

# ***Summary File ONLY***

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THIS PDF FILE  
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**IT IS BROWSABLE ON-SCREEN ONLY AND IS PROVIDED  
FOR YOUR INFORMATION TO DECIDE WHETHER TO  
BECOME A PROSPECTIVE TENDERER ONLY**

Note: This file may contain a brief scope statement, or an extract from the RFT documents, or a full exhibited copy – depending on the specific circumstances.

To participate in this tender process you **MUST** first download or order a full copy of the Request for Tender (RFT) documents, including the responsible components, and any addenda issued to date.

To do this return to the RFT web page on this web site and copy the RFT documents to your own computer or network – the blue “**DOWNLOAD A SOFT COPY**” link at the bottom provides access to the page from which you can do this.

**Request for Tender Document**  
**for**  
**BOURKE GOVERNMENT OFFICE BLOCK**  
**COOLING SYSTEM UPGRADE**

**Contract No/RFT Id: 0900656**

**APRIL 2009**  
**NSW Department of Commerce**  
**for**  
**NSW State Property Authority**

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## **TENDERING**

# CONDITIONS OF TENDERING

## THERE ARE 12 PAGES IN THIS SECTION

This section includes notices to tenderers.

The Conditions of Tendering section does not form part of the Contract.

## 1 GENERAL

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### 1.1 CONTACT PERSON

Refer requests for information about the Tender to:

Name: Scott Thurbon

Telephone number: (02) 9372 8275

Facsimile number: (02) 9372 8144

E-mail address: [scott.thurbon@commerce.nsw.gov.au](mailto:scott.thurbon@commerce.nsw.gov.au)

### 1.2 NSW GOVERNMENT CODE OF PRACTICE FOR PROCUREMENT

Tenderers must comply with the NSW Government *Code of Practice for Procurement*, which is available on the Internet at:

[www.treasury.nsw.gov.au/procurement/cpfp\\_ig](http://www.treasury.nsw.gov.au/procurement/cpfp_ig)

Lodgement of a tender is evidence of the Tenderer's agreement to comply with the Code for the duration of any contract awarded as a result of the tender process. If a tenderer fails to comply with the Code, the Principal may take the failure into account when considering this or any subsequent tender from the tenderer, and may pass over such the tender.

## 2 TENDERER ELIGIBILITY

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### 2.1 ACCEPTABLE LEGAL ENTITIES

The Principal contracts only with recognised and acceptable legal entities. The Principal does not contract with firms under any form of external administration. Any tender submitted by an unincorporated business such as a sole trader, partnership, or business name must identify the legal entity that proposes to enter the contract.

If the Tenderer is a trustee, the Principal may require:

- an unconditional undertaking in accordance with Preliminaries Clause - **Additional security and obligations for trustees**; and
- a signed statement from the Tenderer, provided before the Contract is awarded, making the following undertaking:

'If (insert the legal name of the Tenderer) is awarded Contract No (insert the contract number) for (insert the contract description) it will provide security in the amount of (insert the amount of security advised by the Principal) in accordance with Preliminaries clause - **Additional security and obligations for trustees**, and it undertakes to ensure that, for the duration of the

Contract, the total value of the trust beneficiaries' loans to the trustee is always greater than the total value of trust beneficiaries' loans from the trustee.'

Failure to provide the signed statement may result in the Tender being passed over.

## 2.2 QUALITY MANAGEMENT

The Principal may elect to pass over a tender from a tenderer that does not demonstrate the capacity to systematically plan and manage the quality of its work in accordance with the NSW Government *Quality Management Systems Guidelines*, which are available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

Submit with the Tender the information identified in Tender Schedules - **Schedule of Quality Management Information.**

## 2.3 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

Tenderers must demonstrate their capacity to manage occupational health and safety in accordance with the NSW Government *Occupational Health and Safety Management Systems Guidelines 4<sup>th</sup> Edition (OHSM Guidelines)*. The *OHSM Guidelines* are available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

Submit with the Tender the information identified in Tender Schedules - **Schedule of Occupational Health and Safety Management Information.**

## 2.4 ENVIRONMENTAL MANAGEMENT

Tenderers must demonstrate their capacity to manage environmental matters in accordance with the NSW Government *Environmental Management Systems Guidelines (EMS Guidelines)* available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

Submit the information identified in Tender Schedules - **Schedule of Environmental Management Information.**

## 2.5 FINANCIAL ASSESSMENT CRITERIA

The main criteria considered in financial assessment of tenderers are:

- Net Worth (total assets, excluding any assets of company directors, less total liabilities less intangible assets);
- Current Ratio (ratio of current assets to current liabilities); and
- Working Capital (current assets less current liabilities).

The Principal considers tenders with the following financial capacity, and no other significant detrimental financial characteristics to be financially satisfactory in respect of tenders:

- Net Worth exceeds 5% of the Contract Sum or initial Contract Price;
- Current Ratio exceeds 1; and
- Working Capital exceeds 10% of the Contract Sum or initial Contract Price.

- Where a tenderer is a trustee the total value of trust beneficiaries' loans to the trustee must be greater than the total value of trust beneficiaries' loans from the trustee.

Deviations below these indicative criteria will not necessarily prevent the Principal from considering any tender.

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### 3 CONTRACT DETAILS

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#### 3.1 INSURANCE

##### Works and public liability insurance

The Principal will arrange insurance of the Works (and any temporary works) and public liability, as required under General Conditions of Contract clause **Insurance**. Tenderers are not required to allow in tenders for payment of premiums for insurance of the Works or public liability.

The insurance policy is available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_contract\\_management\\_insurance\\_policies.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_contract_management_insurance_policies.doc)

The insurance broker is Jardine Lloyd Thompson Pty Ltd.

##### Other Insurance

The Contractor must arrange and pay all premiums for all other insurance required under General Conditions of Contract clause – **Insurance**.

For professional indemnity insurance, a Certificate of Currency or evidence of the ability to obtain the required insurance, such as a letter from a broker or insurer, may be required as a condition of acceptance of tender.

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### 4 CURRENT POLICIES

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#### 4.1 GOODS AND SERVICES TAX

The tendered lump sum and/or rates must include GST if it is payable.

#### 4.2 NSW GOVERNMENT PREFERENCE SCHEME

##### Preference

The Principal will give a preference advantage to goods of Australian and New Zealand origin over imported goods supplied under the Contract. NSW country manufacturers may be eligible for an additional preference under the Country Industries Preference Scheme (CIPS). Details of these schemes may be obtained from the Department of State and Regional Development, telephone (02) 9338-6780; facsimile (02) 9338-6676.

The Industry Capability Network Office has been established to provide assistance in planning for, purchasing and using Australian and New Zealand made products. The office can provide professional advice on local industry capability and on the availability and efficiency of local supplies suited to Australian conditions, while retaining commercial confidentiality. The Industry Capability Network Office may be contacted on: telephone (02) 9819 7200; facsimile (02) 9181 3321; e-mail [enquiry@icnsw.org.au](mailto:enquiry@icnsw.org.au); internet [www.icnsw.org.au](http://www.icnsw.org.au).



### Imported Goods

Where imported goods are proposed, complete the Tender Schedules - **Schedule of Imported Materials and Equipment**. Provide details of alternatives to such goods which are of Australian or New Zealand origin, or give reasons why such alternatives cannot be supplied by completing the Tender Schedules - **Schedule of Alternatives to Imported Goods**.

The Principal may, but is not bound to, negotiate a reduction in price to accept the imported goods, but the reduction will be not less than 20% of the Principal's estimate of the imported value of the goods.

Refer to Preliminaries clause - **Australian and New Zealand Goods**.

### NSW Country Manufactured Goods

If the tenderer wishes to seek preference under the NSW Country Industries Preference Scheme, submit Tender Schedules – **Schedule of NSW country manufactured goods** with the tender.

## 4.3 DISCLOSURE OF TENDER AND CONTRACT INFORMATION

Details of this tender and contract awarded as a result of this tender process must be disclosed in accordance with the *Freedom of Information Act 1989* (NSW), Premier's Memorandum 2007-01, and the NSW Government Tendering Guidelines which are available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

## 4.4 EXCHANGE OF INFORMATION BETWEEN GOVERNMENT AGENCIES

By submitting a tender, the Tenderer authorises the Principal to gather, monitor, assess, and communicate to other NSW Government agencies or local government authorities information about the Tenderer's financial position and its performance in respect of any contract awarded as a result of the tender process. Such information may be used by those agencies or authorities in considering whether to offer the Tenderer future opportunities for work.

## 4.5 FINANCIAL ASSESSMENT

By tendering for this Contract, the Tenderer agrees that the Principal may engage private sector consultants to financially assess tenderers. Financial details of tenderers may be obtained by an external Financial Assessor for assessment. Financial Assessors have a contract with the Principal to safeguard the financial details obtained. Financial Assessors must not disclose such details, either in whole or in part to any party other than NSW Government departments or agencies without the express written permission of the tenderer.

The Financial Assessor is **Kingsway Financial Assessments Pty Ltd**.

Submit, when requested by the Financial Assessor or Principal, the Financial Assessment information shown in Tender Schedules - **Schedule of Financial Assessment Information**.

## 4.6 UNCONDITIONAL UNDERTAKINGS - APPROVED INSTITUTIONS

For the purpose of giving unconditional undertakings, the Principal has approved banks, building societies, credit unions and insurance companies listed by the Australian Prudential Regulation Authority (APRA) as being regulated by the APRA. Lists appear at the APRA website on the Internet at:

[www.apra.gov.au/](http://www.apra.gov.au/)

The Principal is prepared to consider proposals from tenderers for the approval of Unconditional Undertakings by substantial financial institutions, not registered by APRA, which lawfully carry on business in Australia. The Principal may require the submission of evidence demonstrating the substance and status of any proposed financial institution without cost to the Principal.

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## 5 FURTHER INFORMATION

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### 5.1 ADDENDA TO TENDER DOCUMENTS

If, as a result of a request for clarification from a tenderer or for any other reason, the Principal issues an instruction amending the tender documents, the instruction will be issued in writing to all tenderers in the form of an Addendum, which becomes part of the tender documents. Written Addenda issued by the Principal are the only recognised explanations of, or amendments to, the tender documents.

### 5.2 SITE ACCESS RESTRICTIONS

Tenderers and their agents or representatives must:

- obtain permission to inspect the Site from the Client's Representative at least 48 hours before access to the Site is required;
- upon arrival, at the pre-arranged time, introduce themselves at the Client Representative's office prior to undertaking their inspection of the Site.

The Client's Representative's details are:

Name: **Mandy Cohen**  
Telephone number: **(02) 6872 2144**

The Client's Representative may be contacted:

on the following days: **Monday to Friday**  
between the hours of: **9am to 5pm**

Tenderers should telephone the Contact Person if they experience difficulty in securing an appointment with the Client's Representative for a site inspection.

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## 6 PREPARATION OF TENDERS

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### 6.1 ALTERNATIVE TENDERS

The Principal may consider alternative tenders, provided the alternative tender meets the scope, functional intent and design concept expressed in the tender document. Where an alternative tender is proposed, submit a detailed description of the alternative stating clearly the manner in which it differs from the detailed requirements of the tender documents and including separate tender schedules applicable to the alternative.

Alternative tenders will not be considered unless the Tenderer has submitted a conforming tender.

Alternatives will not be considered for the following aspects of the work:

- Any roof mounted equipment.
- Exposed equipment, pipework and ductwork inside the building.

## 7 SUBMISSION OF TENDERS

### 7.1 DOCUMENTS TO BE SUBMITTED

The following documents must be completed and submitted by the Tenderer:

- **Tender Form**
- **Tender Schedules as requested.**

Where applicable, refer to each Addendum and state that the Tender allows for the instructions given in the Addendum.

### 7.2 SUBMISSION PROCEDURE

Submit the Tender Form, Tender Schedules marked 'Submit with the Tender Form' and other required documents or information by the date and time given in the advertisement or invitation, by one of the following methods:

- Electronic tendering,
- Hard copy,
- Facsimile.

If more than one tender submission is made, mark each submission clearly as to whether it is a copy, an alternative tender, or whether the submission supersedes another submission.

Submit when requested, by the date, time and method stipulated in the request, Tender Schedules marked 'Submit when requested' and any other information required to allow further consideration of the Tender. Failure to meet this requirement may result in the Tender being passed over.

### 7.3 ETENDERING

Tenderers are encouraged to obtain Requests for Tenders (RFT) and submit tenders through NSW Government eTendering, via the Commerce tenders web site at:

<https://tenders.nsw.gov.au/commerce>

#### Legal status

Tenders submitted electronically will be treated in accordance with the *Electronic Transactions Act 2000* (NSW), and given no lesser level of confidentiality, probity and attention than tenders submitted by other means. Hand written signatures are not required for electronically lodged tenders.

Tenderers, by electronically submitting a tender, are taken to have accepted any conditions shown on the NSW Commerce tenders web site.

The Principal may decline to consider for acceptance, tenders that cannot be effectively evaluated because they are incomplete or corrupt.

#### Electronic Format for Submissions

Tenders submitted electronically must be in a file format that can be read, formatted, displayed and printed by Microsoft Word 2003, or any format required by the RFT.

### **File Compression**

Tenderers may compress electronic tenders in any format that can be decompressed by WinZip. Tenderers must not submit self-extracting (\*.exe) zip files.

### **Change of Tender Form Text**

Tenderers must not change existing text in electronic tender forms other than to insert required information.

## **7.4 TENDER BOX**

The Tender may be submitted in the Tender Box at:

<https://tenders.nsw.gov.au/commerce>

Locate the web page for RFT Id 0900656, login as an eTendering system user, and follow the on-screen instructions to lodge.

## **7.5 ALTERNATIVE TENDER BOXES**

The Tender may alternatively be lodged in the Tender Boxes at:

**Level 3, McKell Building, 2-24 Rawson Place, Sydney, NSW 2000.**

Submit the Tender in a sealed envelope addressed to the Tender Box and marked with 'Tender for **Bourke GOB – Cooling System Upgrade**' and the closing date and time.

The Tender may alternatively be lodged in the Tender Boxes at facsimile number:

**(02) 9372 8974**

Address the Tender to the Tender Box and mark the first page of the facsimile with '**0900656 - Bourke GOB – Cooling System Upgrade**' and the closing date and time.

Tenders sent by facsimile and not completely received by the close of tenders may be excluded from consideration for acceptance even if transmission or receipt is delayed due to the receiving facsimile machine being engaged, faulty or otherwise inoperative.

## **7.6 LATE TENDERS**

In accordance with the NSW Government *Code of Practice for Procurement*, available on the Internet at:

[www.treasury.nsw.gov.au/procurement/cpfp\\_ig](http://www.treasury.nsw.gov.au/procurement/cpfp_ig)

late tenders will not be accepted, except where the integrity and competitiveness of the tendering process will not be compromised.

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## **8 PROCEDURES AFTER CLOSING OF TENDERS**

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### **8.1 EVALUATION OF TENDERS**

In evaluating tenders, the Principal may take into consideration factors including, but not limited to: whole of life costs; ability to meet requirements of the NSW Government *Code of Practice for Procurement*; innovation; delivery time; quality offered; previous performance; experience; capability; occupational health and safety performance; industrial relations performance; environmental management performance; community relations; value adding including economic, social and environmental initiatives; and conformity.

The Principal may treat any detail required by the tender documents which is omitted, illegible or unintelligible as failing to fulfil the relevant requirement.

## **8.2 ACCEPTANCE OF TENDER**

The Principal may accept tenders that do not conform strictly with all requirements of the tender documents.

The Principal is not bound to accept the lowest or any tender. Tenders which do not comply with any requirement of, or which contain conditions or qualifications not required or allowed by, the tender document may be passed over.

No tender, or qualification or departure from a contract condition or specification, is accepted unless the Principal gives an acceptance or formal agreement in writing.

## **8.3 PROTECTION OF PRIVACY**

The Tenderer warrants, in respect of any personal information provided in this Tender or any contract arising from this Tender, that the information is accurate, up to date and complete, and that nominated individuals authorise its collection and are aware:

- that the information is being collected for the purpose of evaluating tenders and administering any contracts arising from those tenders and may be made available to other NSW government agencies or local government authorities for those purposes;
- whether the supply of the information by the individual is required by law or is voluntary, and any consequences for the individual if the information (or any part of it) is not provided; and
- of the existence of any right of access to, and correction of, the information.

**END OF SECTION – CONDITIONS OF TENDERING**



## **TENDER SCHEDULES**

**THERE ARE 13 PAGES IN THIS SECTION**

# 1 TENDER FORM – RFT 0900656

Location of Tender Closing Office:	Department of Commerce, McKell Building, 2-24 Rawson Place, Sydney
Name of Tenderer (in block letters):	.....
A.B.N. (if applicable):	.....
Address:	..... .....
Telephone number:	.....
Facsimile number:	.....
e-mail address:	.....

hereby tender(s) to perform the work for  
**BOURKE GOB – COOLING SYSTEM UPGRADE**  
 21 MITCHELL STREET, BOURKE, NSW  
 (CONTRACT NO./RFT Id 0900656)  
 in accordance with the following documents:  
 TENDER DOCUMENT VOL. 1 SPECIFICATION  
 TENDER DOCUMENT VOL. 2 DRAWINGS  
 and Addenda Numbers: .....  
 For the lump sum of: .....  
 .....  
 (\$.....) including GST.

Signed * for the Tenderer by:	.....	Date:.....
Name (in block letters):	.....	(Authorised Officer)
In the Office Bearer capacity of:	.....	



## 2 SCHEDULE OF LUMP SUM ITEMS

(SUBMIT WITH TENDER FORM)

Insert the amount allowed for each of the following items.

This Schedule is for information only and does not form part of the Contract. Its purpose is to assist in valuing completed work, but the Principal is not bound to use it.

All amounts must include an amount for GST.

Item No.	Description	Amount
1.	All work and obligations under the Contract NOT INCLUDED ELSEWHERE in this Schedule.	\$.....
2.	Decommission and removal of the redundant equipment, ductwork, pipework and etc	\$.....
3.	Provision of new air conditioning units	\$.....
4.	Provision of new ductwork, insulation and air grilles	\$.....
5.	Provision of new refrigerant pipeworks and insulation	\$.....
6.	Decommission and removal the existing electrical switchboard and provision of new electrical switchboard.	\$.....
7.	Provision of complete electrical and control system.	\$.....
8.	12 months comprehensive maintenance of the equipment and work under this contract, including preventive and breakdown maintenance, concurrent with the 12 months defect liability period.	\$.....
<b>Total (Lump Sum tendered)</b>		\$.....

Signed \* for the Tenderer by: ..... Date:.....  
 Name (in block letters): ..... (Authorised Officer)  
 In the Office Bearer capacity of: .....

### 3 SCHEDULE OF IMPORTED MATERIALS AND EQUIPMENT

(SUBMIT WITH TENDER FORM)

Provide brief details of all imported materials and equipment to be supplied or incorporated into the Works, and country of manufacture or origin. Do not include goods manufactured in New Zealand.

The value of the imported content must be the estimated duty paid value inclusive of the value of any services (eg. overseas freight and insurance, software in computer tenders, consultancy or engineering fees) or any charges of overseas origin, together with customs clearing charges.

This is not a Schedule of Rates within the meaning of the Construction Contract Conditions. See also Preliminaries Clause - **Australian and New Zealand goods**.

Description	Country of Origin	Value A\$
.....	.....	\$ .....
.....	.....	\$ .....
.....	.....	\$ .....
.....	.....	\$ .....
.....	.....	\$ .....
.....	.....	\$ .....
.....	.....	\$ .....

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

*Bourke GOB - Cooling System Upgrade*

#### 4 SCHEDULE OF ALTERNATIVES TO IMPORTED GOODS

(SUBMIT WITH TENDER FORM)

Provide brief details of materials and equipment of Australian and/or New Zealand manufacture as alternatives to imported materials and equipment as listed in the SCHEDULE OF IMPORTED MATERIALS AND EQUIPMENT, or give reasons why such alternatives cannot be provided.

The Principal may accept a tender specifying all or any of the items listed below, with an adjustment to the contract price based on the difference between the prices listed in this Schedule and the SCHEDULE OF IMPORTED MATERIALS AND EQUIPMENT.

Description of Australian and/or New Zealand manufactured Alternatives	Value A\$
.....	\$ .....
.....	\$ .....
.....	\$ .....
.....	\$ .....
.....	\$ .....
.....	\$ .....
.....	\$ .....
.....	\$ .....

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

## 5 SCHEDULE OF NSW COUNTRY MANUFACTURED GOODS

(SUBMIT WITH TENDER FORM)

Complete the Schedule if you wish to seek preference under the NSW Country Industry Preference Scheme (CIPS.). The preference may be given only to a Tenderer who is a NSW manufacturer registered under the scheme.

State your CIPS. registration number. Give details of the materials and equipment to be supplied or incorporated into the Works, the place of manufacture, the percentage(s) applicable for preference purposes and the value added content at the Tenderer's works for the material or equipment manufactured by the Tenderer for incorporation in the Works.

This is not a Schedule of Rates within the meaning of the Construction Contract Conditions.

**C.I.P.S. Registration No.:** .....

Description	Place of Manufacture	% Applicable	Value Added Content \$
.....	.....	.....	\$ .....
.....	.....	.....	\$ .....
.....	.....	.....	\$ .....
.....	.....	.....	\$ .....
.....	.....	.....	\$ .....

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

*Bourke GOB - Cooling System Upgrade*

## 6 SCHEDULE OF QUALITY MANAGEMENT INFORMATION

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(SUBMIT WITH TENDER FORM)

Submit one of the following, to demonstrate the capacity to plan and manage the quality of work:

- evidence of current full certification of the Tenderer's Quality Management System to AS/NZS ISO 9001:2000 by a certifying body registered with the Joint Accreditation System - Australia and New Zealand (JAS-ANZ); **or**
- evidence that the Tenderer's Quality Management System complies with the NSW Government *Quality Management Systems Guidelines (QMS Guidelines)*; **or**
- a minimum of three (3) completed examples of Inspection and Test Plans used on recent past projects and complying with the requirements of the *QMS Guidelines*.

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

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*Bourke GOB - Cooling System Upgrade*

## 7 SCHEDULE OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT INFORMATION

(SUBMIT WITH TENDER FORM)

Provide documents and information indicated below in accordance with Conditions of Tendering clause – **Occupational health and safety management.**

Evidence of satisfactory OHS management

Nominate at least three contracts/projects completed within the last two years that demonstrate successful management of occupational health and safety by the Tenderer:

Client	Name & location of contract <i>Eg. Sutherland Hospital Carpark; Dubbo Water Treatment Plant; Tamworth Coles shopping Centre; 3 Storey Unit Block, Penrith.</i>	Contract Price/ Project Value	Start Date	Completion Date

**WHEN REQUESTED**, submit the following additional information for each of three contracts/projects selected from the above list:

- a client referee report (which may be a NSW Government agency Contractor Performance Report) commenting on the Tenderer's performance in relation to occupational health and safety management, identifying the referee's name, position, organisation and telephone and email contact details; **or**
- a third party audit report or internal audit report; **or**
- a site safety inspection report; **or**
- a Safety Management Plan; **or**
- three Safe Work Method Statements; **or**
- minutes of three Toolbox meetings.

Recent OHS prosecutions and fines

Provide:

- a statement confirming that the Tenderer is not in default of any fine issued for a breach of the OHS legislation; **AND**
- details of every OHS prosecution and fine imposed on the Tenderer in Australia during the last two years, together with a description of actions taken by the Tenderer in response to each prosecution and fine; **or**
- a statement that the Tenderer incurred no prosecutions or fines during the last two years.

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

## 7 SCHEDULE OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT INFORMATION (CONT)

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### Hazardous substances

**WHEN REQUESTED**, submit details of proposed:

- i) methods for surveying for hazardous materials;
- ii) methods for handling and removal from the Site of hazardous materials; and
- iii) Consultants and Subcontractors and licence details.

### Occupational Health and Safety Management Monthly Report

The Tenderer undertakes, if awarded the Contract, to provide Monthly OHS Management Reports as described in Preliminaries clause – **Occupational Health and Safety Management**.

### Independent certification of formwork

The Tenderer undertakes, if awarded the Contract, to provide evidence of independent certification of formwork as required by Preliminaries clause – **Occupational Health and Safety Management**.

Signed \* for the Tenderer by: ..... Date:.....  
Name (in block letters): ..... (Authorised Officer)  
In the Office Bearer capacity of: .....

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## 8 SCHEDULE OF ENVIRONMENTAL MANAGEMENT INFORMATION

(SUBMIT WITH TENDER FORM)

Provide the documents and information specified below in accordance with Conditions of Tendering clause - **Environmental management**.

### Recent prosecutions and fines

Submit:

- a statement confirming that the Tenderer is not in default of any fine issued for a breach of environmental legislation; **and**
- details of every prosecution and fine incurred by the Tenderer during the last two years under the *Protection of the Environment Operations Act 1997 (POEO Act)* or other Australian environmental legislation, together with a description of the actions taken by the Tenderer in response to each prosecution and fine; **or**
- a statement that the Tenderer incurred no prosecutions or fines under environmental legislation during the last two years.

### Evidence of satisfactory environmental management

Nominate at least three contracts/projects, for work of comparable nature to the Works and completed within the last two years, that demonstrate successful environmental management by the Tenderer:

Client	Name & location of contract <i>Eg. Concord Hospital Carpark; Dubbo Water Treatment Plant; Tamworth Coles shopping Centre; 3 Storey Unit Block, Penrith.</i>	Contract Price/ Project Value	Start Date	Completion Date

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

*Bourke GOB - Cooling System Upgrade*

Contract No: 0900656

\* signatures not required for electronic lodgment

Revision Date: 15/04/09

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## 9 SCHEDULE OF FINANCIAL ASSESSMENT INFORMATION

(SUBMIT WHEN REQUESTED BY PRINCIPAL OR FINANCIAL ASSESSOR)

Provide documents and information listed below in accordance with Clause Conditions of Tendering - **Financial assessment.**

1. Financial Statements for last three years for the entity under consideration, including:
  - i) Balance Sheets;
  - ii) Profit and Loss Statement;
  - iii) detailed Profit and Loss Statement;
  - iv) statement of Cash Flows;
  - v) notes to and Forming Part of the Accounts;
  - vi) an Accountant's Report; and
  - vii) where existing, Auditor's Reports.

Consolidated accounts of a parent organisation or group to which the entity belongs are not acceptable.
2. Where latest financial statement is more than 6 months old, the latest management report showing:
  - i) a trading statement;
  - ii) a profit and loss statement; and
  - iii) a trial balance.
3. Where the company is required to lodge audited financial statements with ASIC, copies of these statements for the last three years.
4. Where any financial statement supplied is not audited, copies of the entity's tax returns for last three years.
5. A letter from the Tenderer's banker providing details of overdraft and guarantee facilities including:
  - i) Bank, Branch, and Account Names,
  - ii) type and limit of bank overdraft facility,
  - iii) type and limit of bank guarantee facility,
  - iv) current bank overdraft balance,
  - v) number and amount of bank guarantees outstanding; and
  - vi) details of other bank funding facilities available to the Tenderer, such as term loans, lines of credit, commercial bills and other debt instruments.
6. Current and projected cash flows for all work on hand.
7. Forecast budget for forthcoming financial year including Revenue and Profit and Loss.
8. Names and contact numbers of:
  - i) major suppliers; and
  - ii) major subcontractors.
9. Details relating to the Tenderer's history and Directors Profiles.

Signed \* for the Tenderer by: ..... Date:.....

Name (in block letters): ..... (Authorised Officer)

In the Office Bearer capacity of: .....

**10 UNDERTAKING TO COMPLY WITH THE NSW GOVERNMENT  
CODE OF PRACTICE FOR PROCUREMENT .**

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(SUBMIT WHEN REQUESTED)

The Tenderer, if awarded the Contract, will comply with the NSW Government *Code of Practice for Procurement*.

Signed \* for the Tenderer by: ..... Date:.....  
Name (in block letters): ..... (Authorised Officer)  
In the Office Bearer capacity of: .....

