Basement Supply Air Systems** incorporating fans, variable speed drives, ductwork, plenum and attenuator.
- o) **Basement Toilet Exhaust System** incorporating fan, ductwork, dampers and outlets.
- p) **Car Park Ventilation System** incorporating supply and exhaust fans, CO monitoring, motion detectors, variable speed drives, ductwork and grilles.
- q) **Gas Meter Room Exhaust System** incorporating fan, ductwork, dampers and outlets.
- r) **Main Switchboard Room and Building Distribution Ventilation System** incorporating fans, ductwork, dampers and outlets.
- s) **Substation Supply Ventilation System** incorporating fans, ductwork, dampers and outlets.
- t) **Store Area Ventilation Systems** incorporating fans, ductwork, dampers and outlets.
- u) **Basement PCM Plantroom Ventilation System** incorporating fans, ductwork, dampers and outlets.
- v) **Supplementary A/C Systems** incorporating water cooled reverse cycle a/c units, ductwork, dampers and outlets.
- w) **Shower Tower Outside Air System** incorporating shower roses, air dampers, piping, valves, pumps, heat exchangers, water treatment system and storage tanks.
- x) **Retail Tenants Kitchen Exhaust System** incorporating fan, variable speed drive, ductwork, attenuator and outlets.
- y) **Building Automation System** incorporating weather station, power, water, energy and environmental monitoring and control.

### 2.1.2 Electrical

Further description of these systems are detailed within the CH2 Electrical Services Technical Specification.

- a) **Cogeneration Plant** incorporating gas microturbine generator.
- b) **Addressable Lighting Control System** incorporating networking, dimmers, contactors, hardware and software and interface to BAS and security systems.
- c) **Monitored Emergency Lighting System**

- d) **PV Solar Panel** incorporating PV Solar Panels, interconnections with external solar shading and converter modules.
- e) **Night Purge System** incorporating operable windows, actuators and controls.

### 2.1.3 Hydraulic

Further description of these systems are detailed within the CH2 Hydraulic Services Technical Specification.

- a) **Black Water Re Use Plant** incorporating pipework, pumps, controls and interface to BAS.
- b) **Hot Water Supply Plant** incorporating a bulk solar powered system, pipework, pumps, flow meters and interface to BAS
- c) **Cold Water Supply Plant** incorporating pipework, pumps, flow meters and interface to BAS.

### 2.1.4 Architectural

Further description of these systems are detailed within the CH2 Architectural Technical Specification.

- a) **External Solar Shading System** incorporating actuators, controls and interface to BAS.
- b) **Internal Blinds System** incorporating actuators, controls and interface to BAS.

### **3 TESTING, COMMISSIONING AND HANDOVER**

#### **3.1 Acceptance Criteria**

Provide to the Superintendent, in good time to allow review without impediment to the programme:-

- a) Certified competency of all tradesman intended to work on the project.
- b) All work plans, commissioning plans and Inspection and Test Plan (ITP) at least 12 weeks prior to the planned commencement of testing and commissioning.
- c) All performance test and commissioning results required by this brief.

#### **3.2 Sequence of Events**

The following are the sequence of events required. It is the ICA's responsibility to ensure that co-ordination occurs between themselves the head contractor and the relevant sub contractors commissioning agents so that the following events occur in a timely and accurate fashion.

- a) Confirmation of commissioning programme allowance in construction programme.
- b) Production and submission of Inspection and Test Plan (ITP) at least 6 weeks prior to the planned commencement of testing and commissioning.
- c) Liaison with and briefing of Authorities to ensure that the commissioning procedures and resultant data provided for their approval is consistent with their requirements and records
- d) Amendment to ITP as necessary and re-submission at least 2 weeks prior to planned commencement.
- e) Submission of detailed commissioning procedures for review by the Consulting Engineer and all relevant services. Contractor at least 2 weeks prior to the commencement of each procedure.
- f) Liaison with and gain assurance from the Head Contractor, that building works have been completed in the areas where air balancing will be undertaken (eg external walls and windows, internal partitions, doors and ceilings all physically complete).
- g) Witnessing of preliminary commissioning including pre-commissioning procedures.
- h) Inspect rectification of any defects and deficiencies found during preliminary commissioning.
- i) Ensure preliminary commissioning results are repeated until achievement of correct operation and performance.
- j) Review and witness testing and commissioning of major plant and equipment, complete systems, interfaces between systems and finally all systems which interact together under normal or emergency conditions.



- k) Inspect and ensure full rectification of any further defects and deficiencies found during testing and commissioning.
- l) Ensure repetition of sequence of activities as necessary until works comply with acceptance criteria as set out in the ITPs.
- m) Submission of correctly and completely executed ITPs including test results.
- n) Provide final commissioning report including recommendations to the client regarding performance of commissioned building.

### 3.3 Information Required

- a) Inspection and Test Plans.
- b) Testing and commissioning procedures.
- c) Evidence of qualification of all personnel proposed for carrying out any commissioning related activities.
- d) Records of all reviews of pre-commissioning checks and final commissioning data. All records/data to be independently notated during the commissioning process.

### 3.4 Inspection and Test Plans

Inspection and test plans are to be prepared specifically for the project but may be based on or customised from generic ITPs.