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*Bourke GOB - Cooling System Upgrade*

*TENDER SCHEDULES*

**END OF SECTION –TENDER SCHEDULES**

## *TENDER SCHEDULES*

# SPECIFICATION

# 1 GENERAL CONDITIONS OF CONTRACT AND ANNEXURE

*THERE ARE 22 PAGES IN THIS SECTION*

## GENERAL CONDITIONS OF CONTRACT - MINOR WORKS

### 1. DEFINITIONS

- 1.1** The Principal is as stated in the Annexure.
- 1.2** The Principal's Representative is as stated in the Annexure.
- 1.3** The Principal's Agent is as stated in the Annexure.
- 1.4** The Works means the whole of the work to be carried out and materials and services to be provided under the Contract.
- 1.5** The Contract Sum means:
- (a) where the Principal accepted a lump sum, the lump sum;
  - (b) where the Principal accepted rates, the amount calculated by firstly multiplying the rates by their respective quantities in the schedule of rates and then adding those products;
- but excluding any additions or deductions which are made under the Contract.
- 1.6** day means calendar day.
- 1.7** Site means the lands and other places made available to the Contractor by the Principal for the purpose of the Contract.
- 1.8** Text within the following format denotes a definition:



### 2. CONTRACT

**2.1** The written agreement between the Principal and the Contractor for the performance of the Works, including all documents and parts of documents to which reference may properly be made to determine the rights and obligations of the parties (the Contract Documents) shall evidence the Contract.

**2.2** The Contract Documents shall be taken as mutually explanatory and anything contained in one but not in another shall be treated as if contained in all.

**2.3** If the Contractor finds any discrepancy, error or ambiguity in or between the Contract Documents, the Contractor is to inform the Principal's Representative before starting such work and follow the directions given by the Principal's Representative.

**3. DESIGN AND CONSTRUCTION**

**3.1** The Contractor is to supply all materials and construct the Works in accordance with the Principal's design and any further development of the design allowed under the Contract. Minor items not included in the Principal's design which are needed for the satisfactory completion of the Works are to be provided by the Contractor.

**3.2** If the Contractor is to undertake design as part of the Works, the Contractor is to develop the Principal's design and submit the completed design comprising drawings, specifications, calculations and any statutory certificates required to the Principal's Representative within the period stated in the Annexure.

**3.5** The Principal is not bound to check the completed design for errors, omissions or compliance with the requirements of the Contract. The Principal is not liable to the Contractor for any claim whatsoever due to the Principal not detecting or notifying the Contractor of any errors, omissions or non-compliance with the requirements of the Contract in the completed design.

**3.3** The Contractor is not to depart from the Principal's design, unless directed by the Principal's Representative.

**3.4** The Contractor's completed design is to comply with the Contract and be fit for the intended purpose of the Works which can be reasonably inferred from the Contract Documents.

**3.6** Responsibility for the completed design and its satisfaction of the Contract requirements remains solely with the Contractor and the Principal is relying on the Contractor's knowledge, skill and judgement to carry out this responsibility.

**3.7** The Contractor is to grant to the Principal an irrevocable licence to use the Contractor's design for the Works. Such licence is also to include any subsequent repairs to, maintenance or servicing of (including the supply of replacement parts), or additions or alterations to, the Works.

**4 CARE OF THE WORKS AND OTHER PROPERTY**

**4.1** From and including the date the Site is made available to the Contractor to the date of Completion of the Works, the Contractor is responsible for the care of the Works, constructional plant and things entrusted to the Contractor by the Principal for the purpose of the Works.

The Contractor is to make good at the Contractor's expense any damage which occurs to the Works while responsible for their care.

The Contractor is also liable for damage caused by the Contractor during the Defects Liability Period.

**4.2** The Contractor is to indemnify and keep the Principal indemnified against any loss or damage to the property of the Principal (including existing property in, about or adjacent to the Works) and against any legal liability for injury, death or damage to property of others arising from the performance of the Works.

**4.3** Nothing in Clause 4 relieves the Principal from liability for the Principal's own default and defaults of others for whom the Principal is liable.

## 5. INSURANCE

**5.1** On acceptance of the tender, the Contractor is to hold or take out an insurance policy covering Workers Compensation in the State of NSW and shall also ensure that every subcontractor who is not taken to be a worker employed by the Contractor in accordance with the *Workplace Injury Management and Workers Compensation Act 1998* (NSW) Schedule 1, must hold or take out insurance covering Workers Compensation.

If insurance of the Works and public liability is to be arranged by:

- the Principal, go to **5.2**
- the Contractor, go to **5.3**

**5.2** If insurance of the Works and public liability is to be arranged by the Principal (see the Annexure) the Principal must effect insurance of the Works and public liability.

The Principal must make a copy of the policy for insurance of the Works and public liability available to the Contractor.

Go to **5.4**

**5.3** If insurance of the Works and public liability is to be arranged by the Contractor (see the Annexure) then, before commencing work on the Site, the Contractor is to hold or take out policies of insurance covering the Contractor, Principal and subcontractors for:

- (a) public liability to an amount of not less than \$5,000,000 for any single occurrence; and
- (b) loss or damage to the Works, any temporary works and all materials, constructional plant and other things that are brought onto the Site by or on behalf of the Contractor or are entrusted to the Contractor by the Principal. The amount insured is not to be less than the Contract Sum.

The Principal is to be named as an insured in the policies.

The policies must include cross liability and waiver of subrogation clauses under which the insurer, in respect of liability, agrees that the term 'insured' applies to each of the persons covered as if a separate insurance policy had been issued to each of them and generally agrees to waive all rights of subrogation or action against any of the persons covered.

Go to **5.4**

**5.4** If the Works includes work described in (a), (b) or (c) below, the Contractor is to take out the following additional insurance policies before starting such work:

- (a) The use of water-borne craft in excess of 8 metres in length: marine liability insurance;
- (b) Design of the Works undertaken by the Contractor: professional indemnity insurance;

The policy under (a) is to be in the name of the Contractor with the Principal as an additional name insured and is to cover the Contractor, the Principal, and all subcontractors employed from time to time in relation to the Works for their respective rights and interests and cover their liabilities to third parties. The policy is to be for an amount not less than \$5,000,000 for any one occurrence and shall include cross-liability and waiver of subrogation clauses under which the insurer, in respect of liability, agrees that the term 'insured' applies to each of the persons covered as if a separate insurance policy had been issued to each of them and generally agrees to waive all rights of subrogation or action against any of the persons covered.

The policy under (b) is to cover the Contractor for liability to the Principal for a minimum amount of \$500,000 or 20% of the Contract Sum, whichever is greater, to a maximum of \$5,000,000 for loss (whether economic loss only or other loss) in a single occurrence arising from errors or omissions in design of the Works carried out by the Contractor or any subcontractor.

Go to **5.5**



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**5.5.** The required policies are to be with insurers and in terms approved by the Principal's Representative. Approvals will not be unreasonably withheld.

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**5.6** The Contractor is responsible for making and managing claims and meeting the costs of any deductibles.

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**5.7** The Contractor is to maintain all required insurance policies until the end of the Defects Liability Period, or Completion if there is no Defects Liability Period.

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**5.8** If, when required in writing by the Principal to do so, the Contractor fails to produce evidence of having paid insurance premiums and other compliance with insurance obligations under General Conditions of Contract Clause 5, to the satisfaction of the Principal, the Principal may effect or maintain the insurance and pay any premiums. The Contractor is to pay the Principal the amount of any premiums paid by the Principal plus an amount of \$250 to cover the Principal's costs.

## 6 SITE AND POSSESSION

**6.1** The Principal is to give the Contractor possession of the Site by the time stated in the Annexure.



**6.2** The Principal is to give the Contractor sufficient possession to allow the Contractor to perform the Works but is not required to give the Contractor sole or uninterrupted possession of or access to the Site.



**6.3** The Contractor is to begin work on the Site as soon as practicable after being given possession of the Site by the Principal.



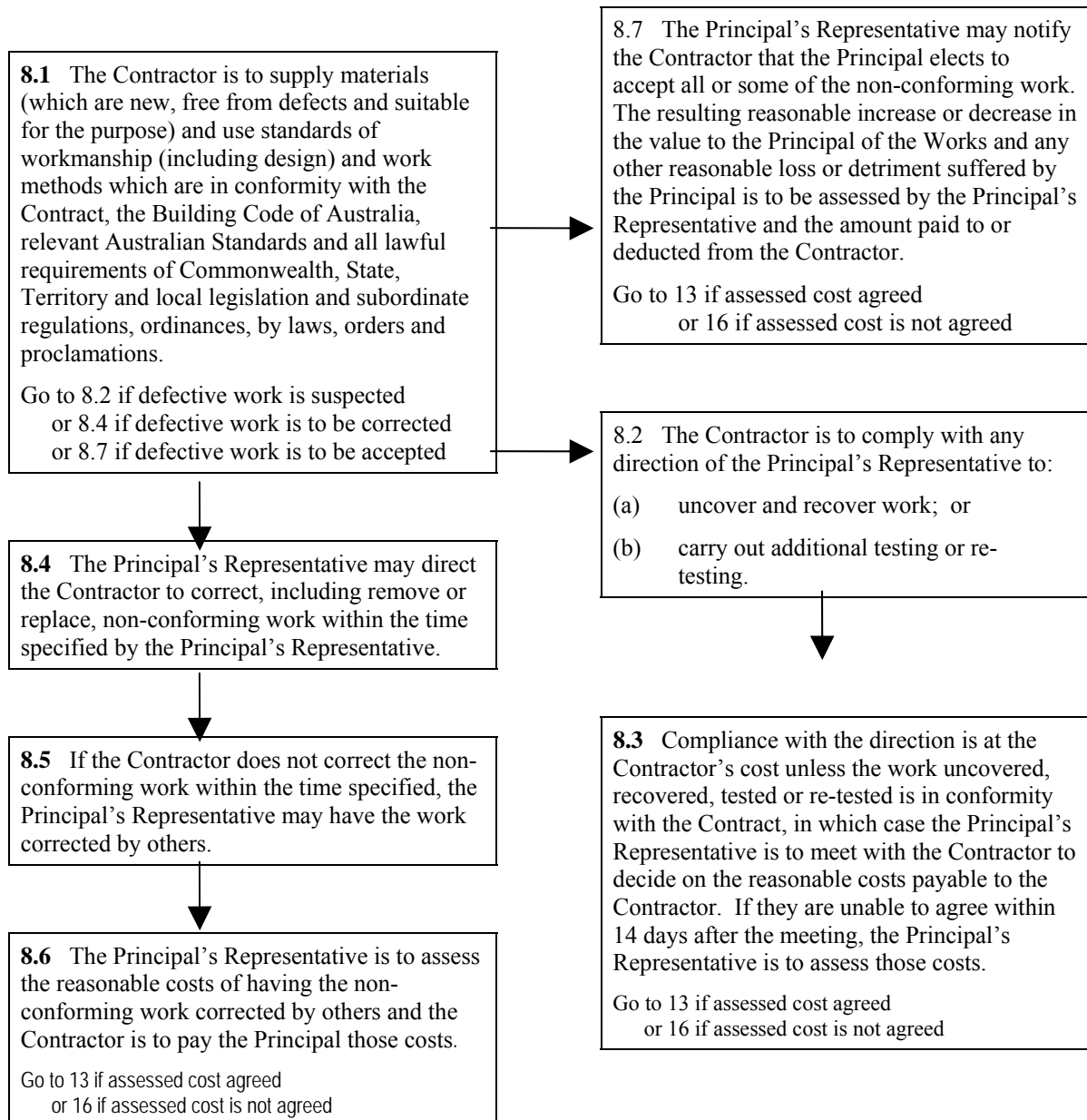
**6.4** The Contractor is to give the Principal's Representative, agents and contractors reasonable access to the Site for any purpose.

## 7. SITE CONDITIONS

**7.1** If the Contractor discovers that the conditions on, about or below the Site differ from what ought to have reasonably been anticipated at Tender time the Contractor is to inform the Principal's Representative immediately and, where possible, before the conditions are disturbed.



**7.2** The Contractor is not entitled to any extra payment for the different Site conditions. If the different conditions are such that the Principal's Representative directs the Contractor to carry out a variation, the procedure in Clause 9 is then to be followed.

**8. NON-CONFORMING WORK**

## 9. VARIATIONS

**9.1** The Principal's Representative may direct the Contractor to carry out a variation and the Contractor is to carry out the direction.

**9.3** A variation is any change to the character, form, quality and extent of the Works directed in writing by the Principal's Representative. A variation shall not invalidate the Contract.

**9.2** The Principal's Representative and Contractor are to meet to agree on the reasonable amount payable to or deducted from the Contractor for the variation. If they do not agree within 14 days after the meeting, the Principal's Representative is to assess that amount.

Go to 13 if assessed amount agreed  
or 16 if assessed amount is not agreed

## 10. SUSPENSION

**10.1** The Principal's Representative may direct the Contractor to suspend all or part of the Works and the Contractor is to carry out the direction.

**10.2** If the direction to suspend the work is due to any act or omission of the Principal, the Principal's Representative and Contractor are to meet to agree on the reasonable extra costs payable to the Contractor which resulted from the suspension. If they do not agree within 14 days after the meeting, the Principal's Representative is to assess those extra costs.

Go to 13 if assessed cost agreed  
or 16 if assessed cost is not agreed

**10.3** The Contractor is to recommence the Works as soon as practicable after being directed to do so by the Principal's Representative.

## 11. COMPLETION OF THE WORKS

**11.1** The Contractor is to Complete the Works within the period stated in the Annexure which starts on the date of being given possession of the Site.

**11.2** The Contractor is to inform the Principal's Representative when, in the Contractor's opinion the Works have reached Completion.

**11.4** The Works have reached Completion and are Complete when the Works are capable of use for their intended purpose, and should be free from any omissions or defects, and the Contractor has made good the Site and its surroundings.

**11.3** The Principal's Representative is to:

- (a) determine if the Works have reached Completion, and if so, the date of Completion; and
- (b) give the Contractor written notice of the determination.

## 12. DELAY IN COMPLETION

**12.1** If the Contractor is delayed in reaching Completion then the Contractor is to notify the Principal's Representative within 14 days after the commencement of the delay and to meet with the Principal's Representative to determine the cause of delay. Where such a delay is caused by:

- (a) a direction given by the Principal's Representative except under:
  - Clause 8; or
  - Clause 10 where the event giving rise to the direction was not beyond the control of the Contractor; or
- (b) a breach of the Contract by the Principal; or
- (c) any event beyond the control of the Contractor,

the period for Completion is to be extended.

**12.2** If the Principal's Representative and the Contractor do not agree on an extension to the period for Completion within 14 days of the meeting to determine the cause of delay, the Principal's Representative is to assess a reasonable extension of time. The Principal's Representative may for any reason and at any time extend the period for Completion.

Go to 16 if assessed extension of time is not agreed.

**12.3** If the Contractor does not Complete the Works by the last day of the period for Completion then the Contractor is to pay to the Principal liquidated damages from, but excluding that date, to and including the date the Works are Completed at the rate stated in the Annexure.

**13. PAYMENT AND RETENTION**

**13.1** The Contractor is to give the Principal's Representative a written claim for payment when a Milestone stated in the Annexure is reached. The claim is to identify the Milestone, the amount claimed, how the amount is calculated, deductions to which the Principal is entitled and, when additions are claimed, the legal and factual basis of the claim. Additions are extra costs or other amounts to which the Contractor is entitled under or in connection with the subject matter of the Contract.

When a Milestone is reached, the amount which the Contractor is entitled to claim and be paid is the sum of:

- for work for which the Principal accepted rates, an amount calculated by applying the rates to the quantities of work carried out to that date;
- for work for which the Principal accepted a lump sum, the percentage stated in the Annexure for the Milestone;
- for any additions for which the Principal has approved an amount in writing or for which an amount has been finally determined by an Expert under Clause 16, the amount approved or determined;

less payments previously made (including under Clause 16), costs payable by the Contractor to the Principal and deductions to which the Principal is entitled under or in connection with the subject matter of the Contract, including but not limited to retention moneys, liquidated damages and other damages whether liquidated or unliquidated.

Go to 13.2 for payments  
and 13.8 on Completion

**13.8** When the Works are Complete an amount of 2.5% of the Contract Sum is to be retained by the Principal against the due and proper performance of the Contract, except when there is no Defects Liability Period.

**13.9** The Contractor may, instead of the retention, provide security in the amount of the retention in the form as detailed in Schedule - Unconditional Undertaking.

**13.3** Within 10 business days after receipt of the Contractor's payment claim, the Principal is to provide to the Contractor a payment schedule identifying the progress claim to which it relates and stating the payment, if any, which the Principal will be making. If the payment is to be less than the amount claimed by the Contractor the payment schedule is to indicate why it is less.

For the purposes of this clause a business day is any day other than a Saturday, Sunday, public holiday or 27, 28, 29, 30 or 31 December.

**13.2** With each claim for payment, and at any other time as requested by the Principal's Representative the Contractor is to give the Principal's Representative a completed statutory declaration, as detailed in Schedule - Statutory Declaration.



**13.4** Any claim by the Contractor on the Principal is to be made within 28 days after the date of the Principal's Representative's written notice of Completion under Clause 11.3. All claims whatsoever by the Contractor against the Principal made after that time are barred.

However, if the Contract includes a Defects Liability Period, and the Contractor has a claim against the Principal under Clause 14.4 or because of an event which occurred during the Defects Liability Period, the Contractor may make that claim up to 28 days after the end of the Defects Liability Period. If the claim is made after that time it is barred.



**13.5** Payment is to be made:

- within 20 business days after receipt of the Contractor's written payment claim; or
- within 5 business days after the statutory declaration is received; or
- by the specified time after any action required prior to payment has been carried out,

whichever is the latest. If the Contractor breaches Clause 13.2, the Principal is not obliged to make any payment to the Contractor while the breach continues.

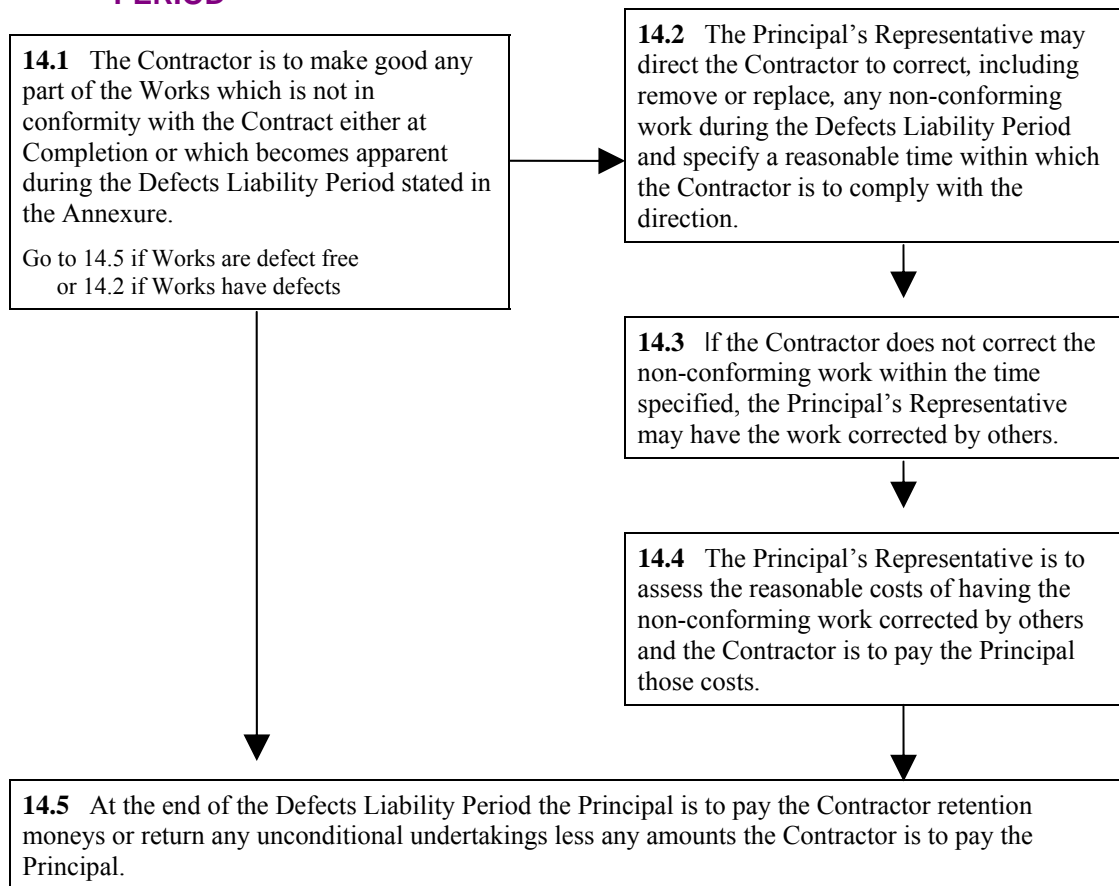


**13.6** Unless stated otherwise, all payments by the Principal to the Contractor are to be made by Electronic Funds Transfer to a bank, building society or credit union account nominated by the Contractor. No payment is due to the Contractor until details of the nominated account (name of financial institution, account name and account number) are notified in writing to the Principal's Representative. The Contractor is to promptly notify the Principal's Representative in writing of any changes to the nominated account and the Principal is not responsible for any payments made into a previously nominated account before notification of such change is received by the Principal's Representative.



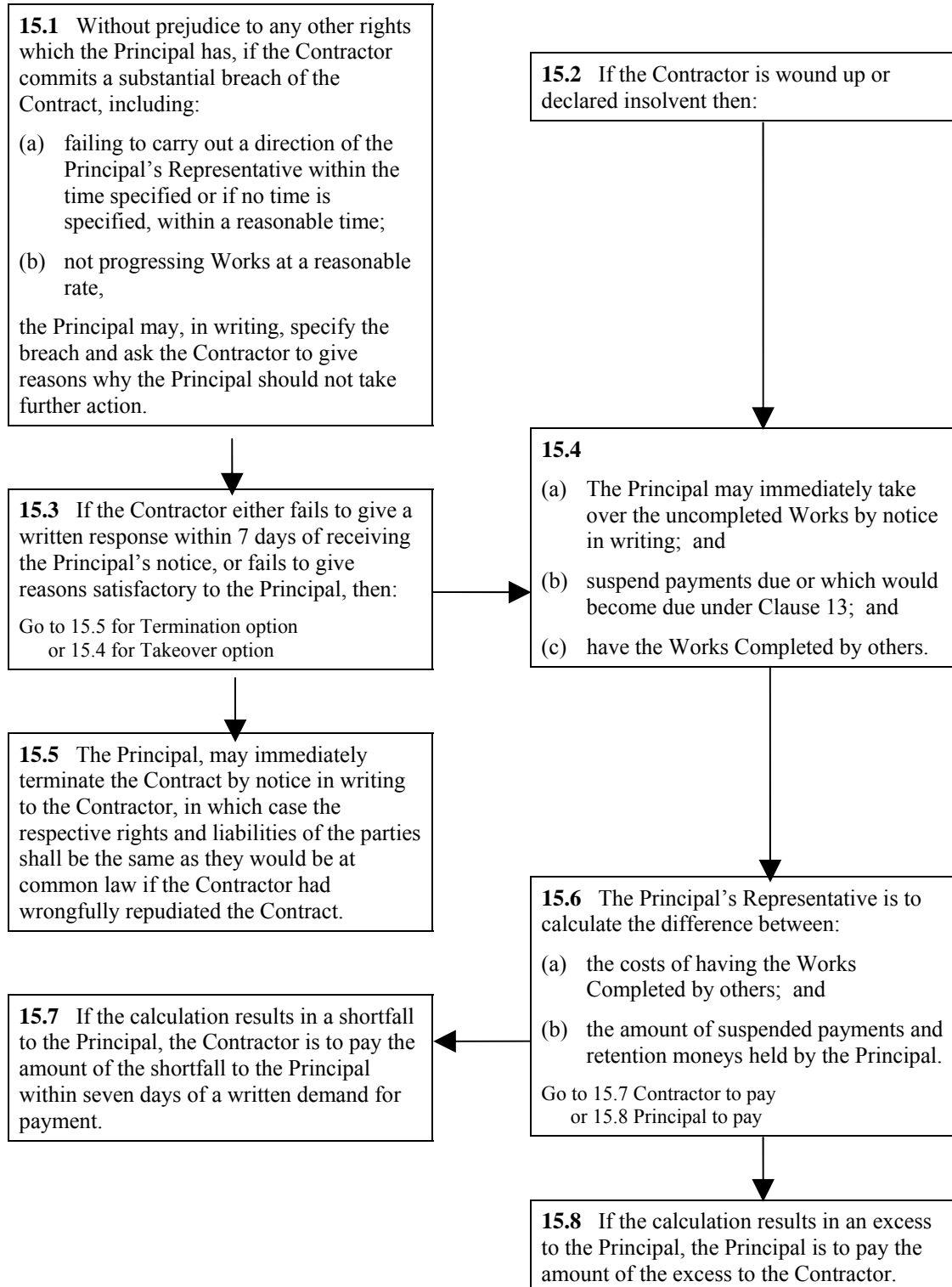
**13.7** Payment is not evidence of the value of work or an admission of liability or that the work is satisfactory but is a payment on account only.

## 14. DEFECTS LIABILITY PERIOD





## 15. DEFAULT AND INSOLVENCY



**16. DISPUTES**

**16.1** If either party is dissatisfied with an act or omission of the other party in connection with the Contract, including assessment of a claim, failure to agree, or an instruction, that party is to notify the Principal's Agent and the other party in writing of a dispute within 14 days of the act or omission. The notifying party is to provide particulars, including the factual and legal basis of any claimed entitlement.

If a party gives notice of a dispute but not within the time provided by this Clause 16.1, then it is not entitled to interest for the period before the party gave notice.

**16.2** Within 7 days of the giving of the notice, the Contractor and Principal's Agent are to meet to attempt to resolve the dispute.

**16.3** If the dispute is not resolved within 14 days after the notice providing particulars of the dispute, the parties are to appoint an independent Expert.

If the parties fail to agree upon an Expert, either may request the Chief Executive Officer of the Australian Commercial Disputes Centre Ltd Sydney to nominate an Expert. If there is no Chief Executive Officer or the Chief Executive Officer fails to make a nomination within a reasonable time, the Principal is to nominate an Expert.

**16.4** The person nominating the Expert is not to nominate:

- an employee of the Principal or Contractor,
- a person who has been connected with the Contract, or
- a person upon whose appointment the Principal and the Contractor have previously failed to agree.

**16.5** When the person to be the Expert has been agreed on or nominated, the Principal, on behalf of both parties is to appoint the expert in writing, with a copy to the Contractor, setting out:

- the dispute being referred to the Expert for a decision,
- the Expert's fees,
- the procedures detailed in this Clause 16, and
- any other matters which are relevant to the engagement.

**16.6** The Principal and the Contractor are to share equally the Expert's fees and out-of-pocket expenses, including security deposit if required. Each party is to otherwise bear their own costs and share equally any other costs of the process.

↓

**16.7** Each party is to make written submissions to the Expert and provide a copy to the other party as follows:

- (a) Within 7 days after the appointment of the Expert, the notifying party is to submit details of the claimed act or omission.
- (b) Within 14 days after receiving a copy of that submission, the other party is to submit a written response. That response can include cross-claims.

↓

**16.8** The Expert is to decide whether the claimed event, act or omission did occur and, if so:

- when it occurred,
- what term of the Contract or other obligation in law, if any, requires the other party to pay the claimant money in respect of it, and
- the merits in law of any defence or cross-claim raised by the other party.

The Expert then decides the amount, if any, which one party is legally bound to pay the other on account of the event, act or omission.

The Expert is also to decide any other questions required by the parties, as set out in the dispute referred to the Expert at Clause 16.5.

→

**16.9** In making the decision, the Expert acts as an expert and not as an arbitrator and is:

- (a) not liable for acts, omissions or negligence;
- (b) to make the decision on the basis of the written submissions from the parties and without formalities such as a hearing;
- (c) required within 35 days of appointment to give the decision in writing, with brief reasons, to each party; and
- (d) bound by the rules of natural justice.

↓

**16.10** If the Expert decides that one party is to pay the other an amount exceeding \$250,000 (calculating the amount without including interest on it), and within 14 days of receiving the decision of the Expert, either party gives notice in writing to the other that the party is dissatisfied, the decision is of no effect and either party may then commence litigation.