- a) List acceptance criteria for each element and sub-element of the mechanical installation in ITPs. Acceptance criteria to include:
  - a. Specification details in regard to materials, construction methods, physical requirements, performance and operational requirements.
  - b. Schedule of Technical Data in respect of make, model and performance details of equipment.
  - c. Shop drawings.
  - d. Control logic and diagrams.
  - e. Authority inspection and testing requirements.
- b) Format ITPs as follows:
  - a. A4 single sided.
  - b. Machine printed.
  - c. Each page identified with Inspection and Test organisation's name, project name, ITP record no., mechanical services element or sub-element, signature of inspector, date of sign off, page no. of total pages.
  - d. Tick boxes and comment column for record purposes.

- c) 4 Copies of ITPs to be supplied, 3 bound into Installation Manuals and 1 bound separately.

### **3.5 Commissioning Instrumentation**

It is the ICA's responsibility to ensure that correct equipment is utilised for all commissioning procedures.

- a) All instrumentation used in the commissioning of the installation shall be managed in accordance with the requirements of AS 3912 or NEBB.
- b) Reference instruments are to be NATA certified.
- c) All commissioning results to include instrument calibration documentation.

### **3.6 Preliminary Commissioning**

The ICA shall ensure that the preliminary commissioning scope of works is to include at a minimum the following requirements:

#### **3.6.1 Air Systems**

- a) Check all dampers for correct operation.
- b) Clean air handling unit interiors and clean or replace air filters as necessary.
- c) Check and adjust air diffusers and grilles for direction and throw.
- d) Balance and adjust air flows for each system and sub-system so as to achieve air flows within 0% to +10% of specified rates allowing for filters partly obstructed to simulate 50% loaded.

#### **3.6.2 Water Systems**

- a) Follow the procedures set out in 'Water Treatment' clauses of Section 6 within the Mechanical Specification prior to commencing balancing.
- b) Balance and adjust water flows for each system and sub-system so as to achieve 0% to +5% of the specified flow rates.
- c) Check and verify pressure and flow activated controls, relief devices, bleeds, vents, drains etc.
- d) Check and verify performance of all water flow meters.

#### **3.6.3 Controls and Electrical**

- a) Check and verify the correct operation of each item of control equipment and of each control system.
- b) Check and verify correct performance of all instrumentation, lights, timers, relays and safeties under all working conditions.

### 3.7 Commissioning Management

It is the ICA's responsibility to manage the commissioning works and as such the following management responsibilities apply.

Testing and commissioning is to be organised and managed so as to test and verify the operation of individual items of plant and equipment, sub-systems, systems and the overall installation including the interfaces with other building services systems provided by others.

Management of commissioning to include:

- a) Programming and scheduling of commissioning and handover activities in conjunction with the Head Contractor and in consultation with the client and other relevant parties.
- b) Liaison with other services, trades and co-ordination of commissioning activities associated with system interfaces and interaction between systems.
- c) Liaison with and briefing of Authorities to ensure that the commissioning procedures and resultant data provided for their approval is consistent with their requirements and records.
- d) Taking a lead role for the mechanical testing and commissioning including attending meetings with Head Contractor, other services trades with consultants and Authorities as necessary.
- e) Preparation of progress reports on testing and commissioning.

### 3.8 Final Commissioning

The ICA shall ensure that following final commissioning scope of works is to include at a minimum the following requirements:

Undertake final commissioning in 3 stages:

- a) Major items of plant and equipment and components.
- b) Systems and sub-systems.
- c) Inter-system operation and interfaces.

Final commissioning to include:

- a) Testing of performance of individual plant items and components.
- b) Testing of operating sequences, interlocks and safeties.
- c) Final air and water balancing.
- d) Final controls calibration.
- e) System operation under all operating modes and under all conditions of load.
- f) Inter-system operation and correct interfacing connections under all operating conditions and under simulated fire conditions.

- g) Noise and vibration tests.
- h) Thermographic survey of mechanical switchboards.
- i) Water treatment tests and water analysis.
- j) Environmental audit.
- k) Rectification and correction of any defects and deficiencies.

### 3.9 Environmental Audits

Environmental Audits are to be outlined within the ITP for incorporation during Final Commissioning.

Requirements:

- a) Undertake, using suitably qualified personnel with experience in conducting environmental audits.
- b) Use recently calibrated instrumentation and produce calibration records.
- c) Present environmental audit findings in an environmental test report suitable for use as a benchmark for future audits.
- d) Conduct environmental audits for locations scheduled.
- e) Environmental audits to cover:
  - Indoor Air Quality
    - Carbon dioxide
    - Carbon monoxide
    - Ozone
    - Formaldehyde
    - Dust particles
    - Bacteria
    - Fungi and mould
    - Hydrocarbons
  - Indoor Comfort Conditions
    - Temperature
    - Relative humidity
    - Air velocity

### 3.10 Post Occupancy Performance Tests

The following Post Occupancy Performance Tests are to be incorporated within the Commissioning Plan.

- a) Conduct air conditioning performance tests over 4 periods of up to 5 consecutive days each period in Summer, Spring, Autumn and Winter. During each testing period, log the following at hourly intervals:
  - I. Ambient dry and wet bulb temperatures in a shaded location.
  - II. Internal dry and wet bulb temperatures in representative locations.
  - III. Actual number of persons in each area.

- IV. Actual kW of lighting and heat producing appliances.
  - V. Estimated infiltration air quantities (based on measured and recorded values by the Contractor during Façade testing.)
  - VI. Any other factors effecting cooling and heating loads.
  - VII. Flow and return water temperatures from Cooling Towers, PCMS, Chilled Ceilings Panels and Shower Towers.
  - VIII. Shower Tower supply air temperatures.
- b) Calculate the plant thermal capacity at peak operating conditions obtained from the test results.
  - c) Undertake any adjustments to controls or to air and water quantities as may be required to correct any deficiencies found during the performance testing.