↓

**16.11** Unless a party has a right to commence litigation under Clause 16.10:

- (a) The parties are to treat each determination of the Expert as final and binding and give effect to it.
- (b) If the Expert decides that one party owes the other party money, that party is to pay the money within 14 days of the receiving the decision of the Expert.

## 17. TERMINATION FOR THE PRINCIPAL'S CONVENIENCE

**17.1** The Principal may terminate the Contract by giving notice with effect from the date stated in the notice, for its convenience and without the need to give reasons. The Contractor must leave the Site by the date stated in the termination notice and remove all plant, equipment and amenities it has brought onto the Site for the construction of the Works.

If the Contract is terminated for the Principal's convenience, the Principal must pay the Contractor:

- the value of all work carried out (as determined in clause 13) up to the date of the termination notice takes effect; plus
- 2% of the difference between the Contract Sum, adjusted by any amounts agreed or assessed under clause 9.2 or finally determined under clause 16, and the total of all amounts paid and payable to the contractor for payment claims.

The payments referred to in this Clause are full compensation under this Clause, and the Contractor has no claim for damages or other entitlement whether under the Contract or otherwise.

The Contractor must, wherever possible, include in all subcontracts and supply agreements an equivalent provision to this Clause.

**SCHEDULE 1**

**APPROVED FORM OF UNCONDITIONAL UNDERTAKING**

(Clause 13.9)

**[To be submitted on a Financial Institution's letterhead and show, at a minimum, the Financial Institution's name and address]**

At the request of ..... ('the Contractor)  
and in consideration of ..... ('the Principal')  
accepting this undertaking in respect of the contract for  
..... ('the Contract'),  
..... ('the Financial Institution')  
unconditionally undertakes to pay on demand any sum or sums which may from time to time be  
demanded by the Principal to a maximum aggregate sum of  
..... (\$.....) ('the Sum').

*The undertaking is to continue until notification has been received from the Principal that the Sum is no longer required by the Principal or until this undertaking is returned to the Financial Institution or until payment to the Principal by the Financial Institution of the Sum or such part as the Principal may require. The Principal must not assign the unconditional undertaking without the prior **written** agreement of the Financial Institution, which must not be unreasonably withheld.*

*Should the Financial Institution be notified in writing, purporting to be signed by or for and on behalf of the Principal that the Principal requires payment to be made of the whole or any part or parts of the Sum, it is unconditionally agreed that the Financial Institution will make the payment or payments to the Principal forthwith without reference to the Contractor and notwithstanding any notice given by the Contractor not to pay same.*

*Provided always that the Financial Institution may at any time without being required so to do pay to the Principal the Sum less any amount or amounts it may previously have paid under this undertaking or such lesser sum as may be required and specified by the Principal and thereupon the liability of the Financial Institution hereunder shall immediately cease.*

DATED at ..... this ..... day  
of ..... 20.....

.....  
[Signature]

.....  
[Print name of person signing the Undertaking]

.....  
[Position / Title]

**SCHEDULE 2****Statutory Declaration****Definitions***Oaths Act 1900  
(NSW)**The Principal is* .....*The Contractor is* .....

ACN/ABN.....

*The Contract is* Contract No. ....

Contract Title.....

dated .....(Date of Contract) between the party identified as the Principal and the party identified as the Contractor.

**Declaration***Full name* **I,** .....*Address* **of** .....

do hereby solemnly declare and affirm that:

*Insert position title of the Declarant* **1** I am the representative of the Contractor in the Office Bearer capacity of .....**2** I am in a position to make this statutory declaration about the facts attested to.**REMUNERATION OF CONTRACTOR'S EMPLOYEES ENGAGED TO CARRY OUT WORK IN CONNECTION WITH THE CONTRACT****3** All remuneration payable to the Contractor's relevant employees for work done in connection with the Contract to the date of this statutory declaration has been paid and the Contractor has made provision for all other benefits accrued in respect of the employees.

Relevant employees are those engaged in carrying out the work done in connection with the Contract.

Remuneration means remuneration or other amounts payable to relevant employees by legislation, or under an industrial instrument, in connection with work done by the employees [s127(6) of the *Industrial Relations Act 1996* (NSW)].**REMUNERATION OF THE EMPLOYEES OF SUBCONTRACTORS ENGAGED TO CARRY OUT WORK IN CONNECTION WITH THE CONTRACT****4** The Contractor *is/is not* a principal contractor for the work done in connection with the Contract, as defined in section 127 of the *Industrial Relations Act 1996* (NSW).Delete the words *in italics* that are not applicable.**5** Where the Contractor is also a principal contractor for work done in connection with the Contract, the Contractor has been given a written statement in its capacity of principal contractor under section 127(2) of the *Industrial Relations Act 1996* (NSW) by each subcontractor in connection with that work stating that all remuneration payable by each subcontractor to the subcontractor's relevant employees for work done in connection with the Contract to the date of this declaration has been paid, and each subcontractor has made provision for all other benefits accrued in respect of each subcontractor's employees.**6** I am aware that the *Industrial Relations Act 1996* (NSW) requires any written statement provided by subcontractors must be retained for at least 6 years after it

## 1. GENERAL CONDITIONS OF CONTRACT AND ANNEXURE

was given and declare that the Contractor has accordingly made arrangements for the secure retention of the written statements.

### WORKERS COMPENSATION INSURANCE OF THE CONTRACTOR'S WORKERS

- 7 All workers compensation insurance premiums payable by the Contractor to the date of this statutory declaration in respect of the work done in connection with the Contract have been paid. This statutory declaration is accompanied by a copy of any relevant certificate of currency in respect of that insurance.

### WORKERS COMPENSATION INSURANCE FOR WORKERS OF SUBCONTRACTORS

- 8 The Contractor *is / is not* a principal contractor for work done in connection with the Contract, as defined in section 175B of the *Workers Compensation Act 1987* (NSW).
- 9 Where the Contractor is also a principal contractor for work done in connection with the Contract, the Contractor has been given a written statement under section 175B of the *Workers Compensation Act 1987* (NSW) in the capacity of principal contractor in connection with that work to the intent that all workers compensation insurance premiums payable by each subcontractor in respect of that work done to the date of this statutory declaration have been paid, accompanied by a copy of any relevant certificate of currency in respect of that insurance.
- 10 I am aware that the *Workers Compensation Act 1987* (NSW) requires any written statement provided by subcontractors and any related certificate of currency must be retained for at least 7 years after it was given and declare that the Contractor has accordingly made arrangements for the secure retention of the written statements.

Delete the words *in italics* that are not applicable.

### EMPLOYER UNDER THE PAYROLL TAX ACT

- 11 The Contractor *is registered as / is not required to be registered as* an employer under the *Payroll Tax Act 2007* (NSW).
- 12 All payroll tax payable by the Contractor in respect of wages paid or payable to the relevant employees for work done in connection with the Contract to the date of this statutory declaration has been paid.
- 13 The Contractor *is / is not* a principal contractor for work done in connection with the Contract, as defined in section 17 of Schedule 2 to the *Payroll Tax Act 2007* (NSW).
- 14 Where the Contractor is also a principal contractor for work done in connection with the Contract, the Contractor has been given a written statement under section 18 of Schedule 2 to the *Payroll Tax Act 2007* (NSW) in the capacity of principal contractor in connection with that work to the intent that all payroll tax payable by each subcontractor in respect of the wages paid or payable to the relevant employees for that work done to the date of this statutory declaration has been paid.
- 15 I am aware that the *Payroll Tax Act 2007* (NSW) requires any written statement provided by subcontractors must be retained for at least 5 years after it was given and declare that the Contractor has accordingly made arrangements for the secure retention of the written statements.

Delete the words *in italics* that are not applicable.

Delete the words *in italics* that are not applicable.

### PAYMENTS TO SUBCONTRACTORS

- 16 The Contractor has paid every subcontractor, supplier and consultant all amounts payable to each of them by the Contractor as at the date of this statutory declaration with respect to engagement of each of them for the performance of work or the supply of materials for or in connection with the Contract.
- 17 The provisions of clause "SECURITY OF PAYMENT", if included in the Contract, have been complied with by the Contractor.
- 18 The Contractor has been informed by each subcontractor and consultant to the Contractor (except for subcontracts and agreements not exceeding \$25,000 at their commencement) by written statement in equivalent terms to this declaration (made no earlier than the date 14 days before the date of this declaration):

## 1. GENERAL CONDITIONS OF CONTRACT AND ANNEXURE

.1 that their subcontracts with their subcontractors, consultants and suppliers comply with the requirements of clause "SECURITY OF PAYMENT", if included in the Contract, as they apply to them; and

.2 that all of their employees, subcontractors, consultants and suppliers, as at the date of the making of such a statement have been paid all remuneration and benefits due and payable to them by, and had accrued to their account all benefits to which they are entitled from, the subcontractor or consultant of the Contractor or from any other of their subcontractors or consultants (except for their subcontracts and agreements not exceeding \$25,000 at their commencement) in respect of any work for or in connection with the Contract.

19 I am not aware of anything to the contrary of any statutory declaration referred to in paragraph 18 of this declaration and on the basis of the statements provided, I believe the matters set out in paragraph 18 to be true.

20 And I make this solemn declaration, as to the matters aforesaid, according to the law in this behalf made, and subject to the punishment by law provided for any wilfully false statement in any such declaration.

Signature of  
Declarant

.....  
declared at

Place

.....

Date

on.....  
before me

Signature of legally  
authorised person\*  
before whom the  
declaration is made

.....

Name and title of  
person\* before  
whom the declaration  
is made

.....  
.....

### Notes:

1. In this declaration:

- (a) the words "principal contractor", "employee", "employees" and "relevant employees" have the meanings applicable under the relevant Acts;
- (b) the word "subcontractor" in paragraphs 5, 6, 9, 10, 14 and 15 has the meaning applicable under the relevant Act; and
- (c) otherwise the words "Contractor", "subcontractor", "supplier" and "consultant" have the meanings given in or applicable under the Contract.

2. \* The declaration must be made before one of the following persons:

(a) where the declaration is sworn within the State of New South Wales:

- (i) a justice of the peace of the State of New South Wales;
- (ii) a solicitor of the Supreme Court of New South Wales with a current practising certificate;
- (iii) a notary public; or
- (iv) another prescribed person legally authorised to administer an oath under the *Oaths Act 1900* (NSW); or

(b) where the declaration is sworn in a place outside the State of New South Wales:

- (i) a notary public; or
- (ii) any person having authority to administer an oath in that place.



## ANNEXURE TO GENERAL CONDITIONS OF CONTRACT

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### Clause

#### 1.1

The Principal is: **The Chief Executive of NSW State Property Authority**

#### 1.2

The Principal's Representative is: **Scott Thurbon**

If no name is stated the Principal is to name the person in writing within 14 days after accepting the tender. The Principal may at any time change the person for any reason whatsoever by giving written notice.

#### 1.3

The Principal's Agent is: »

If no name is stated the Principal is to name the person in writing within 2 days of the Contractor giving written notice of a dispute under Clause 16. The Principal may at any time change the person for any reason whatsoever by giving written notice.

#### 3.2

The period to submit the completed design is: **Not Applicable** before its use for construction.

If no period is stated it is 7 days before its use for construction.

#### 5.2

The Principal has arranged insurance of the Works and public liability through insurance broker Jardine Lloyd Thompson Pty Ltd.

The insurance policy is available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_contract\\_management\\_insurance\\_policies.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_contract_management_insurance_policies.doc)

#### 6.1

The time to give possession of Site is: **14 days** after the Principal accepted the tender.

If no time is stated it is 7 days after the Principal accepted the tender.

#### 11.1

The period for Completion is: **12** calendar weeks.

If no period is stated a reasonable period is to apply.

#### 12.3

The rate per day of liquidated damages is: » \$ .

If no rate is stated common law damages are to apply.

#### 13.

The Milestones and Percentages are as below:

Milestone	Percentage of Contract Sum
Delivery of air conditioning equipment and fix in position	<b>20%</b>
Completion of installation, including testing and commissioning	<b>80%</b>

If no Milestones and Percentages are stated the Milestone is Completion of the Works and Percentage is 100% of the Contract Sum.

**14.1**

The Defects Liability Period, which commences at Completion of the Works is: **52 Weeks**

If no Period is stated then no Defects Liability Period applies.

**END OF SECTION – GENERAL CONDITIONS OF CONTRACT AND ANNEXURE**



## 2 PRELIMINARIES

*THERE ARE 22 PAGES IN THIS SECTION*

### 1 ADMINISTRATION AND CONTRACTING

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#### 1.1 ELECTRONIC COMMUNICATIONS

The parties agree and consent that notices and communications may be by electronic communication in accordance with the *Electronic Transactions Act 2000* (NSW).

#### 1.2 USE OF QUALIFIED TRADEPERSONS

Use qualified tradepersons when completing the Works. The use of such persons shall not relieve the Contractor of liability for the fitness of the Works for the purposes required by the Contract.

#### 1.3 LONG SERVICE LEVY

Before commencing the works, the Contractor must:

- pay to the Building and Construction Industry Long Service Payments Corporation or the Corporation's agent the amount of the long service levy payable under the *Building and Construction Industry Long Service Payments Act 1986* (NSW); and
- produce to the Principal the document evidencing payment of the levy.

Additional information and the Levy Payment Form are available on the Internet at:

[www.lspc.nsw.gov.au](http://www.lspc.nsw.gov.au)

#### 1.4 COLLUSIVE ARRANGEMENTS

The Contractor must comply with the NSW Government *Code of Practice for Procurement*, which is available on the Internet at:

[www.treasury.nsw.gov.au/procurement/cpfp\\_ig](http://www.treasury.nsw.gov.au/procurement/cpfp_ig)

#### 1.5 CONTRACTOR PERFORMANCE REPORTING

During the course of the Contract, the Contractor's performance may be monitored and assessed in accordance with the *Performance management system guidelines* which are available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_performance\\_management.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_performance_management.doc)

#### 1.6 EXCHANGE OF INFORMATION BETWEEN GOVERNMENT AGENCIES

The Contractor authorises the Principal and its employees and agents to make information concerning the Contractor and its performance available to other NSW government agencies and local government authorities, which may take such information into account in considering whether to offer the Contractor future opportunities for work.

The Principal regards the provision of information about the Contractor to any NSW government agency or local government authority as privileged under the *Defamation Act*

2005. The Contractor agrees that it will have no entitlement to make any claim against the Principal in respect of any matter arising out of the provision or receipt of such information.

### 1.7 NATSPEC SUBSCRIPTION

If any of the Contractor's Documents are based on NATSPEC, then the Contractor must provide to the Principal proof of the Contractor's current NATSPEC subscription.

### 1.8 GOODS AND SERVICES TAX

All prices, rates and other amounts referred to under the Contract must include GST if it is payable.

The Principal will issue payment schedules in the form of Recipient Created Tax Invoices. The Contractor must not issue Tax Invoices in respect of the Contract.

The Principal will issue Adjustment Notes in respect of adjustment events known to the Principal. The Contractor must notify the Principal of details of any adjustment event not known to the Principal.

Each party warrants it is registered for GST at the time of entering into the Contract, and must notify the other party if it ceases to be registered for GST or to satisfy any requirements for the issue of Recipient Created Tax Invoices.

### 1.9 PASSING OF PROPERTY AND RISK

Unless otherwise provided, items supplied by the Contractor become the property of the Principal when unloaded as required in the Contract. Such items remain at the risk of the Contractor until property therein passes to the Principal.

### 1.10 AUSTRALIAN AND NEW ZEALAND GOODS

Do not supply or incorporate into the Works any items imported into Australia except:

- items manufactured in New Zealand;
- items included in Tender Schedules - **Schedule of Imported Materials and Equipment** lodged with the Tender and accepted by the Principal;
- a single item with an imported content valued at less than 2% of the Contract Sum or \$20,000, whichever is the lesser. If an item is one of a group of similar items, the group shall be considered as one single item.

The Principal will not pay for imported goods supplied or incorporated into the Works in breach of the provisions of this clause.

### 1.11 QUALITY MANAGEMENT REQUIREMENTS

#### Design Plan

Prior to commencing design work, prepare and implement a Design Plan complying with the NSW Government *Quality Management Systems Guidelines (QMS Guidelines)*, covering each phase of design and addressing the key activities.

The *QMS Guidelines* are available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

### Inspection and Test Plans

Prepare and implement Inspection and Test Plans, complying with the *QMS Guidelines*, incorporating the Hold and Witness points specified in the Contract.

Submit copies of Inspection and Test Plans and checklists not less than 7 days before commencing the work to which they apply. Also submit certification that the relevant Inspection and Test Plans of Subcontractors and Consultants meet the requirements of the *QMS Guidelines*. Do not start any work before this documentation is submitted.

Give at least 24 hours notice prior to reaching a Hold or Witness point.

The Contractor must not proceed beyond a Hold point without endorsement by the Principal or its authorised representative.

The Principal, at its discretion, may inspect the work at a Witness point, but work may proceed without endorsement.

Endorsement by the Principal at a Hold or Witness point does not release the Contractor from its obligations to achieve the specified requirements of the Contract.

Surveillance (monitoring) by the Principal will apply to all work associated with the Contract.

### Conformance records

Submit copies of conformance records as specified, including:

Conformance records	Time when records are required
Completed Inspection & Test Plans and associated checklists	With each Payment Claim
Operation and Maintenance Manuals	At the completion of works
Commissioning procedures	Prior to the testing and commissioning

### Failure to Comply

If the Contractor fails to comply with the requirements of this clause, the Principal may implement such inspections and tests as the Principal determines and the cost incurred by the Principal shall be a debt due from the Contractor.

## 1.12 SECURITY OF PAYMENT

### General

In this clause “subcontract” includes an agreement for supply of goods or services (including professional services and plant hire) or both and “subcontractor” includes a supplier of goods or services (including professional services and plant hire) or both.

The Contractor shall ensure that each subcontract, whether written or oral, entered into by the Contractor or any subcontractor in respect of the work under the Contract and which has a value of \$25,000 or more at the commencement of the subcontract, includes provisions in the form or to the effect of the form, as the case may be, of those contained in this clause, including the provisions of this subclause.

### Options as to Form of Security

Each subcontract which -

- requires the subcontractor to provide a cash security to its principal;
- allows the subcontractor's principal to deduct retention moneys from any payment made by it to the subcontractor; or

- provides for both of the above

shall allow the subcontractor the option at any time to provide an unconditional undertaking or unconditional undertakings in lieu of a cash security or retention moneys. To the extent that the subcontractor provides an unconditional undertaking or undertakings, the subcontractor's principal shall not deduct retention moneys and shall forthwith release to the subcontractor any retention moneys or cash security then held.

### Trust for Cash Security and Retention Moneys

Each subcontract shall include a provision having the effect that:

- When a party receives or retains security in cash or converts security to cash, that security is held in trust by the security holder from the time of receipt, retention or conversion, as the case may be, and the security holder must forthwith deposit the money into a trust account in a bank selected by that party;
- the moneys shall be held in trust for whichever party is entitled to receive them until they are paid in favour of that party and the security holder shall maintain proper records to account for such moneys; and
- any interest earned by the trust account shall not be held in trust, and shall be owned by the party holding the security.

If the party holding security has a policy of insurance protecting subcontract payments due to the other party which is equivalent to the HIA Security of Payment Bond, then compliance with the above of this subclause is not required.

Whenever requested by the Principal to provide evidence verifying that the Contractor is holding in trust an amount which the Contractor should be holding in trust, the Contractor shall provide evidence to the reasonable satisfaction of the Principal that the amount is held in trust. If the Contractor fails to do so then, in addition to any other remedy which the Principal may have against the Contractor, the Principal may withhold an equivalent amount from payments to the Contractor.

### Payments

Each subcontract shall include:

- an obligation, which takes precedence over any inconsistent provision of the subcontract, for the subcontractor's principal to pay the subcontractor regular progress payments of 100% of the value of work, goods or services provided by the subcontractor less only retention moneys, if any, paid into the trust account referred to in subclause - **Trust for cash security and retention moneys**;
- an entitlement to progress payments within the following periods after the date upon which a progress claim is lodged by the Contractor with the Principal's Representative:
  - in the case of the Contractor's subcontractors, 28 days;
  - in the case of all other subcontractors, 35 days,

Compliance with this subclause shall not prevent the Contractor from paying a subcontractor an amount in excess of that claimed from the Principal, or paying before the time stipulated in this subclause.

### Alternative Dispute Resolution

Each subcontract shall include provisions incorporating the dispute resolution procedures outlined in the Contract except that, in each case, it shall not be mandatory for the subcontractor to pursue the contractual dispute resolution mechanism if the only remedy sought by the subcontractor is an order that the subcontractor's principal pay to it an amount which is not disputed to be due and payable under the subcontract.

### Documents to be Provided to Subcontractors

Each subcontract shall include a provision which requires the subcontractor's principal to provide to the subcontractor, before the subcontractor commences work under the subcontract, a copy of the following provisions of the contract between the subcontractor's principal and its principal:

- the provision equivalent to this Preliminaries clause - **Security of Payment**; and
- the clauses relating to proof of payment of subcontractors, times for payment claims and payment and alternative dispute resolution.

### Register of Subcontracts

Maintain a register of all subcontracts which have a value of \$25,000 or greater showing brief details of the subcontract work, the name, address and telephone number of the subcontractor, and provide an up to date copy of the register when requested by the Principal's Representative.

If further requested by the Principal's Representative, provide an unpriced copy of the subcontract agreement within 14 days of such request.

## 1.13 ADDITIONAL SECURITY AND OBLIGATIONS FOR TRUSTEES

If the Contractor is a trustee:

- before commencing the Works, the Contractor must give the Principal an unconditional undertaking as security for any amount previously agreed in writing by the parties. The unconditional undertaking must be in the form detailed in Schedule 1- **Approved Form of Unconditional Undertaking** and from a financial institution acceptable to the Principal.
- The security will be retained by the Principal against the due and proper performance of the Contract by the Contractor. Unless the Principal has made or intends to make a demand against the unconditional undertaking, the Principal will return the unconditional undertaking within 14 days after the date of Completion of the Works determined or agreed by the Principal.
- The Contractor must not prevent the Principal making any demand against the unconditional undertaking, or prevent the provider of an unconditional undertaking complying with the unconditional undertaking or any demand by the Principal, but the Contractor may seek damages if the Principal makes a demand in breach of the Contract.
- The Contractor must ensure that, for the duration of the Contract, the total value of the trust beneficiaries' loans to the trustee is always greater than the total value of trust beneficiaries' loans from the company.

## 1.14 INDUSTRIAL RELATIONS MANAGEMENT

### Requirement

The Contractor must comply with the NSW Government *Industrial Relations Management Guidelines*.

Submit, before beginning work on the Site, confirmation that the Contractor will comply with the industrial relations aspects of the NSW Government *Code of Practice for Procurement* and the associated Implementation Guidelines.

### Failure to comply

If at any time the Contractor has not carried out its obligations under this clause - **Industrial Relations Management**, then notwithstanding any other provision of the Contract, no payment is due to the Contractor until the 7<sup>th</sup> day after the required action has been carried out.



### 1.15 AUDIT AND REVIEW

Make available, on request, all records, including those of or relating to Subcontractors or suppliers, relevant to compliance with requirements of the Contract, for the purposes of audit, review or surveillance. Provide all reasonable assistance during the audits or reviews including attendance by the Contractor.

Promptly implement effective corrective action on matters disclosed by audit or review.

## 2 SITE AND WORKS

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### 2.1 WORKING HOURS AND WORKING DAYS

Unless the Contract provides otherwise the Site is available to the Contractor to perform the Works between 7 am and 5 pm Monday to Friday but excluding public holidays.

The Principal's Representative may approve additional working hours or working days, subject to conditions which may include, but are not limited to:

- restrictions on the performance of work which requires supervision; and
- a requirement that the Contractor meet the costs of supervision, by or on behalf of the Principal, of work performed during the additional working hours or working days.

### 2.2 EXISTING SERVICES

#### Locating Existing Services – Dial Before You Dig

The Contractor is responsible for locating services and in doing so, must comply with the WorkCover Work Near Underground Assets Guideline, which is available on the Internet at:

[www.workcover.nsw.gov.au/NR/ronlyres/96ACDD20-8FC0-4583-A6F4-97292055A954/0/work\\_near\\_underground\\_asset\\_1419.pdf](http://www.workcover.nsw.gov.au/NR/ronlyres/96ACDD20-8FC0-4583-A6F4-97292055A954/0/work_near_underground_asset_1419.pdf)

Before commencing excavation the Contractor must obtain, from the Dial Before You Dig information service or relevant public authorities or owners of underground services, written confirmation of the exact positions of all underground services at and around the Site, and verify and prominently mark the locations of the underground services on the Site.

#### Dealing with Existing Services

Existing services (such as drains, watercourses, public utilities, telecommunications and other services) obstructing the Works or if damaged in the course of the Contract, must be dealt with as follows:

- if the service is to be continued: repair, divert, relocate as required;
- if the service is to be abandoned: cut and seal or disconnect and make safe as required;

#### Cost and Delay

Where an existing service is damaged by the Contractor for any reason whatsoever, the Contractor shall bear all costs and any delays for repairing or disconnecting the service.

#### Notification

Notify the Principal's Representative immediately upon the discovery of services obstructing the Works not shown in the Contract documents.

## 2.3 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

### Specification and Statutory Requirements

The Contractor must comply with the NSW Government *Occupational Health and Safety Management Systems Guidelines 4<sup>th</sup> Edition* (OHSM Guidelines) and all statutory requirements including, but not limited to, the *Occupational Health and Safety Act 2000* (NSW) and *Occupational Health and Safety Regulation 2001* (NSW). In the event of any inconsistency, the Contractor must comply with the statutory provisions.

### Appointment as principal contractor

The Contractor, having responsibility for the construction work at all times until the work is completed under the Contract, is appointed principal contractor and controller of the premises for the construction work under Clause 210 of the *Occupational Health and Safety Regulation 2001* (NSW), and is authorised to exercise such authority of the owner as is necessary to enable it to discharge the responsibilities of principal contractor and controller of premises imposed by the *Occupational Health and Safety Act 2000* (NSW) and Chapter 8 of the *Occupational Health and Safety Regulation 2001* (NSW).

### Design

The Contractor must ensure that systematic assessments are undertaken in carrying out any design required, that:

- identify hazards and analyse the associated risks, probability and consequences of injury or illness;
- involve consultation with appropriate people on the safe construction, use and maintenance of the designed asset;
- establish a Design Hazard Register for the designed asset to record any hazards not eliminated in the design that may impose a risk to those constructing, using or maintaining the asset.

An up to date copy of the Design Hazard Register must be provided to the Principal at the date of Completion of the Works or the date the Works are occupied or taken over, whichever is earlier.

### Site-specific Safety Management Plan

Develop and implement a Site-specific Safety Management Plan that complies with the *OHSM Guidelines*.

Submit the Site-specific Safety Management Plan no later than 14 days before construction work commences. Do not start construction work before a complying Site-specific Safety Management Plan has been submitted.

Ensure all the risks are covered in the Site-specific Safety Management Plan:

This list of risks is not exhaustive and must not be relied upon by the Contractor. The Contractor must undertake its own detailed analysis of all occupational health and safety risks under the Contract.

### Site Safety Rules

Develop site safety rules that are equal to or better than the following minimum set of site safety rules, include them in the Site-specific Safety Management Plan and ensure implementation.

Site safety rules must make it a condition of entry to the applicable work site that all employees and visitors comply with their provisions, including:

- **Construction OHS Induction.** All persons must display evidence of completing OHS Induction training prior to being inducted to commence work on the Site.
- **Site Induction.** All persons working on the Site must attend a Site Induction prior to entering it. Visitors may enter a work site if, either, they first attend a Site Induction, or if they are accompanied by a person who has attended a Site Induction. All persons each day must sign in and out on the Site Register.
- **Safe Work Method Statements.** Safe Work Method Statements must be prepared and used for all work activities assessed as having a safety risk.
- **Toolbox Talks.** Weekly or more regular discussions must be held with workers to consult on site safety matters.
- **Safety Helmets, Safety Footwear and Safety Vests.** Safety helmets and steel-capped safety footwear must be worn by all supervisors, employees, and visitors in the construction area at all times. The footwear must comply with AS 2210. Safety vests must be worn when moving plant is present or work is undertaken near traffic.
- **Personal Protective Equipment (PPE).** PPE, such as safety eye protection, hearing protection, safety gloves and masks and the like, must be worn when welding, drilling and with all other tasks with similar risks.
- **Accidents and Incidents.** Accidents, incidents and injuries must be reported immediately to the Contractor's and applicable subcontractor's site representative in charge.
- **Alcohol and Drugs.** The consumption of, or being under the influence of, alcohol and illegal drugs on the Site is prohibited.
- **Amenities.** Access to clean toilets and meal facilities, cool, clean drinking water, and the other requirements of the WorkCover [Code of practice: Amenities for construction work](#) must be provided for all persons.
- **Electrical.** All electrical work and electrical plant must comply with the WorkCover [Code of practice: Electrical practices for construction work](#).
- **Emergency evacuation.** Arrangements must be included in the Site Induction and clearly identified.
- **Excavations.** Barricading and signage for all excavations must be provided, with excavations 1.5 metres or more deep also to be benched, battered or shored. See the WorkCover [Code of practice: Excavation](#).
- **Fire Prevention.** Fire prevention must be used by all persons on the Site. An appropriate fire extinguisher must be on hand for all welding sets and oxy acetylene work.
- **First Aid.** All persons requiring first aid treatment must contact the first aid officer who will administer the treatment and record the injury in the WorkCover Register of Injuries, including the person's name and the nature of the injury.
- **Hazardous Substances.** Chemicals and hazardous substances must be used and stored in compliance with up to date Material Safety Data Sheets (MSDS) and details recorded in the Register of Hazardous Substances.

- **Housekeeping.** Work areas must be kept clean and tidy, with rubbish and other safety hazards cleaned up promptly. All protruding nails must be removed immediately from timber.
- **Leads and Power Tools.** All leads, power tools and electrical equipment must be inspected and tagged by a qualified person prior to their use and then at monthly intervals. See the WorkCover [Code of practice: Electrical practices for construction work](#).
- **Mobile Plant.** Every owner of plant must ensure plant is registered with WorkCover when required and operators are appropriately qualified. Plant must be fitted with working hazard lights/reversing lights and beepers. See the WorkCover [Code of Practice for Moving Plant on Construction Sites](#).
- **Overhead Power Lines.** The requirements of the WorkCover [Code of Practice – Work near Overhead Power Lines](#) must be complied with.
- **Site Security and Public Access.** Security measures, including perimeter fencing, must be used to prevent unauthorised access to construction areas and ensure safe access and passage for all those on and adjacent to the Site. Security must comply with Clause 235 of the OHS Regulation 2001 and the WorkCover [Position paper: The requirements for fencing](#).
- **Underground Services.** Prior to any underground work being carried out, services must be located using Dial Before You Dig, a services locator, potholing and the other precautions identified in the WorkCover [Work Near Underground Assets Guideline](#).
- **Working at Height.** Working at heights must be in accordance with WorkCover requirements, including certification of formwork and scaffolding. See the WorkCover [Guide to Safe Working at Heights](#).

### **OHS Management Monthly Report**

Submit, no later than the seventh (7<sup>th</sup>) day of each month, an OHS Management Monthly Report, detailing *Inspection, testing and servicing* activities, *Internal reviews* and *Incident management and corrective action*, and including the information listed below, as evidence of the implementation of the Site-specific Safety Management Plan during the previous month.

#### **Contract Details**

- Contract
- Contractor
- Contractor's representative
- Signature and Date
- Period Covered

#### **Implementation of Risk management** (OHSM Guidelines Section 5, element 1)

Summary of OHS inspections and reviews carried out to identify risks and hazards and ensure risk management controls are being implemented for:

- plant and equipment
- incoming products

- work site conditions
- adherence to and completeness of Risk Assessments, Safe Work Method Statements and Site Safety Rules
- work site access and exits
- personal protective equipment

**Implementation of OHS training** (*OHSM Guidelines* Section 5, element 3)

An up to date copy of the Induction Register and details of OHS training carried out.

**Implementation of Incident management** (*OHSM Guidelines* Section 5, element 4)

Details of:

- any OHS incidents or OHS issues, including non-compliance with OHS procedures and near misses
- implementation of incident management
- implementation of corrective action
- OHS statistics for entire the Contract including:

	This Month	Total Cumulative
Number of Lost Time Injuries		
Number of Hours Worked		
Number of Hours Lost Due to Injury		
Lost Time Injury Frequency Rate LTIFR		
Number of OHS Management Audits		
Number of OHS Inspections		

**Implementation of Safe Work Method Statements** (*OHSM Guidelines* Section 5, element 6)

An up to date copy of the register of Safe Work Method Statements, including confirmation that the principal contractor has ensured that all Safe Work Method Statements comply with the *OHS Regulation 2001* and that their implementation is being monitored.

**Incident Reports**

Ensure compliance with the notification and other requirements of *OHS Regulation 2001* Clauses 341 and 344 for accidents, incidents and non-disturbance occurrences, including immediate notification of WorkCover where required.

Immediately notify the Principal of any accident or incident defined in *OHS Regulation 2001* Clauses 341 and 344.

Provide a written report to the Principal within twenty-four hours of the incident, giving details of the incident and evidence that notification requirements have been met.

When requested, provide an incident investigation report, including identification of the cause of the incident and corrective actions taken, in the form directed.

### **Prohibition and Improvement Notices and On-The-Spot Fines**

Immediately notify the Principal of any Prohibition and Improvement Notice (PIN) or on-the-spot fine issued by WorkCover. Provide the Principal with a copy of the PIN or fine notice and written details of the corrective action taken by the Contractor and/or the applicable subcontractor to rectify the breach and to prevent recurrence.

### **Electrical work on electrical installations**

In compliance with section 207 of the *OHS Regulation 2001*, ensure that electrical work on an electrical installation is not carried out while the circuits and apparatus of the part of the installation that is being worked on are energised, unless it is necessary to do so in the interests of safety and the risk of harm would be greater if the circuits and apparatus were de-energised before work commenced.

### **Independent Certification of Formwork**

In this clause, the terms “qualified engineer” and “formwork” have the meanings given in Clause 209 of the *OHS Regulation 2001*. “Related Entities” means businesses, one of which is owned wholly or in part by the other or that have proprietors, directors, officers, shareholders or employees in common.

Inspection and certification of formwork, if required by Clause 233 of the *OHS Regulation 2001*, must be carried out by a qualified engineer who is not a proprietor, director, officer, or employee either of the entity carrying out the formwork erection or a Related Entity to that entity. In addition, if the Contractor carries out the design of the formwork, then the qualified engineer must not be a proprietor, director, officer or employee either of the Contractor or a Related Entity to the Contractor.

If such inspection and certification are required, the Contractor and any subcontractors involved must include the inspection and certification as actions in Safe Work Method Statements for the erection and use of formwork, and they must be hold points in the Contractor’s and subcontractors’ Inspection and Test Plans.

Submit formwork certification before commencing the use of the formwork. Do not use the formwork before this certification is submitted.

### **Failure to Comply**

If at any time the Contractor has not carried out its obligations under the Contract in relation to occupational health and safety management, then notwithstanding any other provisions of the Contract, no payment will be due to the Contractor until the 7<sup>th</sup> day after the required action has been carried out.

## **2.4 HAZARDOUS SUBSTANCES**

### **Definition**

Hazardous Substance means a substance that is listed in the document entitled *List of Designated Hazardous Substances* published by Worksafe Australia; or a substance that fits the criteria for a hazardous substance set out in the document entitled *Approved Criteria for Classifying Hazardous Substances* published by Worksafe Australia.

Asbestos, material containing asbestos, polychlorinated biphenyl (PCB) and lead based paints are recognised as hazardous substances. Other substances in certain situations are also considered hazardous and therefore require controlled handling. Examples are glues, solvents, cleaning agents, paints, and water treatment chemicals.

Work involving stone, rock, concrete, masonry and such materials containing silica, is work under the Contract whether explicitly identified in the Specification or not. The Contractor is responsible for the control of any hazard which may arise from the presence of silica.

### **Response to Unexpected Discovery**

If any hazardous substance not specified in work under the Contract is discovered on the Site the Contractor must suspend all work which may result in exposure to such hazardous substance and notify the Principal's Representative immediately of the type of substance and its location.

With the initial notification, or as soon as practicable thereafter, submit details, including:

- the additional work and additional resources the Contractor estimates to be necessary to deal with the substance so that work and subsequent use of the Works may proceed safely and without risk to health
- the time the Contractor anticipates will be required to deal with the substance and the expected delay in achieving Completion;
- the Contractor's estimate of the cost of the measures necessary to deal with the substance; and
- other details reasonably required by the Principal's Representative

The Contractor must, in planning and carrying out any work dealing with the substance take all reasonable steps:

- to carry out the work concurrently with other work wherever possible; and
- to otherwise minimise effects of the work on the Contractual Completion Date.

### **Responsibility For Decontamination**

Control and decontamination of any hazardous substances is the responsibility of:

- the Principal, in respect of any such substances not identified in the Contract Documents, which are discovered on the Site; and
- the Contractor, in respect of any such substances identified in the Contract Documents.

### **Decontamination By Principal**

Where the Principal is responsible for the control and decontamination of any hazardous substances, the Principal's Representative may suspend the whole or any part of the Works until the hazardous substances are isolated or removed.

### **Decontamination By Contractor**

Where the Contractor is responsible for the control and decontamination of the Site following the discovery of hazardous substances, handle, use, isolate, remove and dispose of such substances in accordance with statutory requirements.

The Environment Protection Authority or Waste Service NSW may advise of suitable disposal sites.

### **Working Hours**

When the Contractor is required to decontaminate hazardous substances on occupied Sites, all such decontamination shall be carried out outside normal hours of occupation, unless otherwise approved in writing by the Principal's Representative. Normal hours of occupation are:

- **7am to 6pm Monday to Friday**



## 2.5 ASBESTOS REMOVAL

### Requirement

Where the Contractor is responsible for asbestos removal work, comply with the relevant statutory requirements, standards, codes and guidelines, including but not limited to the:

- *Occupational Health and Safety Act 2000* (NSW)
- *Occupational Health and Safety Regulation 2001* (NSW)
- WorkCover Authority of NSW requirements
- Australian Safety and Compensation Council *Code of Practice for the Safe Removal of Asbestos 2<sup>nd</sup> Edition* (2005)
- Australian Safety and Compensation Council *Code of Practice for the Management and Control of Asbestos in Workplaces* (2005)
- Australian Safety and Compensation Council *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2<sup>nd</sup> Edition* (2005)
- *Environmentally Hazardous Chemicals Act 1985* (NSW)
- *Waste Avoidance and Resource Recovery Act 2001* (NSW)

### Notification and Permit

Not less than seven days prior to commencing any asbestos removal work, notify the local office of WorkCover and the Principal of the intention to carry out that work.

Where the regulations require a licence for asbestos removal work, before the work commences, submit a copy of the current licence held by the entity that will undertake the work and a copy of any WorkCover permit required for the work.

### Monitoring

Provide air monitoring by an independent testing authority on each day during asbestos removal and on completion of each area where removal has been undertaken.

### Clearance Certificate

Submit to the Principal a clearance certificate from an independent testing authority at the completion of the asbestos removal work.

## 2.6 ENVIRONMENTAL MANAGEMENT

### Requirement

The Contractor must comply with the NSW Government *Environmental Management Systems Guidelines* available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/system/index\\_procurement\\_guideline\\_documents.doc](http://www.managingprocurement.commerce.nsw.gov.au/system/index_procurement_guideline_documents.doc)

### Environmental Management Plan

Develop and implement an Environmental Management Plan that complies with the *EMS Guidelines*.

The Contractor may elect to complete Schedule to Preliminaries - **Environmental Management Plan**, adding objectives and actions as required to suit the risks/hazards



associated with the work under the Contract, and implement the completed version as the Environmental Management Plan.

Submit the Environmental Management Plan no later than 7 days before construction work commences. Do not start construction work before a complying Environmental Management Plan has been submitted.

The Environmental Management Plan must address the following risks:

- Nil Mandatory

This list of risks is not exhaustive and must not be relied upon by the Contractor. The Contractor must undertake its own detailed analysis of all environmental risks under the Contract.

### **Incident reports**

Ensure compliance with the notification and other requirements of the *Protection of the Environment Operations Act 1997 (POEO Act)*.

Immediately notify the Principal of any pollution incident that may cause material harm to the environment, providing evidence that notification requirements of the POEO Act have been met, where applicable.

Report immediately the details of any waste removed from the Site and not disposed of at a lawful facility.

When requested, provide an incident investigation report, including identification of the cause of the incident and corrective actions taken, in the form directed.

### **Failure to comply**

If at any time the Contractor has not carried out its environmental management obligations under the Contract, then notwithstanding any other provisions of the Contract, no payment is due to the Contractor until the 7<sup>th</sup> day after the required action has been carried out.

## **2.7 ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

### **Requirement**

Apply strategies to maximise the achievement of ecologically sustainable development in the design, construction and operation of the Works, including reducing pollutants, greenhouse gas emissions and demand on non-renewable resources such as energy sources and water.

### **Restricted timbers**

Do not use the following timbers or their products for work under the Contract:

- rainforest timbers, unless certification is provided that they are plantation grown;
- timber from Australian high conservation forests.

## **2.8 WASTE MANAGEMENT**

### **Requirement**

Implement waste minimisation and management measures, including:

- recycling and diverting from landfill surplus soil, rock, and other excavated or demolition materials, wherever practical;

- separately collecting and streaming quantities of waste concrete, bricks, blocks, timber, metals, plasterboard, paper and packaging, glass and plastics, and offering them for recycling where practical.

Ensure that no waste from the Site is conveyed to or deposited at any place that cannot lawfully be used as a waste facility for that waste.

### Monitoring

Monitor and record the volumes of waste and the methods and locations of disposal.

Submit a progress report every two months, and a summary report before Completion, on the implementation of waste management measures, including the total quantity of material purchased, the quantity purchased with recycled content, the total quantity of waste generated, the total quantity recycled, the total quantity disposed of and the method and location of disposal in the form of a *Waste Recycling and Purchasing Report* available on the Internet at:

[www.managingprocurement.commerce.nsw.gov.au/contract\\_management/cm\\_sf\\_waste\\_recycling\\_and\\_purchasing\\_report.doc](http://www.managingprocurement.commerce.nsw.gov.au/contract_management/cm_sf_waste_recycling_and_purchasing_report.doc)

With the *Waste Recycling and Purchasing Report*, submit waste disposal certificates and/or company certification confirming appropriate, lawful disposal of waste.

## 2.9 PEST CONTROL

Do not use any chemical pesticides or termiticides for new construction work. Use preventive treatment by physical means to minimise the risk of pest infestations.

Chemical treatments may be used in existing buildings only as a last resort for the eradication of pest and termite infestations. Chemical pesticides used for this purpose must be registered by the National Registration Authority for Agricultural and Veterinary Chemicals and applied by a Pest Control Operator licensed by WorkCover.

Pest preventive methods must comply with AS 3660.1-2000 Protection of Buildings from Subterranean Termites (except for references to chemical soil barriers), as well as supplementary standards for existing buildings.

## 2.10 WORK METHOD

If the Contract prescribes a particular work method or the Principal or Principal's Representative directs that a particular work method must be used to the exclusion of the other work methods, then that work method is part of the Contract.

Otherwise, the work method is not part of the Contract and the Contractor is free to use any work method. This is so even though, before or after acceptance of the tender, the Contractor made known to the Principal the Contractor's proposed work method and the Principal accepted or approved it.

If the work method is not part of the Contract, the fact that the proposed work method is impractical or impossible or the Contractor, with or without the approval of the Principal's Representative, uses another work method will:

- not entitle the Contractor to make a claim on the Principal;
- not be grounds for an extension of time for Completion;
- not cause the Contract to be frustrated.

### 2.11 STANDARDS

Where the Contract requires compliance with a standard or Code, unless otherwise specified that Standard or Code shall be the one current at the closing date for tenders, except for the Building Code of Australia, which shall be the one current at the Date of Completion.

Where the Contract refers to an Australian Standard it does not preclude the adoption of a relevant international standard.

### 2.12 CLEANING UP

All visible external and internal surfaces, including fittings, fixtures and equipment, must be free of marks, dirt, dust, vermin and unwanted materials, at Completion.

### 2.13 PROPRIETARY ITEMS

Identification by the Principal of a proprietary item does not necessarily imply exclusive preference for that item, but indicates the required properties of the item.

The Contractor may offer an alternative to any proprietary item. Apply in writing for approval to use the alternative. The request must be accompanied by all available technical information and describe how, if at all, the alternative differs from the proprietary item and how it will affect other parts of the Works and performance of the Works.

Except to the extent that the approval, if any, of the Principal's Representative includes a contrary provision, the approval shall be deemed to include the conditions that:

- use of the alternative must not directly or indirectly result in any increase in the cost to the Principal of the Works;
- the Contractor must indemnify the Principal against any increase in costs;
- use of the alternative must not directly or indirectly cause any delay to the Works and if it does, the Contractor will compensate the Principal for any loss which the delay causes.

### 2.14 GUARANTEES

#### Generally

Obtain and ensure that **NSW State Property Authority** will have the benefit of warranties or guarantees as specified in the Contract or offered by suppliers, including warranties or guaranties that are obtained by, or offered to the subcontractors of the Contractor.

## 2. PRELIMINARIES

### 2.15 SCHEDULE TO PRELIMINARIES - ENVIRONMENTAL MANAGEMENT PLAN

(Note: Refer to Preliminaries clause – **Environmental Management** where the Contractor elects to adopt this Plan. The Contractor must complete the Environmental Management Plan by inserting contract-related requirements as necessary, or 'NA' where a particular item is not applicable.)

#### IMPLEMENTATION

ENVIRONMENTAL OBJECTIVES	ACTION TO BE TAKEN	WHEN ACTION WILL BE TAKEN	PERSON RESPONSIBLE	ACTION COMPLETED
<b>1. CONSERVATION OF PLANTS &amp; WILDLIFE</b>				
1.1 Protect flora and fauna	Protect existing trees and plants at and around the Site from damage unless approved by the Principal			
	Do not remove trees and plants without approval from the Principal			
	Control weeds on the Site			
	Protect birds, fish and animals at and around the Site from harm			
	Do not remove birds, fish and animals from the Site without the written agreement of the Principal			
	Do not bring birds, fish, animals and plants onto the Site without written agreement from the Principal			
	Minimise the use of pesticides and herbicides for minimal impact on the environment			
1.2 Control movement of pedestrians, materials, vehicles and plant to minimise damage to the environment	Use only designated routes for access to the Site			
	Use designated site roads and access routes for all movements on and adjacent to the Site			
	Locate compounds, and park all vehicles and plant, in designated areas on the Site			
<b>2. CONSERVATION OF RESOURCES</b>				
2.1 Design for energy efficiency	Adopt energy efficiency, environmental enhancement and waste minimisation as design criteria			
	Use low energy usage construction, fittings and appliances (including heating/cooling and lighting)			
2.2 Select materials to minimise: 1. resource use	Incorporate conservation of resources obligations into subcontracts			
	Reuse all topsoil on the Site and minimise the use of imported topsoil			
	Mulch and chip cleared vegetation as appropriate			

## 2. PRELIMINARIES

ENVIRONMENTAL OBJECTIVES	ACTION TO BE TAKEN	WHEN ACTION WILL BE TAKEN	PERSON RESPONSIBLE	ACTION COMPLETED
and waste 2. ozone depleting effects 3. detrimental effects on air, water, and land quality 2.3 Conserve heritage items and other physical attributes of the Site	Maximise use of materials that are recyclable or from a sustainable source			
	Use timber from sustainable managed sources only			
	Implement a strategy to reduce the quantity of waste, including minimising and recycling packaging			
	Use low water demand fittings & appliances (dual flush toilets, water conserving shower roses & taps)			
	Minimise the use of solvents, glues, paints and other materials which release odours or vapour			
	Comply with statutory requirements for conservation of heritage items			
	Manage the conservation of physical attributes of the Site, including (LIST THE ATTRIBUTES):			
	•			
<b>3. POLLUTION CONTROL</b>				
3.1 Control discharges and emissions from vehicles and plant to minimise damage to the environment	Do not use vehicles, plant or equipment that produce excessive emissions			
	Monitor emissions from vehicles and plant			
	Do not bring vehicles or plant and equipment with hydraulic fluid, fuel or oil leaks to the Site			
	Wash down vehicles, plant and equipment only in controlled areas acceptable to the Principal			
	Prevent and clean up any spills from transport vehicles			
3.2 Prevent pollution of stormwater and adverse effects on land and vegetation by control of cleaning activities and discharges	Use only water based, non-toxic paints and use only water to clear point brushes and rollers			
	Control all run-off from cleaning activities			
	Discharge only non-toxic cleaning products generally			
3.3 Control soil erosion	Identify the existing drainage paths on the Site and protect them against siltation			
	Protect vulnerable and exposed surfaces and stockpiles against scouring			

## 2. PRELIMINARIES

ENVIRONMENTAL OBJECTIVES	ACTION TO BE TAKEN	WHEN ACTION WILL BE TAKEN	PERSON RESPONSIBLE	ACTION COMPLETED
	Install the following sediment control devices before starting construction (LIST THE DEVICES):			
	•			
	Monitor and manage the effectiveness of sediment control devices			
	Remove sediment control devices when no longer required			
3.4 Prevent release of soil contamination to the environment	Establish, before commencing work on the Site, in consultation with the Principal, if contaminated soil is present at the Site			
	If contaminated soil is present, manage the work to prevent release to the environment			
3.5 Manage refrigerants and other dangerous goods to meet statutory requirements	Ensure the procedures used for the charging and disposal of refrigerants and use of dangerous goods meet statutory obligations			
	Use appropriately trained employees			
	Obtain the licences required			
	Document dangerous goods identification, disposal and management, and retain the documentation			
3.6 Minimise noise and vibration impacts on neighbours, occupants and users of any facility	Comply with noise limits and conditions prescribed by the EPA, Department of Environment and Conservation and Council (as applicable)			
	Use equipment in good repair and condition			
	Use noise suppression equipment (e.g. silencers on compressors) and acoustic barriers as required			
	Do not expose workers, neighbours or visitors to excessive noise, and cooperate and coordinate with operators of any neighbouring facility			
	Do not expose people or property to excessive vibrations			
3.7 Comply with Trade Waste Licence conditions applicable	Implement procedures to avoid breaches of the Trade Waste Licence conditions (may apply to discharges from cooling water systems, condenser water systems, heating water systems, cooking facilities, engine discharges, water treated with chemicals or where large sediment loads exist)			

## 2. PRELIMINARIES

ENVIRONMENTAL OBJECTIVES	ACTION TO BE TAKEN	WHEN ACTION WILL BE TAKEN	PERSON RESPONSIBLE	ACTION COMPLETED
to the facility				
3.8 Minimise air pollution from dust and emissions	Minimise areas of exposed earth and stockpiles			
	Cover and secure materials in open transport			
	Use water sprays and/or other means to control dust			
	Keep emissions within statutory or other required limits			
	Minimise fire risks, and prevent and control fires			
3.9 Dispose of waste in accordance with statutory requirements	Implement appropriate disposal procedures for all waste items, including using lawful places for disposal, recording and reporting on the method and location of disposal and any non-conformances			
	<b>EITHER</b> Provide valid disposal certificates for each applicable item <b>OR</b> Provide company certification of appropriate disposal of the following (LIST THE ITEMS): <ul style="list-style-type: none"> <li>• Packaging materials</li> <li>• Replaced or redundant materials</li> <li>• Chemicals</li> <li>• Oils and greases from machinery, cooking and other processes</li> <li>• Paints and solvents, including those used to clean equipment, tools and brushes</li> <li>• Cleaning materials and rags</li> <li>• Materials unsuitable for re-use, including hazardous materials such as asbestos</li> </ul>			
3.10 Minimise damage to the environment from	Document emergency procedures to manage all reasonably foreseeable harm, including spills and other environmental emergencies			
	Ensure emergency procedures are followed			

## 2. PRELIMINARIES

ENVIRONMENTAL OBJECTIVES	ACTION TO BE TAKEN	WHEN ACTION WILL BE TAKEN	PERSON RESPONSIBLE	ACTION COMPLETED
emergencies	Obtain the agreement of the Principal to procedures for handling oil, chemicals and other dangerous goods before placing them on the Site, including secure storage arrangements			
	Re-instate and clean damaged areas and features, including work areas			
	Re-instate damaged eco-systems and features to their previous condition			
	Identify key contacts: (LIST NAMES and ROLES) •			
3.11 Comply with environmental requirements and rectify breaches	Inspect the Site daily to ensure appropriate environmental controls are in place and operating effectively, and that all environmental management requirements are being met			
	Cooperate with environmental audits by others			
	Rectify any environmental breaches identified within the time specified in an audit or by the Principal			
<b>4. RECORDS AND REPORTING</b>				
4.1 Provide sufficient documentation to demonstrate appropriate environmental management, including:	Prepare, submit and update the Environmental Management Plan			
	Maintain and submit records of environmental training			
	Report on implementation of the Environmental Management Plan			
	Submit applicable waste disposal certificates and/or company certification of appropriate disposal			
	Submit to the Principal copies of correspondence with regulators, including incident reports and notification of non-compliances or fines			
	Submit documentation evidencing that the causes of non-compliances have been corrected			
	Keep records for inspection securely filed using an effective document retrieval system			
4.2 Report environmental incidents	Immediately report all environmental incidents to the Principal			
	Immediately report environmental incidents as otherwise required			



**END OF SECTION - PRELIMINARIES**

### *3. TECHNICAL SPECIFICATION*

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## 3 TECHNICAL SPECIFICATION

[THERE ARE 101 PAGES IN THIS SECTION](#)

### A GENERAL REQUIREMENTS

#### 1 GENERAL

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##### 1.1 SPECIFIED IN THIS SECTION

###### Outline

The works comprise the provision of all materials , labour, transport, tools, plant, payment of fees and everything necessary for the construction, installation, testing, commissioning and maintenance of the works detailed in this specification and accompanying drawings together with all minor and incidental work not specifically mentioned herein, to the true intent and meaning of this specification and the accompanying drawings.

The aim is to replace the old and outdated system with new equipment to improve reliability, control and efficiency. The new systems are air cooled split type reverse cycle air conditioning system.

A brief description of the work as follow:

- Decommission and remove the existing evaporative cooling systems including redundant ductwork, pipework and accessories.
- Decommission and remove the existing electrical switchboard including redundant cables, wiring and accessories.
- Provide the air conditioning systems as documented on the drawings.
- Provide the outside air system as documented on the drawings.
- Provide all associated electrical work including new main switchboard, and submain, as documented on the drawings.
- Provide a service walkway and associated lighting and wiring inside the ceiling as documented on the drawings.
- Provide all associated building work, including all penetrations and flashing, removal of parts of the ceiling as necessary and reinstatement of the ceilings. Replace any damaged roof and ceiling tiles and repair any damage to the building due to the work of this contract.
- Label the new equipment and work.
- Commission and test the complete system.
- Provide 12 months comprehensive maintenance of equipment and systems, concurrent with 12 months defect liability period.

##### 1.2 AIMS

###### Outline

Equipment and Material Selections: As shown on the drawings and as specified.

Design: Provide design work necessary to enable completion of the works as documented.

### Cooling and heating performance

Air quantities: Achieve air quantities under operating conditions given that the air quantities in the contract documents are for standard dry air with a density of 1.2 kg/m<sup>3</sup>.

Indoor conditions: Maintain the conditioned areas, as measured at the points of control in accordance with the **Indoor design conditions schedule** when loads imposed by the outdoor conditions stated in the **Outdoor design conditions schedule** are not exceeded.

### Electrical

General: Supply system to be 415V, 3-phase, 4-wire, 50Hz.

Fault level protection: To withstand the fault level of the incoming supply at the equipment location.

### Noise levels

- Meeting room NR 35
- Mechanically ventilated areas NR 45
- Other rooms: To be within the limits as specified in AS 2107.

Noise at site boundary: In accordance with NSW EPA requirements.

## 1.3 HAZARDOUS MATERIALS

### Generally

Where equipment involving hazardous materials is to be modified, demolished or removed comply with relevant clauses in other sections of this specification and all relevant legislation governing the safe handling and removal of hazardous materials.

A hazardous materials survey on the building was carried out in June 2005. A full copy of the report will be made available to the contractor. The report listed the following:

### Asbestos

Asbestos cement sheeting in north, south, west perimeter wall lining at Kitchen.

Asbestos cement sheeting in east wall lining at Store 2.

Asbestos cement sheeting in external and internal wall lining at north west built-in verandah (Store 4).

Asbestos cement sheeting in north, east, west perimeter wall lining at Store 5.

Asbestos cement sheeting in redundant fireplace covers.

Asbestos cement sheeting in external and internal wall lining as well as eaves on the north and south faces of the building at Male/Female toilets.

Asbestos cement sheeting in external and internal wall lining as well as eaves on the north, south and west faces of the building at north west garages (including side shed).

Asbestos cement sheeting in external and internal wall lining at north east garage.

The asbestos containing materials were reported as being in good and stable condition with minimal risk of fibre release. The risk category was considered to be Priority Rating 4: Negligible risk under present conditions.

### **Lead based paints**

Lead based paints were detected on the external walls, windows, eave posts and walls.

Lead based paints were detected on the internal walls, cornices and doors.

### **Poly Chlorinated Biphenyls (PCBs)**

Poly Chlorinated Biphenyls (PCBs) were not found to be present in the fluorescent light fittings capacitors.

### **Synthetic Mineral Fibres (SMF)**

The followings is suspected to contain synthetic mineral fibres:

- Existing ductwork insulation.

Perform all work involving synthetic mineral fibres in accordance with the NSW WorkCover requirements, all relevant codes including the Code of Practice for the Safe Use of Synthetic Mineral Fibres.

## **1.4 EXISTING AIR CONDITIONING SYSTEM DESCRIPTION**

This building is a single storey, timber framed building and is clad with corrugated iron. Internal wall surfaces are timber boards. The floors are timber, approximately 1.4 metres above ground. The brick foundation walls are segmented to allow under floor ventilation. The roof is pitched corrugated iron over timber boards on a timber frame. The ceilings are of fine pitch corrugated iron. There is a verandah around the north, west and southern sides of the building.

A one bedroom flat has been added to the eastern side of the building.

The present cooling system for the main building consists of two roof-mounted evaporative coolers with the main duct runs of rigid sheet metal ductwork with flexible ducts to ceiling mounted grilles in most of the office. The system was installed in 1990.

There is a thin layer, about 15 mm thick, of dust on the ceiling but no ceiling insulation, sarking or visible roof insulation. The timber boards on the underside of the corrugated iron roof will provide some insulation.

The present heating system is by floor mounted gas radiant/ convection heaters in each room. The heaters are reported as only a few years old. LP gas is supplied from 2 of 190 kg gas cylinders located in an enclosure at the rear of the building. The heating system will be retained under this Contract.

The flat has its own evaporative cooling system which will be retained under this Contract.

## **1.5 OCCUPIED BUILDING**

### **WORK PROGRAM**

Contractor to develop a work implementation plan in consultation with Principal Representative. An agreement and approval of the implementation plan is required before contractor can commence works.

The building will be occupied throughout the construction period. No functions of the building will be interrupted except where such stoppage is unavoidable and takes place only as planned and agreed to by Principal Representative.

Any work that will require the interruption of the normal operation of the building, and/or will cause significantly inconvenience to occupants shall be carried out at times approved by Principal Representative. In general, all work that will cause interruptions will be allowed only at outside the normal working hours and/or at specific hours at weekends. Such works would include, but not limited to:

- All works inside the building premises.
- All works that will restrict normal access to the building.
- All works that would adversely affect the occupants and/or normal operation.
- All works that would involve the use of power tools or similarly noisy procedures in location that would adversely affect the occupants and/or normal operation.

Within one week of the contract commencement, the contractor shall prepare a work program, complete with all main activities and dates indicating clearly all critical activities and target dates to be met to achieve the specified period of completion.

Unavoidable shutdowns can only take place at times permitted by Principal Representative. Works that would cause Occupation Health and Safety issues to the occupants must only be carried out outside normal working hours and/or during hours that are coordinated with Principal Representative.

All request or notice must be in writing and provide with adequate time, minimum 4 weeks, to notice the Client and Principal Representative.

All works shall be carried out in accordance with schedule of work stated in the work program. Any amendments to the schedule of works shall be mutually agreed by the Client and Principal Representative. Claim for additional costs for unforeseen difficulties with this aspect of the works will not be accepted.

#### **TEMPORARY PROTECTION**

Protection of the building fabric and finishes to prevent damage. Making good of all damage made by this contract to all items of building fabric and finishes during the execution of the works.

Provide drop sheets and covers to protect equipment, furniture and building surfaces during construction.

Remove all the rubbish and clean up the work areas inside the building everyday.

Where work is carried out in an area outside normal hours, the area is to be cleaned and any staging removed so that staff can resume their normal business during office hours.

### **1.6 CRANAGE**

The contractor must be deemed to have obtained all necessary details of, and to have included all necessary costs for plant deliveries, crantage, rigging and hoisting. Where required make temporary holes in the plant room roof to allow for equipment to be installed. Provide all necessary weatherproofing and reinstate the roof as soon as possible to minimise the risk of damage. Claim for additional costs for unforeseen difficulties with this aspect of the works will not be accepted.

### **1.7 DISPOSAL OF PLANT REMOVED**

The contractor must dispose of all items of existing plant, which are to be removed under the contract. Removed equipment, pipes, valves, electric and control cables, circuit breakers, relays and etc must not be re-used in the new installation works.

### **1.8 SEQUENCE OF WORKS**

The contractor has to develop the actual sequence of works and to submit to the client and Principal Representative for approval.

Claim for additional costs for unforeseen difficulties with this aspect of the works will not be accepted.

## 1.9 PRECEDENCE

### Precedence

General: Requirements of subsequent worksections of the specification override conflicting requirements in this worksection.

## 1.10 CROSS REFERENCES

### Common technical requirements

Associated worksections: Conform to the following:

- *Adhesives, sealants and fasteners.*
- *Fire-stopping.*
- *Quality.*
- *Demolition.*

### Cross referencing

Within the text:

- Worksection titles are indicated by *Italicised* text.
- Clause titles are indicated by **Bold** text.

## 1.11 STANDARDS

### General standards

Degree of electrical protection (IP Code): To AS 60529.

Electrical work: To AS/NZS 3000.

Electromagnetic compatibility of electrical and electronic apparatus: To AS/NZS 4251.1 and AS/NZS 4252.1.

Mechanical ventilation and airconditioning: To AS/NZS 1668.1 and AS 1668.2, as required by the Building Code of Australia.

Microbial control: To AS/NZS 3666.1.

Refrigeration systems: To AS 1677.

Ductwork for air-handling systems in buildings: To AS 4254

Air filters for use in general ventilation and air conditioning: To AS 1324

Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to AS 2625.1 and AS 2625.4.

Sanitary plumbing and drainage: To AS/NZS 3500.2.

Sound power level tests: To AS 1217.5 and AS 1217.7.

Water supply: To AS/NZS 3500.1.

## 1.12 REFERENCED DOCUMENTS

### Contractual relationships

General: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

### Current editions

General: Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

## 1.13 INTERPRETATIONS

### Abbreviations

General: For the purposes of this worksection the abbreviations given below apply.

- APAS: Australian Paint Approval Scheme.
- AS: Australian Standard.
- BCA: Building Code of Australia.
- NATA: National Association of Testing Authorities.
- NZS: New Zealand Standard.
- PCA: Plumbing Code of Australia.
- SSL: Scientific Services Laboratory.

### Definitions

General: For the purposes of this worksection the definitions given below apply.

- Attendance: “Attendance”, “provide attendance” and similar expressions mean “give assistance for examination and testing”.
- Contract administrator: “Contract administrator” has the same meaning as “architect” or “superintendent” and is the person appointed by the “owner” or “principal”.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: “Give notice”, “submit”, “advise”, “inform” and similar expressions mean “give notice (submit, advise, inform) in writing to the contract administrator”.
- Hold point: The activity cannot proceed without the approval of the contract administrator.
- IP: “IP”, “IP code”, “IP rating” and similar expression have the same meaning as “IP Code” in AS 60529.
- Maintenance period: Synonymous with “Defects liability period”.
- Obtain: “Obtain”, “seek” and similar expressions mean “obtain (seek) in writing from the contract administrator”.
- Professional engineer: A person who is listed on the National Professional Engineers Register (NPER) in the relevant discipline at the relevant time.



### 3. TECHNICAL SPECIFICATION

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- Metallic-coated steel: Includes zinc-coated steel, zinc/iron alloy-coated steel, and aluminium/zinc-coated steel.
- Pipe: Includes pipe and tube.
- Principal: “Principal” has the same meaning as “owner”, “client” and “proprietor” and is the party to whom the Contractor is legally bound to construct the works.
- Proprietary: “Proprietary” mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: “Provide” and similar expressions mean “supply and install”. Installation shall include development of the design beyond that documented.
- Tests:
  - Pre-completion tests: Tests carried out before completion tests.
  - Type tests: Tests carried out on an item identical with a production item, before delivery to the site.
  - Production tests: Tests carried out on a purchased item, before delivery to the site.
  - Site tests: Tests carried out on site.
  - Completion tests: Tests carried out on completed installations or systems before the date for practical completion, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The superintendent may direct that completion tests be carried out after the date for practical completion.
- Registered testing authority:
  - The CSIRO Division of Manufacturing and Infrastructure Technology (CSIRO-MIT).
  - An authority registered by the National Association of Testing Authorities (NATA) to test in the relevant field.
  - An organisation outside Australia recognised by NATA through a mutual recognition agreement.
- Required: Means required by the documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or be a legislative requirement.
- Samples: Includes samples, prototypes and sample panels.
- Supply: “Supply”, “furnish” and similar expressions mean “supply only”.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.
- Witness points: Provides an opportunity to attend an activity but does not involve an obligation. The activity can proceed without approval from the contract administrator.
- Network Utility Operator: A person who undertakes the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or a stormwater system.

- Hot dip galvanized: Zinc coated to AS/NZS 4680 with coating thickness and mass to Table 1.

#### 1.14 CONTRACT DOCUMENTS

##### Services diagrammatic layouts

General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:

- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

##### Levels

General: Spot levels take precedence over contour lines and ground profile lines.

#### 1.15 DRAWINGS AND MANUALS FOR EXISTING SERVICES

##### General

Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

#### 1.16 PERFORMANCE

##### General

General: If required, provide structures, installations and components as follows:

- Fixed access ways: To AS 1657.
- Structural design actions: To AS/NZS 1170.0.

#### 1.17 INSPECTION

##### Notice

General:: Maximum notice for inspections to be made: 5 working days.

Inspection: If notice of inspection is required in respect of parts of the works that are to be concealed, advise when the inspection can be made before concealment.

##### Attendance

General: Provide attendance.

#### 1.18 SUBMISSIONS

##### Authorities

Authorities' approvals: Submit documents showing approval by the authorities whose requirements apply to the work.

Correspondence: Submit copies of correspondence and notes of meetings with authorities.

### **Electronic submissions**

File format: Drawing: AutoCAD.dwg or Microstation.dgn; Text document: pdf or word format.

Transmission medium: email or CD, email shall be limited to 4 MB file size only.

### **Hard copy submissions**

Quantity: 3 sets as paper prints

- Bound documents: 3 sets as paper prints
- Loose documents larger than A3: One transparency on heavyweight plastic film the same size as the standard contract drawings.
- Loose documents up to and including A3: One copy.

Standard contract drawing size: A1

### **Errors**

General: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission.

### **Identification**

General: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify proposals for non-compliance with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

### **Inspection and testing plan**

General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests.

### **Notice**

Minimum notice: 5 working days

### **Materials and components**

Product certification: If products must conform to product certification schemes, submit evidence of conformance.

Product data: For proprietary equipment, submit the manufacturer's product data as follows:

- Technical specifications and drawings.
- Type-test reports.
- Performance and rating tables.
- Recommendations for installation and maintenance.
- Additional product data for services equipment:
  - Model name, designation and number.
  - Country of origin and manufacture.

- Capacity of all system elements.
- Size, including required clearances for installation.
- Materials used in the construction.

Proposed products schedules: If major products are not specified as proprietary items, submit a schedule of those proposed for use within 3 weeks of site possession.

### **Samples**

Submission: Submit nominated samples.

Incorporation of samples: If it is intended to incorporate samples into the works, submit proposals. Incorporate samples in the works which have been endorsed for incorporation. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until practical completion.

### **Drawings**

General: Minimum A1 drawing size.

Standard: To AS 1100 Parts 101, 201, 301, 401 and 501 as applicable.

Building work drawings: Submit detailed dimensioned drawings showing all:

- Access doors and panels.
- Conduits to be cast in slabs.
- Fire and smoke dampers including dimensional tolerances.
- Floor wastes.
- Holding down bolts and other anchorage and/or fixings required complete with loads to be imposed on the structure during installation and operation.
- Openings, penetrations and block-outs.
- Pipe sleeves.
- Plinths, kerbs and bases.
- Required external openings.

Mechanical services drawings: Submit the following:

- Detailed drawings, at 1:50 scale or larger, showing:
  - Ductwork, pipework and equipment layouts and sections. Show the location of fire rated building elements.
  - Diffuser and grille reference numbers corresponding to commissioning test results.
  - Riser layouts and sections.
  - Plant room layouts and sections.
  - Acoustic details.
  - Conditioner construction details

- Seismic restraint details.
- Relevant performance data for each item of equipment including make, model, speed, capacity etc., as appropriate.
- Piping and other schematic drawings including numbering of each valve to correspond to specified valve tags.
- Submission drawings required by authorities.
- Automatic control details.
- Switchboard details.
- Wiring diagrams.

Services coordination: Ensure coordination with other building and service elements. Show adjusted positions on the shop and record drawings.

Space requirements: Check space requirements of equipment and services indicated diagrammatically in the contract documents and submit a report on consequent variations to the design.

### Shop drawings

General: Include dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and submit dimensioned set-out drawings.

Submission medium:

- Electronic.
- Hard copy.

### Execution details

General: Before starting the respective portions of the installation, submit the following:

- Embedded services: Proposed method for embedding services in concrete walls or floors or chasing into concrete or masonry walls.
- Fixing of services: Typical details of locations, types and methods of fixing of services to structure.
- Inaccessible services: If services will be enclosed and not accessible after completion, submit proposals for location of service runs and fittings.

### Electrical loading information

General: Submit electrical loading information for all equipment before completion of the main switchboard shop drawings.

Electric motors: Ensure motor efficiency and power factor are in accordance with the **Electric Motors** clause.

Loading and connection: Submit the information for items not supplied from the mechanical switchboards.

Starting characteristics: Submit details for motors with reduced current starting. Ensure starting characteristics are within the characteristics of the respective submain protection devices.

Switchboards: Submit the following information for each mechanical switchboard:

- Board location and designation.
- For each submain connected to the board, submit the following for each item connected to it:
  - Submain designation.
  - Item designation and name.
  - Power rating in kW.
  - Number of phases.
  - Full load amps per phase.
  - Power factor.
  - Total amps on each phase for respective sub main.

### Quantity and format

General: Refer to **Submissions**.

### Marking and labelling

General: Before marking and labelling submit:

- Samples of the proposed labels.
- A schedule showing, for each item or type of item:
  - A description of the item or type of item sufficient to identify it.
  - The proposed text of the marking or label
  - The proposed location of the marking or label.

### Building penetrations

General: If it is proposed to penetrate or fix to the following, submit details of the methods proposed to maintain the required structural, fire and other properties:

- Structural building elements including external walls, fire walls, fire doors and access panels, other tested and rated assemblies or elements, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings. If penetrating membranes, provide a waterproof seal between the membrane and the penetrating component.

### Technical data

General: Take note that fan pressures and pump heads provided in the contract documents are based on provisional equipment selections and estimated pressure drops.

Selections: Before ordering equipment, calculate the respective system pressure losses based on the equipment offered and layouts shown on the shop drawings and submit the proposed selections.

Submissions: Submit technical data for all items of plant and equipment.

Data to be submitted: Include at least the following information in technical submissions:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of compliance with the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type-test reports.

### Certification

General: Submit certification that the plant and equipment submitted meets all requirements and capacities of the contract documents except for departures that are identified in the submission.

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## 2 HERITAGE GENERAL REQUIREMENTS

### 2.1 HERITAGE CLAUSES

#### Heritage significance

The Former Bourke Lands Department Building at 21 Mitchell Street, Bourke is a 19<sup>th</sup> century former government office building of **Regional** significance to the township of Bourke, which is **heritage listed** on the Bourke Local Environmental Plan 1998 and on several state heritage registers. Generally the construction of the building comprises timber framed walls clad with corrugated iron, and is encircled by wide timber verandahs and eaves. Works to the building should involve minimum changes to, and be performed without causing any damage to, the existing fabric or surroundings.

The works will require making good to existing penetrations within the roof, and the creation of new penetrations to walls and internal ceilings. These should be undertaken with care and kept to a minimum to avoid unnecessary impact on the original fabric. The existing internal mini-orb ceiling linings and timber and iron wall linings, and timber verandah linings are all **original** fabric. The roof sheeting while new, has been specifically installed as it resembles the original.

#### Heritage approach to repairs

The work is to be done with the objective of leaving intact as much as practically possible of the existing original/significant building fabric. Whole sections of work (eg. mini-orb ceilings) are not to be taken out and replaced with new unless specified. All items repaired or replaced are to match the original or existing items in size, profile and material.

### Archaeological relics

If any relic (as defined in the Heritage Act 1977) is found during excavation works, notify the Conservation Architect at once and stop work until the relics are assessed by Government Architect's Office.

## 2.2 ROOF

### External evaporative coolers

Remove all components of the existing evaporative cooling systems in the current scope of works, including (but not limited to) units, stands, shafts, edge flashings and ladders.

Make good the roof through the installation of new corrugated roof sheeting to match the existing in colour, material and slope.

Match new roof sheeting with the existing in material, finish, style and fixing method. Full sheets should be provided. There should be no other replacement of roof sheeting unless approved by the Heritage Architect.

Roof sheeting should be refixed to match the existing

## 2.3 CEILING

### Generally

Reuse the existing holes for ducts and grilles wherever possible. Enlargement of these holes for installation of new grilles is acceptable, provided that new cuttings are kept to a minimum size.

Where new openings for grilles are required (in two locations) these are to be cut out cleanly through the original ceiling material. Care is required to ensure that the edges are clean and no additional cut or scores lines are visible beyond the new grille.

Fix grilles by using screws appropriate for the use and with colour matched heads.

## 2.4 WALLS

### Generally

New openings within external and internal walls for refrigerant pipes, drain pipes and thermostat connections, should be kept to a minimum in both size and number.

Metal covers should be provided to all externally mounted pipework and ducts, screw fixed into the wall.

Plastic duct covers should be provided for all internally mounted pipework and ducts.

***Please refer to the Hazardous Material Report to avoid the damage of the walls containing asbestos.***

## 2.5 PAINTING

### Generally

All new covers over pipework and ducts should be painted to match the adjacent wall surface in colour and finish.

Where required, the edges to the new or enlarged hole for grilles within the ceiling should be painted to match the adjacent colour and finish.



## 3 PRODUCTS

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### 3.1 TESTS

#### Notice

Notice: Give notice of time and place of nominated tests.

Minimum notice for inspections to be made: 5 working days.

#### Attendance

General: Provide attendance on tests.

#### Testing authorities

General: Except for site tests, have tests carried out by a Registered testing authority.

- Reports: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and conformance or non-conformance with requirements.
- Site tests: Use instruments calibrated by authorities accredited by a Registered testing authority.

### 3.2 MATERIALS AND COMPONENTS

#### Consistency

General: For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

#### Corrosion resistance

General: Conform to the following corrosivity category with regard to worksection corrosion resistance tables.

Corrosivity category: Low

#### Corrosion protection

General: Provide insulation between dissimilar metals to prevent galvanic corrosion.

#### Manufacturers' or suppliers' recommendations

Proprietary items: Select, if no selection is given, and transport, deliver, store, handle, protect, finish, adjust, prepare for use, and provide manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier.

Proprietary systems/assemblies: Assemble, install or fix to substrate in accordance with the current written recommendations and instructions of the manufacturer or supplier.

Project modifications: Advise of activities that supplement, or are contrary to, manufacturer's or suppliers' written recommendations and instructions.

Product certification: If products must comply with product certification schemes, provide them in accordance with the certification requirements.

#### Proprietary items

Implication: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

Alternatives: If alternatives are proposed, submit proposed alternatives and include samples, available technical information, reasons for proposed substitutions and cost. If necessary, provide an English translation. State if provision of proposed alternatives will necessitate alteration to other parts of the works and advise consequent costs.

#### **Sealed containers**

General: If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

#### **Sources policy**

General: A preference for Australian or New Zealand goods.

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## **4 EXECUTION**

### **4.1 DEMOLITION**

#### **General**

General: Decommission, isolate, demolish and remove from the site all existing redundant mechanical services equipment as shown on the drawings including minor associated components that become redundant as a result of the demolition.

#### **Refrigeration systems**

General: Undertake demolition work on refrigeration systems in conformance with:

- AS/NZS 1677.2.
- The recommendations of SAA HB40.1 and SAA HB40.2.

#### **Salvaged materials**

General: All existing equipment and materials documented as removed are demolished for removal.

Breaking down: Disassemble or cut up equipment where necessary to allow removal.

### **4.2 INSTALLATION**

#### **General**

Fixing: If non-structural building elements are not suitable for fixing equipment and services to, fix directly to structure and trim around holes or penetrations in non-structural elements.

Installation: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting as recommended by the manufacturer.

Suspended ground floors: Keep all parts of services under suspended ground floors > 150 mm clear of the ground surface. Make sure services do not impede access.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

### **Differential movement**

General: If the geotechnical site investigation report predicts differential movements between buildings and the ground in which pipes or conduits are buried, provide movement control joints in the pipes or conduits.

- Location: Adjacent to the pipe or conduit supports which are closest to the perimeter of the building.
- Arrangement: Arrange pipes and conduits to minimise the number of movement control joints.
- Magnitude: Accommodate the predicted movements.

## **4.3 BUILDING PENETRATIONS**

### **Embedded pipes**

General: Do not embed pipes that operate under pressure in concrete or surfacing material.

### **Penetrations**

Fire rated building elements: Seal penetrations with a system conforming to AS 4072.1.

Non-fire rated building elements: Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustically rated, maintain the rating.

### **Sleeves**

General: If piping or conduit penetrates building elements, provide metal or UPVC sleeves formed from pipe sections as follows:

- Diameter (for non fire-rated building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Terminations:
  - If cover plates are fitted: Flush with the finished building surface.
  - In fire-rated and acoustic-rated building elements: 50 mm beyond finished building surface.
  - In floors draining to floor wastes: 50 mm above finished floor.
  - Elsewhere: 5 mm beyond finished building surface.
- Termite management: To AS 3660.1.
- Thickness:
  - Metal:  $\geq 1$  mm.
  - UPVC:  $\geq 3$  mm.

### **Sleeves for cables**

General: For penetrations of cables not enclosed in conduit through ground floor slabs, beams and external walls provide sleeves formed from UPVC pipe sections.

- MIMS cables: Provide sleeves for penetrations through masonry.

#### 4.4 CONCRETE PLINTHS

##### Construction

General: Provide plinths for all floor mounted equipment.

- Concrete: Grade N20.
- Finish: Steel float flush with the surround.
- Reinforcement: Single layer of F62 fabric.
- Surround: Provide galvanized steel surround at least 100 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.

#### 4.5 PLANT AND EQUIPMENT ACCESS

##### General

Services and equipment: Locate and arrange all services and equipment so that:

- Failure of plant and equipment (including leaks) does not create a hazard for the building occupants.
- Failure of plant and equipment (including leaks) cause a minimum or no damage to the building, its finishes and contents.
- Fan coil units, valves or other potential leak sources are not be located over rooms containing water sensitive equipment or finishes.
- Inspection and maintenance operations can be arranged to minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
- Safe tray and an overflow pipe are provided to each tank, hot water heater and storage vessel.
- Services and equipment are readily accessible for inspection and maintenance and arranged so that inspection and maintenance can be carried out in a safe and efficient manner. Include the following:
  - Conform to the relevant requirements of AS 1470, AS 1657, AS/NZS 1892.1 and AS/NZS 2865.
  - If parts of the plant (including high level tanks) require regular inspection and maintenance either locate plant so it is safely accessible from floor level or provide permanent access platforms and ladders.
  - In false ceilings locate items of equipment that require inspection and maintenance above tiled parts where possible. If this is not possible (for example if above set plaster or other inaccessible ceilings) provide access panels. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.
  - Modify manufacturer's standard equipment when necessary to provide the plant access in the contract documents.

#### 4.6 ELECTRIC MOTORS

##### General

Dimensions and performance: To AS 1360.11.

Installation: To AS 1359.107.

Motors  $\geq 0.75$  kW: Three phase.

Noise and vibration limits: To AS 1359.109 and AS 1359.114.

Noise and vibration: Support motors to minimise noise and vibration.

### Motor selection

Provide motors selected in conformance with AS 1359.101, motor manufacturers' recommendations and the following:

- Motor enclosure classification and degree of protection: To AS 1359.20 and AS 60529.
- Motor enclosure: Provide enclosures appropriate to the environment in which the motor operates.
- Motor operation: Select motor for mode of operation appropriate to the duty e.g. continuous, frequent starting and stopping.
- Motor power rating: The greater of the specified minimum motor size and 110% of the maximum load of the driven equipment.
- Speed and torque: To suit the driven equipment. Ensure each motor develops torque relative to the starting load of the driven machine such that it runs up to full speed steadily and within a time period compatible with motor winding temperatures, class of insulation and rating of the starting equipment.
- Starting method: As specified or, if none specified, appropriate to the driven equipment, electrical services infrastructure and supply authority requirements.
- Starting performance: To IEC 60034-12 and AS 1359.41.
- Temperature rating: Select motors for continuous operation at an ambient  $\geq 40^{\circ}\text{C}$ .

Variable frequency drive: If supplied from variable frequency drives, provide motors that, in addition to the above:

- Are selected for low noise and vibration under all operating conditions.
- Have Class F insulation with Class B temperature rise or better.

### Motor power factor and efficiency

Motors specified as high efficiency: To AS/NZS 1359.5 Table A3 or Table B3.

All other motors: To AS/NZS 1359.5 Section 2.

Power factor: In conformance with the **Minimum power factor table** for the respective motor size.

### Minimum power factor table

Rated output kW	Minimum power factor at rated output
$\leq 0.37$	0.72
$> 0.37$ to $\leq 0.55$	0.76
$> 0.55$ to $\leq 3.0$	0.83

Rated output kW	Minimum power factor at rated output
> 3.0 to ≤ 18.5	0.86
> 18.5 to ≤ 37	0.87
> 37	0.88

### Overload protection

Provide each motor with overload protection.

- Motors ≥ 22 kW: Fit embedded winding temperature thermistors complying with AS 1023.1 in each phase and connect to a protection relay that trips the starter in the event of over temperature. Match trip operating temperature to motor winding insulation classification.

## 4.7 VIBRATION SUPPRESSION

### General

General: Minimise the transmission of vibration from rotating or reciprocating equipment to other building elements.

### Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery.

- Isolate ducts by flexible connections.
- Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed so that no stress is placed on pipes due to end reaction.

### Inertia bases

General: If necessary to achieve the required level of vibration isolation, provide inertia bases having appropriate mass and conforming as follows:

- Construction: Steel or steel-framed reinforced concrete. Position foundation bolts for equipment before pouring concrete.
- Supports: Support on vibration isolation mountings using height saving support brackets.

### Speeds

General: If no maximum speed is prescribed do not exceed 1500 rpm for direct driven equipment.

### Vibration isolation mountings

General: Except for external equipment that is not connected to the structure of any building, support rotating or reciprocating equipment on mountings as follows:

- For static deflections < 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- For static deflections ≥ 15 mm: Spring mountings.

Installation: Set and adjust vibration isolation mounting supports to give adequate clearance for free movement of the supports.

Selection: Provide mountings selected to achieve 95% isolation efficiency at the normal operating speeds of the equipment.

Spring mountings: Provide freestanding laterally stable springs as follows:

- Clearances:  $\geq 12$  mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between baseplate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid:  $\geq 150\%$  of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection:  $\geq 0.8:1$ .
- Snubbing: Snub the springs to prevent bounce at start-up.
- Vertical resilient limit stops: To prevent spring extension when unloaded, to serve as blocking during erection and which remain out of contact during normal operation.

#### 4.8 SEISMIC RESTRAINT

##### Provisions

General: Arrange all components, other than service items exempted in AS 1170.4 clause 5.1.4, to resist seismic loads determined in accordance with AS 1170.4. Securely fix all plant and equipment to the building structure. Do not rely on gravity and/or friction to resist seismic forces.

- Anti-vibration mounts: Use horizontally restrained type.
- Components: Do not use components that will be damaged by earthquake conditions. Protect systems against the adverse effects of components such as mercury switches that, although not damaged by earthquake, may malfunction.

#### 4.9 PAINTING AND FINISHES

##### General

General: If exposed to view (including in plant rooms) paint new services and equipment.

Surfaces painted or finished off-site: Conform to *Metals and prefinishes*.

Exceptions: Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish in the **On-site paint systems table**.

##### Standard

General: Conform to the recommendations of AS/NZS 2311 Sections 3, 6 and 7 or AS/NZS 2312 Sections 5, 8 and 10, as applicable.

Specifications: Conform to the **On-site paint systems table**.

**On-site paint systems table**

<b>Substrate</b>	<b>1<sup>st</sup> coat</b>	<b>2<sup>nd</sup> and 3<sup>rd</sup> coat</b>
Aluminium	APAS-0035/3	APAS-0015/1
Concrete	APAS-0280/1	APAS-0015/1
Copper	APAS-2921	APAS-0024/1
GRP	APAS-2971	APAS-0015/1
Iron and steel	APAS-0032	APAS-0015/1
Organic or inorganic zinc primed metal	APAS-0016/1	APAS-0015/1
Timber	APAS-0181	APAS-0015/1
Metallic-coated steel	APAS-0134	APAS-0015/1

**Oil and petrol resistant finishes**

General: If the finished surface may be subject to oil and/or petrol provide APAS-0024/1 for the 2nd and 3rd coats in the **On-site paint systems table**.

**Paint application**

Coats: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Ensure each coat of paint or clear finish is uniform in colour, gloss, thickness and texture and free of runs, sags, blisters or other discontinuities.

Combinations: Do not combine paints from different manufacturers in a paint system.

Protection: Remove fixtures before starting to paint and refix in position undamaged on completion.

**Underground metal piping**

Corrosion protection: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in corrosive environments.

Protection methods: Select from the following:

- Cathodic protection: Sacrificial anodes or impressed current. Incorporate a facility for periodic testing. Comply with the recommendations of AS/NZS 2832.1.
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

**4.10 MARKING AND LABELLING****General**

General: Mark services and equipment to provide a ready means of identification.

- Locations exposed to weather: Provide durable materials.



- Pipes, conduits and ducts: Identify and label to AS 1345.
- Cables: Label to indicate the origin and destination of the cable.

Consistency: Label and mark equipment using a consistent scheme across all services elements of the project.

Operating and maintenance manuals: Provide marking and labelling text identical to the text and terminology used in operating and maintenance manuals.

### **Labels and notices**

General: Select from the following materials:

- Cast metal.
- For indoor applications only, engraved two-colour laminated plastic.
- Proprietary pre-printed self-adhesive flexible plastic labels.
- Stainless steel or brass  $\geq 1$  mm thick with black filled engraved lettering.

Colours: Generally in conformance with AS 1345 as appropriate, otherwise black lettering on white background except as follows.

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

Edges: If labels exceed 1.5 mm thickness, radius or bevel the edges.

Fixing: Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape.

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Label locations: Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.

Label text: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents.

Lettering heights:

- Danger, warning and caution notices:  $\geq 10$  mm for main heading,  $\geq 5$  mm for remainder.
- Equipment labels within cabinets:  $\geq 3.5$  mm.
- Equipment nameplates:  $\geq 40$  mm.
- Identifying labels on outside of cabinets:  $\geq 5$  mm.
- Isolating switches:  $\geq 5$  mm.
- Switchboards, main assembly designation:  $\geq 25$  mm.
- Switchboards, outgoing functional units:  $\geq 8$  mm.
- Switchboards, sub assembly designations:  $\geq 15$  mm.

- Valves:  $\geq 20$  mm.
- Other locations:  $\geq 3$  mm.

Operable devices: Mark to provide a ready means of identification. Include the following:

- Controls.
- Indicators, gauges, meters and the like.
- Isolating switches.

Vapour barriers: Do not penetrate vapour barriers.

### **Piping**

General: Identify piping to AS 1345 throughout its length, including in concealed spaces.

### **Pressure vessels**

General: Mount manufacturer's certificates in glazed frames on a wall next to the vessel.

### **Valves and pumps**

General: Label to associate pumps with their starters and valves. Screw fix labels to body or attach label to valve handwheels with a key ring.

## **4.11 ADDITIONAL MARKING**

### **Location**

Equipment concealed in ceilings: Provide a label on the ceiling indicating the location of each concealed item requiring access for routine inspection, maintenance and/or operation. In tiled ceilings locate the label on the ceiling grid closest to the item access point. In flush ceilings locate adjacent to closest access panel. Items to be labelled include but are not limited to:

- Fan coil units and terminal equipment (e.g. VAV boxes).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.

Wall mounted equipment in occupied areas: Provide labels on wall mounted items in occupied areas including the following:

- Services control switches.
- Temperature and humidity sensors.

### **Labels**

General: Provide clear self-adhesive film tape labels with machine printed black lettering.

Label text: To correspond to identifying number of the respective item as shown on the record drawings and documents.

Lettering height:

- Labels < 2000 mm above floor: 3 mm on 6 mm wide tape.

- Labels  $\geq$  2000 mm above floor: 8 mm on 12 mm wide tape.

#### 4.12 SOFTWARE

##### General

General: Provide the software required for the operation and management of building services systems and equipment including the following:

- Absolute right and all necessary facilities for the principal to modify extend or reduce any or all functions, hardware and software that form part of the system.
- All passwords.
- All software and manuals necessary to modify or extend the software.
- Back-up copies of software in electronic format.
- Full listings of all software supplied which has been developed, modified or adapted to meet the requirements of this project.
- Installation of all software updates issued before the end of the defects liability period.
- Record drawings, functional specifications and point schedules of all systems.

#### 4.13 RECORD DRAWINGS

##### General

General: Submit record drawings. Show the “as installed” locations of building elements, plant and equipment. Include “as installed” amendments to shop drawings. Show off-the-grid dimensions where applicable.

Date for submission: Within 2 weeks after practical completion.

##### General

General: Show dimensions, types and location of the services in relation to permanent site features and other underground services. Show the spatial relationship to building structure and other services. Include all changes made during commissioning and the maintenance period.

Diagrams: Provide diagrammatic drawings of each system including the following:

- Controls.
- Piping including all valves and valve identification tags.
- Principal items of equipment.
- Wiring.

Drawings: Include all specified shop drawings.

##### Accuracy

Documents: Incorporate all modifications made during the progress of the work and testing period. Show any provisions for the future.

Endorsement: Sign and date all record drawings. Keep one set of shop drawings on site at all times expressly for the purpose of marking changes made during the progress of the works.

### **Drawing layout**

General: Use the same borders and title block as the contract drawings.

### **Quantity and format**

General: Refer to **Submissions**.

## **4.14 OPERATION AND MAINTENANCE MANUALS**

### **General**

General: Submit operation and maintenance manuals for installations.

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or technical worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Date for submission: Within 2 weeks after practical completion.

### **Contents**

General: Include the following:

- Certificates:
  - Certificates from authorities.
  - Copies of manufacturers' warranties.
  - Product certification.
- Directory: Names, addresses, and telephone and facsimile numbers of principal consultant, subconsultants, contractor, subcontractors and names of responsible parties.
- Drawings:
  - Record drawings, full size.
- Drawings and technical data: As necessary for the efficient operation and maintenance of the installation.
- Equipment descriptions:
  - Name, address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.
  - Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed.
- Maintenance procedures:
  - Detailed recommendations for preventative maintenance frequency and procedures.
  - Manufacturer's technical literature as appropriate. Register with manufacturer as necessary. Retain copies delivered with equipment.

- Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.
- Schedule of spares recommended to be held on site, being those items subject to wear or deterioration and which may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
- Operation procedures:
  - Manufacturers' technical literature as appropriate.
- Table of contents: For each volume. Title to match cover.

#### Format – electronic copies

Printing: Except for drawings required in the **Record drawings** clause provide material that can be legibly printed on A4 size paper.

Scope: Provide the same material as specified for hardcopy in electronic format.

Quantity and format: Refer to **Electronic submissions**.

#### Format – hard copy

General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title “*OPERATION AND MAINTENANCE MANUAL*”, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size and accommodate them in the binders so that they may be unfolded without being detached from the rings. Provide with reinforced punched binder tabs.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

### 4.15 TOOLS AND SPARE PARTS

#### Tools and spare parts schedule

General: At least 8 weeks before the date for practical completion, submit a schedule of tools, portable instruments and spare parts necessary for maintenance of the installation. For each item state the recommended quantity and the manufacturer's current price. Include the following in the prices:

- Checking receipt, marking and numbering in accordance with the spare parts schedule.
- Packaging and delivery to site.

- Painting, greasing and packing to prevent deterioration during storage.
- Referencing equipment schedules in the operation and maintenance manuals.
- Suitable means of identifying, storing and securing the tools and instruments. Include instructions for use.

Replacement: Replace spare parts consumed during the maintenance period.

#### 4.16 TRAINING

##### General

Duration: Instruction to be available for the whole of the commissioning and running-in periods.

Format: Conduct training at agreed times, at system or equipment location. Also provide seminar instruction to cover all major components.

Operation and maintenance manuals: Use items and procedures listed in the final draft operation and maintenance manuals as the basis for instruction. Review contents in detail with the principal's staff.

##### Demonstrators

General: Use only qualified manufacturer's representatives who are knowledgeable about the installations.

##### Maintenance

General: Explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

##### Operation

General: Explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

##### Seasonal operation

General: For equipment requiring seasonal operation, demonstrate during the appropriate season and within 6 months.

#### 4.17 COMPLETION

##### Samples

General: Remove unincorporated samples on completion.

##### Warranties

General: Name the **NSW State Property Authority** as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

## **B PACKAGED AIRCONDITIONING**

### **1 GENERAL**

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#### **1.1 AIMS**

##### **Responsibilities**

General: Provide packaged airconditioning plant.

Split systems: Supply only indoor and outdoor units of split systems designed and rated by the manufacturer to operate together.

Selections: As specified on the drawings.

#### **1.2 CROSS REFERENCES**

##### **General**

General: Conform to the *General requirements* worksection.

##### **Associated worksections**

Associated worksections: Conform to the following:

- *Ductwork.*

#### **1.3 STANDARDS**

##### **General**

Refrigeration systems: To AS/NZS 1677.2 and the recommendations of SAA HB40.1 and SAA HB40.2.

Microbial control: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB32.

Ductwork and insulation: To AS 4254.

Air filter performance and construction: To AS 1324.1.

#### **1.4 INTERPRETATION**

##### **Definitions**

General: For the purposes of this worksection the definitions given below apply.

- Direct expansion one-piece package or split systems with total cooling capacity when tested to AS/NZS 3823.1.1 or AS/NZS 3823.1.2, Standard test condition T1:
  - Room airconditioner: < 7.5 kW.
  - Packaged airconditioner: ≥ 7.5 kW.

## 1.5 PRE-COMPLETION TESTS

### Standards

General: Provide airconditioning equipment that has been subjected to physical test in conformance to the following:

- Non-ducted airconditioners: To AS/NZS 3823.1.1, Standard test condition T1.
- Ducted airconditioners: To AS/NZS 3823.1.2, Standard test condition T1.

### Labelling

Required: To AS/NZS 3823.2.

Refrigerant: Show the type of refrigerant at the charging point and on indicator panels.

## 2 PRODUCTS

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### 2.1 GENERAL

#### Operating conditions

General: Provide equipment that operates within an ambient temperature range of -5°C to 45°C, without excessive head pressure, unstable operation or icing.

#### Split systems

Outdoor units: Provide packaged condensing units consisting of refrigerant condensers, compressors and associated piping and electrical connections, mounted within the condenser enclosure.

The outdoor units shall be placed at the locations as shown on the drawings. These units shall be capable to connect to the indoor units at the distance shown on the drawings without reducing the performance of the split systems.

Indoor units: Provide units consisting of coils, piping, supply air fan, accessories and electrical connections, mounted within an insulated enclosure.

#### Filters

Filters: Type 1 to AS 1324.1 with Class and Performance rating as documented but not less than:

- Test Dust No. 1 to AS 1324.2:  $\geq 20\%$  efficiency.
- Test Dust No. 4 to AS 1324.2:  $\geq 85\%$  arrestance.

### 2.2 EQUIPMENT ENCLOSURES

#### General

General: Provide enclosures, materials and finishes that are weatherproof and corrosion-resistant, assembled and reinforced to prevent flexing and drumming.

#### Material and finishes

Materials:

Metallic-coated steel: Base and legs  $\geq 1.6$  mm with  $\geq 1.0$  mm panels.

Aluminium: Base and legs  $\geq 2.0$  mm with  $\geq 1.6$  mm panels.



Outdoor equipment finishes: Powder coat all metallic-coated steel interior and exterior surfaces to AS 3715 or AS 4506 as appropriate.

Powder coat is specified as it is more durable than an enamel finish.  
Indoor equipment finish: Manufacturer's standard finish.

Moisture retention: All parts free draining with no pockets in which condensation and/or rainwater may be retained.

### **Access**

General: Provide access to the interior of the unit for routine inspection and maintenance and for removal of major components. Provide doors and panels with handles and captive fasteners and, where they are for access to the conditioned air stream, provide soft gaskets ensuring an airtight seal. Provide weatherproof doors and panels on outdoor enclosures. Do not use self tapping screws on removable panels.

Access: As a minimum, provide access to the following:

Condensate tray (underside of access panel to be within 300 mm of tray).

Supply fan motor and drive.

Compressor section.

Condenser section.

Filter section.

Access panel fasteners:

Units < 1000 L/s: Metal thread screws or camlock fasteners.

Units ≥ 1000 L/s: Camlock fasteners.

Handles: Provide handles to permit easy and safe removal and replacement of panels.

< 450 mm diagonal panel dimension: 1 handle.

≥ 450 mm diagonal panel dimension: 2 handles.

### **Insulation**

General: Insulate enclosures to prevent external surface condensation under all operating conditions. Fix insulation to panels with waterproof adhesive applied to at least 50% of the panel area.

Material properties:

Thermal conductivity: ≤ 0.035 W/m.K.

Thickness: ≥ 25 mm.

Facing: Reinforced aluminium foil.

Moisture absorption: Non-hygroscopic.

Fire hazard properties: To AS 4254 clause 2.7.1.

Which do not use CFC or HCFC as blowing agents in the manufacturing process.

### **Condensate trays**

General: Provide a tray under each cooling coil extending downstream to collect water carry over and under any other components on which condensation may occur. Grade trays and sumps to the outlet to prevent water retention. Provide radiused corners and arrange to facilitate cleaning.

Material: Fabricate wetted parts from aluminium to AS/NZS 1734 or stainless steel sheet grade 304L.

### Protection

General: Provide metallic coated steel mesh protection to outdoor fans and exposed faces of outdoor coils.

## 2.3 REFRIGERATION SYSTEM

### Components

Refrigerant: R410A.

Copper pipe: To AS/NZS 1571.

Pipe insulation within unit: Insulate pipes that operate below ambient temperature with elastomeric foam  $\geq 10$  mm thick.

Multiple compressor units: Provide separate refrigeration circuit for each compressor.

Refrigerant expansion device:

$< 20$  kW total capacity: Eliminator or similar, non-capillary expansion device, thermostatic expansion valve or electronic expansion valve.

$\geq 20$  kW total capacity: Electronic expansion valve.

Refrigeration circuits: Provide a suction accumulator if compressor is liable to damage by liquid slugs.

Reverse cycle units: Provide refrigerant reversing valve and an effective outdoor coil defrost facility that prevents room temperature dropping more than 2 K during defrost.

## 2.4 CONTROLS AND ELECTRICAL

### Components

General: Provide factory wired control panel for each unit containing the following:

Plug-in relays.

Terminal strips numbered to correspond to wiring diagram.

Starter and overload protection for each motor.

Short circuit protection: Provide each compressor and each 3-phase motor with short circuit protection by either:

High rupture coefficient (HRC) fuses or

Circuit breaker with interrupting capacity selected to suit the anticipated short circuit current.

Starter contactor with manual reset thermal or magnetic overload.

Provide automatic lead/lag changeover for units with multiple compressors.

Short cycle timer function: To limit compressor starts.

Separate control and electrical circuit for each compressor.

HRC fuse or circuit breaker short circuit protection for each crankcase heater (if fitted) and control circuit.

Phase failure protection on motors  $\geq 5.5$  kW.

Terminals for remote indication of run and fault conditions.

Permanent, weatherproof, wiring diagram fixed on or next to the control panel.

Safety controls: Arrange so that operation of one item does not shut down other items that are not directly dependent on its operation.

Isolating switch: Provide system isolator for each system.

Condenser head pressure control: If documented, provide electronic condenser fan speed control to maintain minimum condenser head pressure at all operating ambient conditions.

Pump-down control: If documented, provide solenoid valve and automatic pump-down control.

### 3 EXECUTION

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#### 3.1 REFRIGERATION PIPING

##### General

General: Conform to equipment manufacturer's recommendations for the refrigerant used. Provide refrigeration piping designed and installed so that the complete system meets the documented performance under the documented operating conditions.

Protect pipes running on floor level, on the walls and within the risers from damage by galvanized metal plate covers fixed to the floor/wall.

##### VRF systems

Design, layout, piping, bends and fittings shall be as recommended and/or supplied by the air conditioning equipment manufacturer.

##### Design

Suction lines: Size for pressure drop  $< 1.0$  K saturated suction temperature at documented supply air flow, documented cooling coil entering conditions, documented condenser air entering condition and unit manufacturer's rated total capacity, saturated condensing temperature and saturated suction temperature under the above conditions.

Oil return: Size for oil return to compressor. Where velocity for oil return would result in the suction line pressure drop exceeding pressure drop limit, provide double suction risers. Prevent oil draining back on the off cycle.

Liquid lines: Size for pressure drop  $< 1.0$  K saturated liquid temperature when handling the manufacturer's unit capacity under the operating temperatures stated in the schedules.

##### Layout

General: Install pipework in straight lines and uniform grades without sags. Grade horizontal hot gas lines and suction lines at not less than 1 in 200 in the direction of gas flow.

Location: When possible, run suction and liquid lines inside common insulation.

##### Pipe support

General: Provide hangers, brackets, saddles, clips, etc., incorporating provisions for adjustment of spacing, alignment, grading and load distribution. Support pipework from associated equipment or building structure. Support valves, strainers and major line fittings so that no load is placed on adjacent tubes or transmitted to them during operation and maintenance.

Support type: Proprietary galvanized channel section with clamps and hangers sized match external diameter of pipe being supported.

Uninsulated pipes: Clamp piping supports directly to pipes.

Insulated pipe support:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.

- Vapour barriers: For cold pipes apply aluminium foil tape over the circumference of the spacer to form a vapour barrier.
- Metal sheathing: Provide a 0.55 mm thick metallic-coated steel band between the aluminium foil tape and the support, for the full width of the spacer.

#### Pipe support spacing table

Nominal pipe size, DN	Maximum spacing (m)	
	Horizontal	Vertical
10	1	2
$\geq 15, \leq 20$	1.5	2.5
25	2	3
32	2.5	3
40	2.5	4
50	3	4
65	3	4

#### Pipes

Piping: Provide copper tubes as follows:

- $\leq$  DN 20: To AS 1571/122-O.
- $>$  DN 20: To AS 1571/122-H. Use annealed copper only for pulled bends.

Pipe wall thickness:

- Pipes  $\leq$  DN 50: To AS 1432 Type B.
- Pipes  $>$  DN 50: 1.6 mm, minimum.

Deemed to comply for split systems under 7.5 kW cooling capacity: Split system manufacturer's standard pre-charged piping kit.

#### Bends

Pulled bends: Form bends without flattening or wrinkling with an inside radius  $\geq 3$  pipe diameters using the correct tool size for the pipe diameter.

#### Pipe fittings

Copper alloy fittings: To AS 3688, dezincification resistant, welded, brazed or compression type only.

Preformed fittings: Preformed refrigerant capillary line tees, bushes, couplings and elbows. Wherever possible make reductions at elbows, tees, line devices or equipment connections with reducing fittings, otherwise provide reducing bushes or reducing couplings.

Compression fittings: Flareless twin ferrule, torque free, mechanical grip fittings which can be gauged using a precision ground and hardened metal gap inspection gauge.

### Brazed joints

General: Provide preformed capillary fittings or form capillary unions by expanding one pipe end. Prevent flux and brazing alloy from entering pipes. Use dry nitrogen to purge air from pipes before brazing. During brazing, maintain a flow of dry nitrogen through pipes to prevent oxidation.

Brazing alloy: To AS 1167.1 Table 2 B4. 15% min silver content.

Brazing alloy for jointing dissimilar metals: To AS 1167.1 Table 1 A10. or an alloy with an equivalent silver content (minimum 34%).

### Sleeves

General: Provide pipe sleeves where pipes pass through building elements.

Material: Copper or UPVC formed from pipe sections. Do not use UPVC for fire rated penetrations.

Sleeve thickness:

- Metal:  $\geq 1$  mm.
- PVC:  $\geq 3$  mm.

### Valves

General: Provide valves of the type and in the location recommended by SAA HB40.1. Make provision for charging and withdrawal of refrigerant. If a gauge is not permanently connected (for example commissioning connections), seal the outlet of the isolating valve with a flared seal cap nut.

### Valve types

Service valves: Backseating type with gasketed cap.

Solenoid line valves: Solenoid coil and valve parts replaceable without disturbing valve body or refrigerant piping.

## 3.2 CONDENSATE DRAINS

### General

Condensate drains: Provide trapped drain lines with uniform and continuous fall to connect condensate trays to the nearest building drain point. Provide drains from:

- Each indoor coil.
- Each outdoor coil unless casing freely drains to a roof or other location where condensate and/or rain water will not cause damage or pond.
- Each safety tray.
- Other moisture and rainwater collecting areas.

Material: Copper to AS 1432 Type B

Size: The greater of unit drain connection size and DN 20.

Sealing: Seal drain pipes where they penetrate casing.

Termination: Terminate drains to enable visual inspection of condensate flow.

Traps: To withstand > 2 times fan static pressure and constructed from either:

- Transparent, kink resistant hose.
- UPVC trap with removable caps and a visible air break.

Falls and drains: Check that the condensate tray falls comply with AS/NZS 3666.1 and in particular that trays and sumps are graded to the outlet to prevent moisture retention. Test drains by pouring a measured quantity of water into upstream end.

Insulation: Insulate condensate pipes with 12 mm slip on elastometric pipe insulation and conceal within wall where possible.

### 3.3 SAFETY TRAY

#### Location

General: Provide a safety tray under packaged unit and indoor unit of split systems if leaks or condensation from these could cause nuisance or damage to the building or its contents.

Reverse cycle units: If reverse cycle outdoor units do not have drain connections, locate safety tray below unit and pipe drain to waste.

#### Construction

General: Galvanized steel sheet, 1.2 mm thick folded and stiffened, edges turned over and with all joints sealed. Sides  $\geq 50$  mm high.

Size: Extend tray 150 mm beyond unit casing and any components that may leak or drip condensation.

Drainage: Provide fall in tray and provide drain at lowest point. Run drain to visible waste.

### 3.4 REFRIGERATION PIPE INSULATION

#### Material

General: Insulate all refrigerant piping that may sweat. Apply insulation un-slit where possible. If slit, refix slit faces with adhesive applied to full area.

Thickness: 13 mm for pipes  $\leq$  DN 20, 19 mm otherwise.

Type: Chemically blown closed cell nitrile rubber or polyethylene in tubular form.

Physical properties:

- Maximum thermal conductivity: 0.04 W/mK at 0°C.
- Moisture absorption: Non-hygroscopic.
- Water vapour permeability:  $\leq 0.065$  ng/Pa.m.s.
- Fire hazard properties:
  - Spread of flame index: 0.
  - Smoke developed index:  $\leq 3$ .

Joining: Use only an adhesive or jointing system supplied by the insulation manufacturer.

Timing: Leak test piping before insulating joints, fittings and valves.

### 3.5 UNIT INSTALLATION

#### General

General: Supply all necessary components, including but not limited to:

- Means of attachment to the structure.
- Anti-vibration mounting.
- Appropriate flexible connections.
- Trim and sealing around openings.
- Electrical connections.
- Drainage connections.
- Field connection of refrigerant lines in split systems.

Alignment: Install units level, plumb and to manufacturer's recommendations.

Fixings: Bolt units in place with minimum 4 anchors or suspension rods.

#### Outdoor equipment

Arrangement: Provide clearance around units for condenser air flow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

#### Duct connections

Supply duct: Provide internal or external flexible duct connection. Comply with the **Flexible connections** clause in the *Ductwork* worksection.

Return, outside air and condenser duct connections: Provide external flexible duct connection.

#### Vibration isolation

General: Provide to each assembly at least four mountings, located to give uniform deflection under the applied load.

Isolation efficiency:  $\geq 90\%$ .

Suspended units:

- Suspended from lightweight structures: Metal spring or rubber-in-shear isolation mountings with  $\geq 25$  mm static deflection. Provide each mounting with a levelling screw and locknut.
- Suspended from heavyweight structure: Double deflection neoprene or rubber in shear mountings, with static deflection  $\geq 15$  mm.

Floor mounted units: Neoprene waffle pads.

### 3.6 COMMISSIONING

#### General

Packaged equipment: Common to the manufacturer's recommendations and record results.

Refrigeration systems: Conform to the recommendations of SAA HB40.1.

Evacuation: If using the deep vacuum method to SAA HB40.1 pull a vacuum to the lowest pressure achievable with the available equipment but  $\leq 130$  Pa absolute (1000 microns of mercury).

#### 4 SELECTIONS

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As specified on the drawings.



## C FANS

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide fans as specified on the drawings.

##### Design

Centrifugal fans: Provide fans selected so the air flow can be increased  $\geq 5\%$  above the specified rate as follows:

- Against the corresponding increased system resistance as installed.
- Without unstable operation.
- By speed change alone.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

#### 1.3 SUBMISSIONS

##### Type test results

General: Provide only fans type tested by a Registered testing authority. Submit evidence of type tests as follows:

- Fan performance: To BS 848 Part 1 or ISO 5801.
- Fan sound power levels: To BS 848-2, BS EN ISO 5136 or ISO 10302.

### 2 PRODUCTS

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#### 2.1 MATERIALS

##### Galvanized steel components

Hot dip galvanized components: Conform to AS/NZS 4680.

Coating thickness and mass: To AS/NZS 4680 Table 1.

#### 2.2 CENTRIFUGAL FANS – GENERAL PURPOSE

##### Casings

Construction: Welded steel scroll and side plates, reinforced to prevent flexing and drumming.

Split casing: If the fan impeller is more than 1200 mm diameter, provide a horizontally split casing.

Inlet bells: Removable, shaped for aerodynamically efficient air entry and close approach to impeller.

Access panels: Provide inspection/access panels to casings of fans with impellers  $\geq 650$  mm diameter. Seal panels airtight with neoprene gaskets.

Outlets: Provide flanged or spigoted outlets to suit connected ductwork or equipment.

Guards: For fans not connected to ductwork provide removable inlet guards, discharge guards or both.

Drain point: Where moisture is likely to enter or condense inside a fan provide a 25 mm drain point welded into base of scroll and stopped with non-ferrous screwed plug.

#### Minimum casings thickness table

Impeller diameter (mm)	Side plates (mm)	Scroll (mm)
$\leq 450$	2	1.6
$> 450, \leq 800$	2.5	2
$> 800, \leq 1000$	3	2.5
$> 1000, \leq 1500$	3	3
$> 1500$	5	3

#### Bases

General: Form from fully welded steel sections integral with or bolted to casings.

Mounting brackets: Provide at least 4 height saving mounting brackets.

#### Impellers

Blade type: Backward inclined aerofoil or laminar single thickness type, flat or curved section, with non-overloading power characteristics.

Characteristics: Provide the following:

- Statically and dynamically balanced.
- Keyed to drive shafts by means of taper-lock fixing devices or taper keys.
- For overhung driven fans  $> 1000$  mm diameter, retained onto drive shafts by positive devices such as washers and set screws into tapped holes in shaft ends.
- Countersink in shaft for tachometer.

#### Bearings

For single width fans with impellers  $< 1250$  mm diameter and double width fans with impellers  $< 950$  mm diameter: Provide pillow-block mounted, self aligning ball bearings, sealed for life, with a minimum rating fatigue life of 12 000 hours.

For single width fans with impellers  $\geq 1250$  mm diameter and double width fans with impellers  $\geq 950$  mm diameter: Provide plummer-block mounted roller bearings to AS 2729, with seals

and grease relief, with a minimum rating fatigue life of 20 000 hours. Extend grease nipples for ready access.

### **Motors**

General: Provide electric motors that are compatible with fan requirements, providing efficient non-overloading fan units.

Power rating: The greater of the following:

- The fan limit load power at speed required for the air flow and resistance required in **Design**.
- The power required by the fan when the air flow is increased by 5% above the design air flow rate required in **Design**, against the corresponding increased system resistance.

Motor protection: Minimum IP54.

### **Belt drives**

Drive sizing: Size for  $\geq 125\%$  of motor power and capable of transmitting the full starting torque without slip.

Belts: Wedge belts to AS 2784, consisting of matched sets of at least 2 belts. Mark belt size in a prominent location on the fan casing.

Belt tensioning: Provide adjustment of belt drive tension by either movement of motor on slide rails or by pivoting support. Do not use the weight of motors to provide belt tension. Restrain motors with locknuts on bolts, clamping motors in place.

### **Drive shafts**

Characteristics: Provide the following:

- Designed so that the first critical resonant speed of the shaft is  $\geq 130\%$  of design maximum operating speed.
- Double width fans with shaft diameter  $> 60$  mm: Filleted stepped type to permit easy impeller removal.
- Keyed with taper-lock fixing devices for fixing of pulleys.
- Countersunk ends for tachometer application or, where the end of the shaft is not accessible, make provision for use of stroboscope or optical tachometer.
- Material: Mild steel or high tensile steel, as appropriate for the duty. Provide corrosion protection by solvent removable petroleum based protective coating formulated for machinery shafts and parts.

### **Drive guards**

Provide rigid, removable belt guards on all fans where drive is accessible while motor is running. Provide the following:

- Tachometer opening.
- Perforated sides on double width, double inlet fans.
- Weatherproof construction, ventilated and drained where exposed to weather.

Material: Open mesh or perforated metallic-coated sheet steel.

### Finishes

Prime all surfaces with zinc phosphate primer to APAS-0162/1 and apply manufacturer's standard paint system to external surfaces.

### Motors

Minimum degree of protection: IP51.

## 2.3 CENTRIFUGAL FANS – IN-LINE

### General

General: Provide fans with non-overloading power characteristics.

### Construction

Casings: Rectangular or circular with spigot or flanges for duct mounting, with construction as follows:

- Steel: Metallic-coated steel sheet, spot welded. Brush and prime spot welds with zinc-rich organic primer to APAS-2916.
- Fibreglass or plastic: Moulded fibreglass or impact resistant plastic with integral support foot.

Impellers: Backward inclined or forward curved style as scheduled, constructed from metallic-coated steel, extruded aluminium or polypropylene. Balance impellers statically and dynamically.

Motors: Direct mounted to impellers with minimum Class 155 insulation to AS 2768. Provide sealed for life bearings with a minimum rating fatigue life of 8750 hours.

Electrical connection: Provide terminal box external to fan casing and wired to fan motor.

Access:

- Impellers < 350 mm diameter: Provide fan manufacturer's standard screw clamps both sides of the fan to permit the impeller-motor assembly or fan as whole to be removed.
- Impellers  $\geq$  350 mm diameter: Provide an access panel in the casing to permit removal of impeller-motor assembly.

Minimum degree of protection: IP51.

## 2.4 MARKING

### Labels

Show the following:

- Manufacturer's name.
- Model.
- Serial number.
- Size.
- Direction of rotation, marked on casing.

## 3 EXECUTION

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### 3.1 INSTALLATION

#### Access

Arrange fans and accessories to allow service access for maintenance and removal and for replacement of assemblies and component parts, without disturbance of other items of plant, fire rating material and/or the building structure.

#### Duct connections

Provide flexible connections to prevent transmission of vibration to ductwork. If under negative pressure, make sure that flexible connection does not reduce fan inlet area. If necessary, provide expansion pieces between fans and flexible connections.

#### Drains

Where moisture is likely to enter or condense inside a fan provide a trapped drain in accordance with AS/NZS 3666.1.

#### Vibration isolation

General: Provide each assembly with at least four anti-vibration mountings, selected to give an isolation efficiency not less than 90%.

Type:

- Fans with motors  $> 3.5$  kW: Metal spring and a neoprene spring cup in series. Include levelling screws and locknuts.
- Fans with motors  $\leq 3.5$  kW: Either double deflection neoprene or rubber in shear mountings or as for fans  $> 3.5$  kW

Location: Locate the mountings so that the mounts deflect uniformly when the fan is operating and subject to all loads, including those imposed by the duct.

Duct connections: Arrange flexible duct connections so that the fan vibration isolation efficiency is not adversely affected.

## 4 SELECTIONS

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### 4.1 FAN SCHEDULES

As specified on the drawings.

## D DUCTWORK

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide ductwork as documented.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

##### Associated worksections

Associated worksections: Conform to the following:

- *Ductwork insulation.*

#### 1.3 STANDARD

##### General

Ductwork: AS 4254.

##### Proprietary and non-standard systems

Standard: Conform to functional criteria in AS 4254.

##### Microbial control

Standard: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB32.

#### 1.4 INTERPRETATIONS

##### Abbreviations

General: For the purposes of this worksection the abbreviations given below apply.

FRL: Fire-resistance level.

#### 1.5 SAMPLES

##### Flexible duct

General: Submit sample 2 metre length of 300 mm diameter flexible duct with sheet metal spigot attached.

## 1.6 SUBMISSIONS

### Fire hazard properties

General: Submit evidence of conformance with the following:

- Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:
  - Spread of flame index: 0.
  - Smoke developed index:  $\leq 3$ .
- Facing materials when tested to AS 1530.2: Flammability index:  $\leq 5$ .
- Assembled duct systems: Pass the UL 181 burning test.
- Fire protection of duct systems: Achieves the required FRL to AS/NZS 1530.4.

### Access panels

General: Submit proposed alternative sizes, if any.

### Rigid ductwork

General: Submit test data establishing conformance of the assembled duct system with AS 4254 clause 2.1.2 with respect to AS/NZS 1530.3 and UL181 burning test.

### Sealants and tapes

General: Submit type-test certificates showing conformance with the following standards:

- Sealants: To AS 1530.3.
- Tapes: Test to AS/NZS 1635.10.1 demonstrating performance not less than that required by AS 4254 Clause 2.2.1.

## 2 PRODUCTS

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### 2.1 MATERIALS AND COMPONENTS

#### Corrosion resistance

General: Metallic-coated sheet Z275/AZ150.

### 2.2 SHEET METAL DUCTWORK

#### Material

General: Galvanized steel duct and mild steel components  $< 3$  mm thick: Prime quality lockforming galvanized steel, to AS 1397 Grade G2 or G3 with Z275 coating.

Thickness: To AS 2338.

Components for stainless steel and aluminium ductwork: Use materials with corrosion resistance not less than that of the duct wall material.

#### Fasteners

Rivets: Expanding solid end type, aluminium base alloy for galvanized duct, stainless steel for stainless steel duct, minimum size as follows:

- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

Self tapping screws: Zinc-plated for galvanized duct, stainless steel for stainless steel duct.

Self drilling and tapping screws: Zinc-plated for galvanized duct, stainless steel for stainless steel duct. Provide only if base material into which they screw is thicker than 1.5 mm and they are unlikely to be removed or replaced.

Bolts, nuts, washers and drop rods: Zinc-plated steel, service condition number 2 for galvanized duct, stainless steel for stainless steel duct. Parts on stainless steel duct not in contact with air stream or corrosive conditions may be zinc-plated as for galvanized duct. Provide washers under nuts and bolt heads.

### Duct sealing

General: Seal all openings in the surface, joints and seams of ducts in accordance with AS 4254 clause 2.2.1 and the **Duct seal class table**.

Duct seal class: Not lower than Class C to AS 4254 regardless of duct pressure or location.

Sealant materials: Use only sealants that:

- Do not foster microbial growth.
- Have a smoke developed index  $\leq 3$  and a spread of flame index  $\leq 0$  when tested to AS/NZS 1530.3.
- Will maintain their sealing performance for the life of the duct system.

Adhesive duct tapes: Use only as a secondary sealant on joints sealed by other means such as mastic, liquids or gaskets. Do not use duct tapes for non-sealant purposes.

Machine rolled flanges: Use mastic at corners.

### Duct seal class table

Duct location	Seal class to AS 4254 Table 2.2.1			
	Supply ducts		Exhaust ducts	Return ducts
	(Static pressure classification Pa)			
	≤ 500	> 500		
Outdoors	A	A	A	A
Unconditioned spaces	B	A	B	B
Conditioned spaces (concealed ductwork)	C	B	B	B
Conditioned spaces (exposed ductwork)	A	A	B	B
• Office-type spaces				
• Factory-type spaces	C	B	B	B



## 2.3 FLEXIBLE DUCT

### Materials

Uninsulated flexible duct: Aluminised fabric clamped on a formed metal helix. Do not use adhesives.

Insulated flexible duct: As for uninsulated flexible duct with flexible blanket insulation wrapped around duct and covered with an outer vapour barrier.

Insulation material: Conform to the *Ductwork insulation* worksection.

## 2.4 FLEXIBLE CONNECTIONS

### General

General: Isolate fans and conditioner casings from ductwork, by means of airtight flexible connections.

Materials: Heavy duty, waterproof.

Length: Provide sufficient slack to ensure free movement and vibration isolation under operating and static conditions.

Alignment: Align openings of connected equipment.

Fixing: Fix to attachments with metallic-coated steel strip. Seal joints. Do not paint flexible material.

Fire protection: To AS 1530.4.

Maintenance: Arrange to permit easy removal and replacement without disturbing ductwork or plant.

Restriction: Do not protrude connections or frames into the airstream where this would be detrimental to the air flow.

## 2.5 DAMPERS – GENERAL

### Location

Provide balancing dampers at each branch duct or tee:

- Splitter type: Use only for supply branches up to 600 mm wide and with velocity in main < 10 m/s. Do not use on return or exhaust ducts.
- Opposed blade dampers: Use for any size supply and for all return and exhaust ducts. Locate in each branch.

## 2.6 VOLUME CONTROL DAMPERS

### General

General: Provide dampers which are free of rattles, fluttering or slack movement and capable of adjustment over the necessary range without excessive self-generated noise or the need for special tools.

Face dimensions: Duct size.

Connections: Mating angle flanged cross joints.

Frames: 1.6 mm minimum thickness metallic-coated steel or 2 mm minimum thickness aluminium folded to form channel sections at least 150 mm wide and welded at corners.

Dampers required to provide tight shut-off: Comply with the **Motorised dampers** clause.

Dampers in smoke-spill systems: Metallic-coated steel or stainless steel blades and frames.

### Blades

Material: Metallic-coated steel, aluminium or stainless steel.

Form: No sharp edges. Sufficiently rigid to eliminate movement when locked.

Minimum thickness:

- Metallic-coated sheet steel and stainless steel:
  - Single thickness blades: 1.6 mm.
  - Double thickness blades: 1.2 mm.
- Aluminium:
  - Single thickness blades: 2.4 mm.
  - Double thickness blades: 1.8 mm.

Maximum length: 1200 mm. If necessary provide intermediate mullions.

Single blade dampers:

- For single thickness blades: 600 mm maximum length, 600 mm maximum width or 600 mm maximum diameter.
- For single thickness blades with 6 mm minimum edge breaks: 1200 mm maximum length x 175 mm minimum width.
- For double thickness blades: 1200 mm maximum length x 300 mm minimum width.

Multi-blade dampers:

- For single thickness blades with 6 mm minimum edge breaks: 1200 mm maximum length 175 mm minimum width.

### Bearings

Type: Oil impregnated sintered bronze bearings, sealed-for-life ball bearings or engineering plastic sleeve bearings. If the operating temperature is > 50°C, do not provide nylon.

Lubrication: Provide access for lubrication.

Housings: Rivet to damper frames.

### Spindles

Material: Stainless steel in stainless steel dampers, zinc-plated steel or stainless steel otherwise.

Construction: Securely fix to damper blades.

Minimum diameter:

- Blade lengths ≤ 600 mm: 10 mm.

- Blade lengths > 600, ≤ 1200 mm: 12 mm.

### Linkages

Fix securely to blades so that the blades rotate equally and close tightly without slip.

### Damper adjustment

Provide for adjusting the damper and locking it in position. Locate in an accessible position. Label the open and closed positions clearly and permanently.

## 2.7 SPLITTER DAMPERS

### Construction

Fabricate to AS 4254 Figure 2.3 (H) with a minimum length 1.5 times the width of the larger branch.

Limitation: Use only on supply ducts and only if duct velocity is less than 10 m/s. Provide volume control dampers otherwise.

Push rods: 5 mm diameter on 600 mm centres with screw locking bushes to fix position.

## 2.8 ACCESS OPENINGS – LOCATION

### Access doors

Provide an access door in each section of air handling units where access is required for maintenance, inspection or removal of components. Removable panels may be used instead of doors where access is required only for removal of coils.

### Access panels

Provide access panels in the following locations:

- Next to each component located inside the duct requiring regular inspection and maintenance including, but not limited to:
  - Filters.
- In air handling units where unit size is insufficient to fit an access door.
- In other locations specified and/or shown on the drawings.

## 2.9 ACCESS PANELS

### Sizes

Access panels: Minimum clear opening:

- Personnel access: 450 x 600 mm.
- Hand access: 200 x 300 mm.

### Construction

Type: Double panel, deep formed, zinc-coated steel construction, insulated to match the duct, or filled with at least 25 mm mineral wool insulation.

Cold bridging: Arrange to prevent condensation on cold surfaces.

Frames: Provide rigid matching galvanized steel frames securely attached to the duct. Do not protrude any part of the panel or frame into the airstream.

Seals: Silicone rubber or soft neoprene gaskets mechanically fixed to either the panel or the frame to ensure an airtight seal against the operating pressure when latched in the closed position. For fire rated seals, provide woven ceramic fibre material.

Latches: Wedge type sash latches.

Number of latches:

- For personnel access: 4.
- For hand access: 2.

Handles: Provide a “D” handle on access panels for personnel access.

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### 3 EXECUTION

#### 3.1 DUCTWORK INSTALLATION

##### Arrangement

Provide stream splitter dampers at each branch duct. Some duct transformations (offsets, transitions, sets up and down) not shown on the drawings shall be determined and installed by the mechanical trade.

Provide butterfly dampers at each flexible duct spigot and OBD's at grilles where not controlled by spigot dampers.

All ducts bends and tees shown shall be fitted with turning vanes or alternatively replaced with radius bends and tees.

All flexible duct connections shall not be shorter than 1.2 metre and longer than 5 metres including any rigid duct or sleeves used to join lengths of flexible duct. Flexible ducts should not be kinked or have excessively bends, particularly near diffusers/grilles. Ensure there are no protrusions inside the duct that could generate noise.

Arrange ductwork neatly. Provide access to ductwork components which require inspection, entry, maintenance and repairs. Where possible arrange duct runs adjacent and parallel to each other and to building elements.

Balance the air handling system using dampers on duct branches, with dampers at diffusers and grilles being used for minor adjustments of air volumes. Where excessive noise levels are due to noise generated at dampers near diffusers/grilles, the branch dampers shall be readjusted to eliminate excessive dampering.

##### Spacing

Provide minimum clear spacing, additional to duct insulation, as follows:

- 25 mm between adjacent ducts.
- 25 mm between duct flanges or upper surfaces of ducts and undersides of beams and slabs.
- 50 mm between ducts and electric cables.
- 150 mm between ducts and ground, below suspended floors.

### **Flexible duct**

General: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than AS 4254 clause 2.8.5 (h).

Joints: Securely fix flexible duct to rigid spigots and sleeves using sealant and draw band encased with duct sealing tape.

Joints between flexible ducts: Join lengths of flexible duct only for the purpose of providing an air tight or acoustic sleeve at a partition.

Support: To AS 4254. Limit sag to < 40 mm/m.

Maximum length of flexible duct sections: 6 metres including any rigid duct or sleeves used to join lengths of flexible duct.

Flexible ducts used for air containing free moisture: Locate supporting helix outside airstream.

### **Cleaning**

During installation progressively remove construction debris and foreign material from inside ducts.

### **Drainage**

Provide drainage to AS/NZS 3666.1 at locations in ductwork where moisture may accumulate including at outside air intakes.

## E DUCTWORK INSULATION

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide insulation of ductwork and related items as shown on the drawings.

##### Alternative insulation methods and materials

General: Do not submit alternatives for materials or methods that have lesser quality or characteristics in terms of the following:

- Performance.
- R value.
- Durability during and after installation.
- Corrosion resistance.
- Cold bridging.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

#### 1.3 STANDARDS

##### General

Ductwork insulation: To AS 4254.

##### Installation of mineral wool insulation

Comply with the AMWU/CFMEU/CEPU/ICANZ Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation.

Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

#### 1.4 INTERPRETATIONS

##### Definitions

For the purposes of this worksection the definitions given below apply.

- Mineral wool (including glasswool and rockwool): Entangled mat of fibrous non-crystalline material derived from inorganic oxides or minerals, rock, slag or glass, processed at high temperatures from a molten state.

- Polyester: Insulation manufactured from thermally bonded polyester fibres.
- R value: The thermal resistance ( $\text{m}^2\text{K/W}$ ) of a component calculated by dividing its thickness by its thermal conductivity. R value does not include air space or surface resistances.

## 1.5 SUBMISSIONS

### Fire hazard properties

General: Submit evidence of conformance with the following:

- Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:
  - Spread of flame index: 0.
  - Smoke developed index:  $\leq 3$ .
- Facing materials when tested to AS 1530.2: Flammability index:  $\leq 5$ .
- Assembled duct systems: Pass the UL 181 burning test.

### Samples

Samples: Submit samples of the following:

- Each type of insulation, applied to a sample section of ductwork.

## 2 PRODUCTS

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### 2.1 INSULATION MATERIALS

#### Insulation material type

General: Choose from the following:

- Mineral wool (including glass fibre).
- Polyester.
- Polyolefin foam.

#### Fire hazard properties

General: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index:  $\leq 0$ .
- Smoke developed index:  $\leq 3$ .

Facing materials:

- Flammability index:  $< 5$ .

#### Insulation properties

Type: In batt, board or blanket form.

Mineral wool: To AS/NZS 4859.1.

Polyester: Thermally bonded polyester fibres.

Polyolefin: Closed cell cross-linked polyolefin foam produced using non-CFC blowing agent.

Flexible type: Blanket form.

### Insulation thicknesses

To comply with BCA , section J.

### Semi-rigid insulation

General: Physical properties:

- Alkalinity: pH 7 – 9.
- Moisture absorption: Non-hygroscopic.

Type: Batt or board form with a maximum mean deflection of 6 mm for 50 mm thick material and 20 mm for 25 mm thick material, tested as follows:

- Freely support a 900 x 1500 mm test piece on its longer sides.
- Allow the test piece to stand for 10 minutes and measure the vertical deflection.
- Turn the test piece over and repeat the test.
- Average the results.

### Minimum absorption coefficients table

Insulation	Absorption coefficients (nominal) to AS 1045 at					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Perforated foil faced: • R 0.9 to AS 4508	0.12	0.48	0.84	0.96	0.97	0.94
• R 1.5 to AS 4508	0.23	0.62	1.00	1.07	1.12	0.78

### Adhesives

Type: Suitable for bonding facing to the insulation. Apply in an even coat.

Fire hazard properties:

- Smoke developed index: 0.

### Aluminium foil laminate sheet

Physical characteristics:

- Tensile strength (minimum) to ASTM D828 or AS/NZS 1301.404s.
  - Machine direction: 14.5 kN/m.
  - Lateral direction: 9.8 kN/m.

### Aluminium foil laminate tape

Physical properties: To SMACNA Fibrous Glass Duct Construction Standards.



### 3. TECHNICAL SPECIFICATION

See AS 4426 Table C1 for permeance values and Table C2 for guidance to life/duty classification as a function of vapour pressure and permeance.

Adhesive: Non toxic, high tack synthetic pressure sensitive type.

Liner: Silicone coated paper.

Backing: Aluminium foil laminate.

Physical properties:

- Tensile strength: 4.8 kN/m (average minimum).
- Shear adhesion: To SMACNA Fibrous Glass Duct Construction Standards Table 3.2.
- Peel adhesion at 180°: 0.68 kN/m (average minimum).

Water vapour permeance to AS 1301.419s Condition B, or ASTM E96 Procedure E:

- Creased:  $\leq 2.26$  ng/N.s.
- Uncreased:  $\leq 1.13$  ng/N.s.

#### Elastomeric foam insulation

Material: Chemically blown closed cell nitrile rubber in sheets or rolls. Provide with a smooth natural finish and vapour barrier properties.

Standard: To ASTM C534.

Physical properties:

- Thermal performance: As for the attached duct.
- Moisture absorption: Non-hygroscopic.
- Water vapour permeability:  $\leq 0.065$  ng/Pa.m.s.

Adhesives: Adhesive fix and seal exterior joints. Use only solvent-based adhesive supplied by insulation manufacturer and designed specifically for the material being used.

Protection: Metal sheath insulation where:

- Exposed to sunlight.
- Subject to mechanical damage.

Alternative protection: Where exposed to sunlight but not exposed to mechanical damage, provide 2 coats of tintable, water-based, rubberised, UV resistant, flexible paint finish to outdoor installations.

#### Minimum elastomeric foam absorption coefficients table

Insulation	Absorption coefficients (nominal) to AS 1045 at				
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz
Elastomeric foam, 20 mm thick	0.04	0.07	0.16	0.62	0.25

## 3 EXECUTION

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### 3.1 GENERAL

#### Fixing devices

Standard: To AS 4254 clause 2.7.

Speed clips: Bevel edged metal type with an area not less than that of a 25 mm circle. Secure speed clips flush to the face of the insulation.

Protection: Cover fixing pins on external insulation with foil tape where sharp pins will present a hazard to personnel. Cut off excess length of pins after insulation and speed clips have been applied.

#### Insulation overlap

General: Provide an overlap of at least 300 mm where insulation changes from the inside of the duct to the outside.

#### Insulation near moisture producing equipment

General: Where the likelihood exists of moisture accumulation inside ducts, in the vicinity of moisture producing equipment use only external insulation.

Metal sheath insulation: In plant rooms and where nominated in the **Ductwork insulation schedule**.

#### Vapour barriers

Type: Free from perforations and leaks, continuous, and sealed continuously at penetrations.

Location: Place vapour barriers on the side of the insulation that will be warm during cooling mode operation.

#### Application of tapes

Tape width:  $\geq 100$  mm.

Make sure surfaces are dry and free of dust and grease before applying tapes.

### 3.2 INTERNAL INSULATION – LAMINATE FACED

#### System description

Insulation type: Semi-rigid board or batt.

Surface facing: Factory applied perforated aluminium foil laminate.

#### Application

General: Cover parts of ducts designated to be insulated, with individual pieces of insulation for each side of the duct. Where this is not possible, butt join edges of adjacent pieces. Where multi-layers are used (round or oval ducts) stagger all joints.

#### Joins in insulation

General: Cover joints with 100 mm wide aluminium foil laminate tape, centrally located.

Longitudinal joins: Locate behind corner angles or cover strips.

### Fixing method

Select from the following:

- Corner angle and end nosing method.
- Free edge method.

Fixing pins: Provide to AS 4254 clause 2.7.1 (g).

### Corner angle and end nosing method

Corners: Overlap insulation on adjacent sides at corners. Hold insulation in position with metallic-coated steel corner angles. Fix corner angles under the turn back of the end nosing. For corner angles longer than 1600 mm provide additional fixing at 1600 mm maximum centres.

Corner angles:

- Ducts with faces < 300 mm: 25 x 25 x 0.55 mm, minimum.
- Other ducts: 40 x 40 x 0.55 mm, minimum.

End nosings: At ends of ducts, hold insulation in position with U-shaped metallic-coated steel end nosings, with edges crimped towards the surface. Rivet end nosings to ducts.

Size: 0.55 mm thick with a minimum 50 mm turn back over the insulation.

Butt joints: Square cut and butt tightly together edges of adjacent pieces of insulation. Cover with 50 x 0.55 mm metallic-coated steel strip. Rivet cover strips under corner angles or under turn-back of end nosings. For cover strips longer than 1600 mm, provide additional fixing at 1600 mm maximum centres.

Fixing pins: For ducts with faces  $\geq$  300 mm, fix the insulation at 300 mm maximum centres with at least one row per duct face.

### Free edge method

General: Use only where larger duct side is  $\leq$  300 mm.

Edges: Extend insulation proud of ductwork at each end, to provide cushion joints that fully seal during assembly.

## 3.3 EXTERNAL INSULATION – LAMINATE FACED

### System description

Insulation type: Flexible batts or blanket.

Surface facing: Factory applied aluminium foil laminate.

### Application

General: Wrap insulation around the outside of ducts, covering the parts designated to be insulated. Minimise the number of joints.

Joints: Square cut and butt together the edges of adjacent pieces of insulation.

Vapour sealing: Seal the vapour barrier at joints with 100 mm wide aluminium foil laminate tape, applied centrally over the joint. Where the insulation is impaled over pins, seal the vapour barrier by covering pins with water-based mastic vapour barrier or reinforced aluminium foil faced tape.

Flanges and joints: Maintain insulation thickness over flanges, joints and stiffeners.

Polyolefin foam insulation: Apply proprietary 120 mm wide polyolefin foam flange strips over flanges, joints and stiffeners.

### Fixing method

Materials other than polyolefin foam: Select from the following:

- Provide pins to each face of the duct as follows:
  - Horizontal ducts < 380 mm wide: Pins not required.
  - Horizontal ducts > 380, < 760 mm wide: One row of pins along centreline to side and bottom duct faces at 380 mm maximum centres.
  - Horizontal ducts ≥ 760 mm wide: Pins spaced at 380 mm maximum centres.
  - Vertical ducts < 610 mm wide: Pins not required.
  - Vertical ducts ≥ 610 mm wide: Pins spaced at 380 mm maximum centres.
- Strap and pin method: Provide 12 mm wide polypropylene strapping at maximum 600 mm intervals.
  - Horizontal ducts ≥ 600 mm wide: Hold insulation in position on the underside with fixing pins spaced at 400 mm maximum centres with at least one row per duct face.
  - Vertical ducts ≥ 600 mm wide: Provide pins to all faces at 400 mm maximum centres.

Polyolefin foam: Provide pins spaced 50 mm from all edges and spaced 200 to 300 mm apart in all directions.

## 3.4 INSULATION OF DUCTWORK ACCESSORIES

### Plenum boxes on air outlets

Insulation type: Internal insulation, with perforated aluminium foil laminate, black finish.

Minimum insulation R value: 0.4 m<sup>2</sup>.K/W.

Insulation fixing: Turn facing back over raw edges of insulation for at least 75 mm and bond the turn back to the insulation before installation. Provide fixing pins at 250 mm maximum centres with at least one pin per face. Fully bond insulation around neck with adhesive.

### Dampers

Internal: Leave clearance between insulation and edges of the splitter or manually operated damper blades.

External: For manual and motorised dampers, provide removable insulated sheet metal top hat sections to encase dampers.

### Access doors

General: Provide insulation to access doors and openings. Arrange to prevent condensation on cold surfaces.

### 3.5 INSULATION OF DUCT FLEXIBLE CONNECTIONS

#### General

General: Insulate duct flexible connections if the temperature of the air inside the duct may cause condensation on the outside of the flexible connection.

#### Method

General: If the insulation of the connecting ductwork is:

- External laminate faced on one or both sides of the flexible connection: Insulate duct flexible connection as required in the **External laminate faced** clause.
- Any other insulation system: Insulate duct flexible connection with elastomeric foam as required in the **Elastomeric foam insulation** clause.

## 4 SELECTIONS

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### 4.1 DUCTWORK INSULATION

#### Ductwork insulation

As shown on the drawings.

## **F AIR FILTERS**

### **1 GENERAL**

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#### **1.1 AIMS**

##### **Responsibilities**

General: Provide air filters.

Selections: As shown on the drawings.

#### **1.2 CROSS REFERENCES**

##### **General**

General: Conform to the *General requirements* worksection.

#### **1.3 STANDARD**

##### **Air filters**

Performance and construction: To AS 1324.1.

Microbial control: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB32.

#### **1.4 INTERPRETATIONS**

##### **Abbreviations**

General: For the purposes of this worksection the abbreviations given below apply.

DOP: Dioctylphthalate.

HEPA: High efficiency particulate arrestance.

MEPA: Medium efficiency particulate arrestance.

##### **Definitions**

General: For the purposes of this worksection the definitions given below apply.

Class: Filter class to AS 1324.1.

Type: Filter type to AS 1324.1.

#### **1.5 SUBMISSIONS**

##### **Filter type tests**

Particulate filters: For each type of filter, submit evidence of filter type tests conducted by a Registered testing authority within the past 5 years.

Standards:

- Other particulate filters: To AS 1324.2.

Filter size for test: 610 x 610 mm face dimension.

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## 2 PRODUCTS

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### 2.1 MATERIALS

#### General

Sealant performance: Resistant to air, entrained water and oil, and microbial growth.

Adhesive performance:

- Characteristics under environmental conditions: Odourless and non toxic. Non-migrating, non-evaporating and non-hardening, and resistant to microbial growth.
- Environmental conditions: Normal temperature, sustained temperatures up to 60°C, and operating air velocities.

### 2.2 COMPONENTS

#### Component sizes

General: Standardised throughout the installation as far as practicable.

#### Filters

Consistency: For filters of the same type provide filters from only one manufacturer.

#### Filter performance

Minimum performance: To AS 1668.2.

#### Metal components

Material: Stainless steel or metallic-coated steel with powder coat finish.

#### Cell frames

Design: Capable of withstanding distortion arising from the final pressure drop across the filter.

Air by-pass: Frames must stop air by-passing the filter media.

#### Holding frames

General: True and square. Provide gaskets and clamping systems which maintain an airtight seal between the frame and the filter.

Material: Stainless steel or metallic-coated steel with powder coat finish.

### 2.3 DRY MEDIA FILTERS (TYPE 1) AND VISCOUS IMPINGEMENT FILTERS (TYPE 2)

#### Filter performance rating

If filters are specified by performance rating to AS 1324.1 clause 2.1.1 conform to the following:

- ≥ 20% average efficiency when tested with AS 1324.2 Test Dust No. 1.

- $\geq 85\%$  average arrestance when tested with AS 1324.2 Test Dust No. 4.

#### **Filter media**

General: Provide filter media:

- That does not support microbial growth and is resistant to fungal and vermin attack.
- That does not shed fibres in service.

#### **Class A filters**

Construction: Provide cells in which the medium is permanently enclosed in a disposable frame.

Mounting: Mount the disposable cell in a fixed metal holding frame to the manufacturer's recommendations. Hold each cell in place with spring-loaded clips or clamps. Seal between the cell and mounting frame so no air bypasses the cell.

#### **Class B and C filters**

Construction: Provide a rigid metal frame into which the medium is installed.

Mounting: Support the medium on the mounting frame to provide even air flow. Shape pre-formed media to fit the frame. Hold the medium in place with clips, tabs or similar devices so it does not move in service.

### **2.4 MARKING**

#### **Filter**

General: Permanently and legibly mark, on a suitable section of the filter, the following:

- Filter type and class.
- Direction of airflow.
- Proprietary type, model and serial number.
- Filter performance rating to AS 1324.1.

#### **Replaceable element**

General: On the clean air side, fix the name of the supplier, proprietary type, filter type to AS 1324.1 and filter performance rating to AS 1324.1.

#### **Plant room**

General: Provide a permanent notice fixed to the wall identifying each filter and giving their design filter performance rating.

## **3 EXECUTION**

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### **3.1 INSTALLATION GENERALLY**

#### **Attachment**

General: Rigidly attach filter frames to the air handling plant casing (such as duct, or return air plenum) with a system of bolting or blind pop riveting. Locate bolts or rivets clear of the filter



element. Do not fix to the casing insulation. Ensure that the installation of the filter does not reduce its rated performance.

Access: Ensure that individual filter inspection and maintenance can be readily carried out without disturbing the filter bank.

Sealing: Ensure that there are no leaks between the filter holding frame and the casing. Seal individual filter units to each other. Seal filter connections to adjoining equipment, panelling or supporting framing. Do not use adhesive tapes for sealing.

Slide-in filter units: Do not use.

Plinth: Where possible, provide a 50 mm high plinth below the filter bank.

### **Cell frames**

Access: Install filters so that they are accessible for maintenance and do not accumulate moisture.

Sealing: Seal filter frames to the plenum or duct in which they are installed.

### **Blanking plates**

General: Close gaps where the dimensions of the filter plenum do not match those of the framing. Seal air tight to ensure no air bypasses the filters.

Plates material:  $\geq 0.8$  mm metallic-coated steel or grade 304 stainless steel sheet.

### **Additional bracing**

General: Provide stiffeners between or behind the joint of every second column along the narrowest dimension of the plenum.

Stiffeners: Fabricate from  $\geq 1.6$  mm metallic-coated steel or grade 304 stainless steel.

Maximum deflection of filter bank under operating conditions (ratio of deflection: height or width): 1:500 under maximum system final resistance.

### **Manometers**

General: Provide a manometer on each filter bank with more than one cell or handling more than 600 L/s.

Type: Minimum 75 mm diameter non-liquid, diaphragm type marked to show differential pressure across each filter bank.

Differential pressure gauge unit: Include pipework, termination and fittings necessary for correct operation and maintenance.

Indicator scale: Mark in 10 Pa divisions with full scale deflection no more than twice the maximum dirty filter condition.

Location: Outside unit casing in a readily readable location.

Marking: Mark clean and maximum dirty pressure drops on manometer scale.

### **Temporary pre-filters**

Provide sheets of filter media to protect filter banks at installation.

### **Filter banks**

General: Provide holding frames.

### **Filter access platforms**

General: Ensure that platforms and ladders do not obstruct filter access.

Standard: To AS 1657

## **3.2 CLEANING**

### **Cleaning**

General: Before start-up, ensure that the installation is free from debris and dirt, and check the integrity of the filter bank and plenum installation.

### **Temporary pre-filters**

Remove at completion of commissioning.

## **4 SELECTIONS**

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### **4.1 AIR FILTERS**

As shown on the drawings.

## **G AIR GRILLES**

### **1 GENERAL**

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#### **1.1 CROSS REFERENCES**

##### **General**

General: Conform to the *General requirements* worksection.

##### **Associated worksections**

Associated worksections: Conform to the following:

- *Ductwork.*
- *Ductwork insulation.*

#### **1.2 STANDARDS**

##### **General**

General: AS 4254.

#### **1.3 INTERPRETATIONS**

##### **Abbreviations**

VAV: Variable air volume.

##### **Definitions**

General: For the purposes of this worksection the definitions given below apply.

- Air grille: A general term referring to a grille of metal or other material fitted to the inlet or outlet end of an air duct or within walls, floors ceilings or doors.
- Diffuser: A supply air grille mounted in a ceiling or on the underside of a duct through which air is supplied and distributed within a room or interior space of a building.
- Register: A supply air grille mounted in a wall or on the side of duct.
- Grille: A grille fixed over the aperture from which air is removed from an enclosed space.
- Plenum box: A lower velocity (larger volume) duct element behind an air grille intended to allow equalisation of air flow over the air grille.
- Cushion head box: A plenum box fitted above a diffuser.

#### **1.4 SUBMISSIONS**

##### **Samples**

General: Submit a sample of each type of air grille and diffuser. Include plenum box and blanking plates as documented.

### Product data

General: Submit type test data as follows:

- Air diffusion equipment: Acoustic performance to ISO 5135, ASHRAE/ANSI 70 or ARI 890.

---

## 2 PRODUCTS

### 2.1 GENERAL

#### Manufacture

General: Provide proprietary grilles as follows:

- Free from distortion, bends, surface defects, irregular joints, exposed fastenings and operation vibration.
- Mounted with secure and concealed fixings.
- With flanges lining corners neatly mitred, butted and buffed, with no joint gaps.

Material: Steel or aluminium.

Finish:

- Exposed surfaces: Powder coated.
- Visible internal elements: Matt black.

Fixings: Provide concealed fixings which allow removal without damage to surrounds or grilles.

#### Volume control dampers

Dampers attached to grilles and diffusers: Provide dampers adjustable through the grille faces. Paint dampers matt black if visible through grilles.

### 2.2 AIR GRILLE TYPES

#### Square ceiling thermal diffusers

General: Provide either:

- Multi-bladed, removable core 4-way blow configuration, fitted with a blanking plate for 1-, 2-, or 3-way blow, as appropriate.
- Multi-bladed, removable core 1-, 2-, 3- or 4-way blow configuration.

The diffusers shall be the same CMP-T model ceiling diffuser, manufactured by 'Holyoake' or equivalent. The diffusers are to be able to supply a vertical stream of air when the air-conditioning system is in heating mode. The vertical stream is supplied through a central core which is controlled by a thermally actuated damper. The damper will be closed with supply air temperature below 24°C and open with supply air temperature above 28°C.

The diffuser is constructed out of aluminium. The central thermally actuated damper is permanently fixed to the diffuser core.

Reducer necks: If the outlet neck is smaller than the outlet necessary to suit the louvre face size, provide a reducer neck.

Frame: Provide a frame style to suit the ceiling system.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **Dampers on diffusers and grilles attached to flexible duct**.

### **Weatherproof louvre grilles**

Construction: Extruded aluminium with fixed horizontal blades set into a fixed frame.

Louvre blades: Set at nominal 45° angle and incorporating at least one hooked edge to prevent ingress of water under all operating conditions. Brace and stiffen to prevent rattling or movement.

Frame: Flanged or channel to suit the installation profile.

Pressure drop:  $\leq 15$  Pa at the documented air flow.

Screens: Provide metallic-coated steel wire or UPVC mesh screens behind louvres to prevent the entry of vermin, birds, rodents and wind blown extraneous material such as leaves and papers.

### **Egg crate return or exhaust grilles**

Construction: Nominal 12 x 12 mm square, 12 mm deep egg crate type aluminium core fixed in an extruded aluminium frame with mitred corners. Fit core tightly into the frame to prevent rattling or movement.

Free Area:  $\geq 90\%$  of nominal face area.

Damper: Provide an opposed blade damper behind the grille core, key operated without removing the grille core.

---

## **3 EXECUTION**

### **3.1 INSTALLATION OF AIR GRILLES**

#### **Protection**

Wrapping: Leave protective wrappings in place until final mounting.

#### **Mounting**

General: Provide a matching escutcheon to close gaps between the grille and its surrounds. Provide grilles with flanges to cover penetrations and irregularities in surrounds.

Tiled ceilings: Locate grilles and diffusers to minimise cut tiles. Otherwise, locate grille symmetrically in the tile.

Appearance: Install square.

#### **Dampers on diffusers and grilles attached to flexible duct**

In tiled and accessible ceilings: Provide a butterfly type balancing damper with external quadrant and locking screw at the spigot take-off from the rigid duct.

If the spigot at rigid duct is not accessible through ceiling: Provide an opposed blade type damper behind the face of the grille or diffuser with adjustment accessible from the face side.

### Fixing

Visibility: Provide concealed fixings.

Accessibility: Provide fixings which allow removal without damage to surrounds or outlets.

Gaskets: Provide foam type gaskets under outlet flanges or flanged supports.

### Plenum and cushion head boxes

General: Provide side entry plenum or cushion head boxes to diffusers and grilles connected to flexible ductwork.

Design: To achieve even air flow across the face of the diffuser or grille.

Material: Prime quality lockforming galvanized steel, to AS 1397 Grade G2 or G3 with Z275 coating.

Insulation: Conform to the **Insulation of ductwork accessories** clause in the *Ductwork insulation* worksection.

Painting: Paint interior of plenum box matt black if visible through grilles.

Flexible duct connections: Provide round or oval spigots on plenum boxes.

Support of plenum boxes: For louvre ceiling and slot diffusers support the plenum from above independently of the ceiling.

## H ELECTRICAL

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide complete electrical installations.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

### 2 LOW VOLTAGE POWER SYSTEMS

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#### 2.1 GENERAL

##### Standards

General: To AS/NZS 3000 and the recommendations of SAA HB301.

Fire and mechanical performance classification: To AS/NZS 3013.

Selection of cables: To AS/NZS 3008.1.1.

Distribution cables: To AS/NZS 4961.

Testing:

- Standard: To AS/NZS 3017.

##### Submissions

Technical data: Submit the following information for each submain and subcircuit for which calculation is the responsibility of the contractor.

- Single line diagram.
- Fault Levels at switchboards.
- Maximum demand calculations.
- Cable and conductor cross sectional area and insulation type.
- Cable operating temperature at design load conditions.
- Voltage drop calculations at design load conditions.
- Protective device characteristics, e.g. curves,  $I^2t$ .
- Discrimination and grading of protective devices.

- Prospective short circuit current automatic disconnection times.
- Final subcircuits may be treated as typical for common route lengths, loads and cable sizes.
- Earth fault loop impedance for testing and verification.
- Certify compliance with AS/NZS 3000 clause 1.8, for electrical services.

## 2.2 PRODUCTS

### Wiring systems

Selection: Provide wiring systems appropriate to the installation conditions and the function of the load.

### Power cables

Standard:

- PVC and XLPE cables: To AS/NZS 5000.1.

Cable: Use multi-stranded copper cable generally.

Minimum size:

- Power sub-circuits: 2.5 mm<sup>2</sup>.
- Sub-mains: 6 mm<sup>2</sup>.

Voltage drop: Install final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables selected to satisfy the requirements for automatic disconnection under short circuit and earth fault/touch voltage conditions.

## 2.3 EXECUTION

### Power cables

Handling cables: Report damage to cable insulation, serving or sheathing.

Stress: Ensure that installation methods do not exceed the cable's pulling tension. Use cable rollers for cable installed on tray/ladders or in underground enclosures.

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes.

Extra-low voltage circuits: Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking: Identify the origin of all wiring by means of legible indelible marking.

Cable systems: Provide the following:

- Cast concrete slabs: Unsheathed cable in heavy duty UPVC conduit.



- Accessible spaces: Thermoplastic insulated and sheathed cables.
- Concealed spaces: Unsheathed cable in UPVC conduit.
- Plant rooms: Unsheathed cable in heavy duty UPVC conduit.
- Plastered or rendered surfaces: Cable in UPVC conduit.
- Stud walls without bulk insulation: Thermoplastic insulated and sheathed cables.
- Stud walls with bulk insulation: Cable in UPVC conduit.
- Walls filled with thermal insulation: cables in PVC conduit.

#### **Fire-rated (other than MIMS)**

Protection: If exposed to mechanical damage, provide protection to AS/NZS 3013.

#### **Copper conductor terminations**

Within assemblies and equipment: Loom and tie together conductors from within the same cable or conduit from the terminal block to the point of cable sheath or conduit termination. Neatly bend each conductor to enter directly into the terminal tunnel or terminal stud section, allowing sufficient slack for easy disconnection and reconnection.

Alternative: Run cables in UPVC cable duct with fitted cover.

Identification: Provide durable numbered ferrules or other approved labels fitted to each core, and permanently marked with numbers, letters or both to suit the connection diagrams.

Spare cores: Identify spare cores and terminate into spare terminals, if available. Otherwise, neatly insulate and neatly bind the spare cores to the terminated cores.

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### **3 CABLE SUPPORT AND DUCT SYSTEMS**

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#### **3.1 GENERAL**

##### **Standards**

Cable trunking systems: To AS/NZS 4296.

Conduits and fittings for electrical installations: AS/NZS 2053 Parts 1, 2, 3, 4, 5, 6, 7 and 8.

#### **3.2 PRODUCTS**

##### **Conduits**

Sizes:

- Conduits:  $\geq 20$  mm.

##### **Non-metallic conduits and fittings**

Standards: Non-metallic conduits and fittings: AS/NZS 2053 Parts 2, 3, 4, 5 or 6.

Flexible conduit: Provide flexible conduit to connect with equipment and plant subjected to vibration. If necessary, provide for adjustment or ease of maintenance. Provide the minimum possible length.

Associated fittings:

- Type: The same type and material as the conduit.
- Wall boxes on UPVC conduits: For special size wall boxes not available in UPVC, provide prefabricated earthed metal boxes.

Inspection fittings: Provide inspection-type fittings only in accessible locations and where exposed to view.

Joints: Cemented or snap on joints.

### **Ducted wiring enclosures**

Ducting: Provide purpose-made ducts. Provide rigid supports. Round off sharp edges and provide bushed or proprietary cable entries into metallic ducting.

Accessories: Provide purpose-made accessories and covers to match the duct system. Provide screw-fixed covers or clip-on covers removable only with the use of tools.

Cable support: Except for horizontal runs where the covers are on top, support wiring with retaining clips at intervals of not more than 1000 mm.

## **3.3 EXECUTION**

### **Unsheathed cables – installation**

General: Provide permanently fixed enclosure systems, assembled before installing wiring. Provide draw wires to pull in conductor groups from outlet to outlet, or provide ducts with removable covers.

### **Conduit systems – installation**

Set out: If exposed to view, install conduits in parallel runs with right angle changes of direction.

Conduits in roof spaces: General: Locate below roof insulation and sarking. In accessible roof spaces, provide mechanical protection for light-duty conduits.

Inspection fittings: Locate in accessible positions.

Draw cords: Provide 5 mm<sup>2</sup> polypropylene draw cords in conduits not in use.

Draw-in boxes: Provide draw-in boxes as follows:

- Spacing: < 30 m.
- At changes of level or direction.

Underground draw-in boxes: Provide casketed covers and seal against moisture.

Expansion: Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

Rigid conduits: Provide straight long runs, smooth and free from rags, burrs and sharp edges. Set conduits to minimise the number of fittings.

Routes: Run conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations directly between points of termination, minimising the number of sets. Do not provide inspection fittings.

Conduits in concrete slabs:

- Route: Do not run in concrete toppings. Do not run within pretensioning cable zones. Cross pretensioning cable zones at right angles. Route to avoid crossovers and minimise the number of conduits in any location. Space parallel conduits  $\geq 50$  mm apart.
- Minimum cover: The greater of the conduit diameter and 20 mm.
- Fixing: Fix directly to top of the bottom layer of reinforcing.

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## 4 SWITCHBOARDS

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### 4.1 GENERAL

#### Standards

Standards: To AS/NZS 3000 and AS/NZS 3439.3.

#### Submissions

Product data: Submit the following:

- Makes, types and model numbers of items of equipment.
- Type test certificates for components, functional units and assemblies including internal arcing-fault tests and factory test data
- Overall dimensions.
- Fault level.
- IP rating.
- Rated current of components.
- Number of poles and spare capacity.
- Mounting details.
- Door swings.
- Paint colours and finishes.
- Access details.
- Schedule of labels.

### 4.2 PRODUCTS

#### General

Doors: Provide lockable doors with a circuit card holder unless enclosed in cupboards or in an area which is not readily accessible to the public.

IP rating: IP51 minimum.

Weatherproof: IP56 minimum.

Supporting structure: Wall mounted for proprietary switchboards.

Floor mounted: Assemblies  $> 2 \text{ m}^2$ .

Ventilation: General: Required to maintain design operating temperatures at full load.

## 4.3 EXECUTION

### General

Cable entries: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Provide the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Cable enclosures: Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire rating of the cable are maintained.

Cable supports: Support or tie mains and submains cables within 200 mm of terminations. Provide cable supports suitable for stresses resulting from short circuit conditions.

### Maintenance

Standard: To AS 2467.

## 5 SWITCHBOARD COMPONENTS

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### 5.1 PRODUCTS

#### General

Selection: To comply with the requirements of AS/NZS 3000 clause 1.9 and Section 2.

Rated duty: Uninterrupted in non-ventilated enclosure.

Rated making capacity:  $\geq$  fault level at assembly incoming terminals.

Rated breaking capacity:  $\geq$  rated full load current.

Utilisation category: To AS/NZS 60947.1 clause 4.4.

Circuits consisting of motors or other highly inductive loads: At least AC-23.

Other circuits: At least AC-22.

Coordination: Provide protective devices which fully grade and coordinate for short circuit current, over-current, let through energy and earth faults.

#### Switch-isolator units

Standard: To AS/NZS 60947.1 and AS/NZS 3947.3.

Poles: 3.

Operation: Independent manual operation including positive ON/OFF indicator.

Shrouding: Effective over range of switch positions.

#### Moulded case and miniature circuit breakers

Moulded case breakers: To AS/NZS 60947.1 and AS/NZS 3947.2.

Miniature circuit breakers: To AS/NZS 60898.1 or AS 3111.

Operation: Independent manual operation including positive ON/OFF indicator.

Mounting: Mount circuit breakers so that the ON/OFF and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit breaker in the same plane.

Utilisation category:

- Final subcircuits category: Category A.
- Mains and submains: Category B.

Trip settings: Set as documented, seal, and label.

Trip units: Connect circuit breakers with interchangeable and integrally fused trip units so that trip units are not live when circuit breaker contacts are open.

### **Fuses with enclosed fuse links**

Standards: To AS/NZS 60269.1, AS/NZS 60269.2.0 and AS/NZS 60269.2.1.

Fuse links: Enclosed, high rupturing capacity type mounted in a fuse carrier.

Breaking range and utilisation category:

- Distribution/general purpose: gG.
- Motors: gM.

Fuse-holders: Mount fuse-holders so that fuse carriers may be withdrawn directly towards the operator and away from live parts. Provide fixed insulation which shrouds live metal when the fuse carrier is withdrawn.

Barriers: Provide barriers on both sides of each fuse link, preventing inadvertent electrical contact between phases by the insertion of screwdriver.

Spare fuse links: Provide 3 spare fuse links for each rating of fuse link on each assembly. Mount spares on clips within the spares cabinet.

Spare fuse holder carriers: Provide 3 spare fuse holder carriers for each size of fuse holder carriers on each assembly. Mount spares on clips within the spares cabinet.

Busbar mounted fuse holders: Provide fuse carriers with retaining clips, minimum fuse holder 32 A.

### **Instruments and meters**

Mounting: Flush mount meters on hinged panels.

Hours-run meters: 6 figure (minimum), horizontal linear digits dial with last digit read-out in 0.1 hour increments.

### **Contactors**

Standard: To AS/NZS 60947.4.1.

Type: Enclosed, block type, air break, electro-magnetic.

Poles: 3.

Rated operational current: The greater of:

- Full load current of the load controlled.
- $\geq 16$  A.

Mechanical durability: 10 million cycles to AS/NZS 60947.4.1.

Electric durability:  $\geq 1$  million operations at AC-22 to AS/NZS 60947.4.1.

Mounting: Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

Auxiliary contacts: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 A at 230 V a.c., utilisation category: AC-1.

Slave relay: If the number of auxiliary contacts exceeds the number which can be accommodated, provide separate slave relays.

### Control devices and switching elements

Standards: To AS/NZS 60947.1 and AS/NZS 60947.5.1.

Switching elements:

- Electrical emergency stop device with mechanical latching function: To AS/NZS 60947.5.4.
- Electromechanical control circuit devices: To AS/NZS 60947.5.1.

Rotary switches: Cam operated type with switch positions arranged with displacement of 60°.

Off position: Locate at the 12 o'clock position. Test positions must spring return to off position.

Rated operational current: At least 6 A at 230 V a.c.

Escutcheon plates: Provide rectangular plates securely fixed to the assembly panel. Identify switch position and function.

Time switches:

- Operation: 365 day operation.
- Mains failure operation: 100 hour minimum operating capacity.
- Contact rating:  $\geq 16$  A at 230 V a.c.
- Construction: Provide readily accessible means of adjustment. Provide operational settings which are clearly visible when switch cover is fitted.
- Dial: Digital with hour and minute display.

Control relays:

- Standards: To AS/NZS 60947.5.1.
- Operation: Suitable for continuous operation. Provide relays selected in conformance with the **Control relay selection table**.
- Construction: Plug-in types. Receptacle bases with captive clips which can be operated without using tools.
- Contact elements: Electrically separate, double break with silver alloy, non-welding contacts.

- Configuration: For standard relays, provide assemblies with  $\geq 2$  sets of contacts and expandable to 8 sets of contacts in the same assembly. Provide at least one normally-open and one normally-closed contact.
- On site conversion: Provide contact blocks readily convertible to either normally-open or normally-closed contacts.

#### Control relay selection table

Relay type	Minimum mechanical life (million operations)	Base	Minimum contact rating	Inter-changeable	Minimum number of contact elements
1	5	Plug-in	$1.25I_L$	Yes	2
2	10	Plug-in	5 A at 240 V	Yes	2
3	10	Fixed mounting	5 A at 240 V	Yes	4

Push-buttons:

- Type: Oil-tight, minimum 22 mm diameter, or 22 x 22 mm.
- Rated operational current: At least 4 A at 240 V a.c.
- Emergency stop devices with mechanical latching: To AS/NZS 3947.5.5.
- Marking: Identify functions of each push-button. For latched STOP or EMERGENCY STOP push-buttons, provide label with instructions for releasing latches.

#### Indicator lights

Standard: To AS 60947.5.1.

Incandescent indicators: Incandescent oil tight type minimum 22 mm diameter or 22 x 22 mm.

Lamps: Changeable from front of panel without removing the holder.

Lamp rating: 1.2 – 5 W.

Neon indicators: 240 V, 12 mm diameter with in-built resistor.

LED indicators: 12 or 24 V as necessary, in corrosion-resistant bezel, nominal 5 mm diameter.

Press-to-test:

- Compartments/subsections with  $< 5$  indicating lights: Provide each indicating light with a fitted integral press-to-test lamp actuator.
- Compartments/subsections with  $\geq 5$  indicating lights: Provide a common press-to-test lamp push-button.

## 5.2 EXECUTION

#### Marking and labelling

General: Provide labels including control and circuit equipment ratings, functional units, notices for operational and maintenance personnel, incoming and outgoing circuit rating, sizes and origin of supply and kW ratings of motor starters.

## 6 MOTOR STARTERS

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### 6.1 PRODUCTS

#### General

Standard: To AS/NZS 3947.1.

Electromechanical motor starters: To AS/NZS 60947.4.1.

Semiconductor motor starters: To AS/NZS 60947.4.2.

Selection: Provide motor starters selected according to:

- Electricity distributor limitations for starting currents and voltage flicker.
- Torque requirements for the motor load.
- Heating effects on the motor.
- Voltage drop during start due to starting currents.
- Time required to accelerate from rest to full speed.
- Number of starts per hour.

Performance:

- Rated operational current: The full load current of the load controlled.
- Rated duty: Intermittent class 12.
- Utilisation category: AC-3.
- Mechanical durability: 3 million cycles to AS/NZS 60947.4.1.
- Electric durability:  $\geq 1$  million operations at AC-3 to AS/NZS 60947.4.1.
- Mounting: Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.
- Auxiliary contacts: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 A at 230 V a.c., utilisation category: AC-1.
- Slave relay: If the number of auxiliary contacts exceeds the number which can be accommodated, provide separate slave relays.

#### Direct-on-line starters

Type: Direct-switching electromagnetic contactor.

Overload protection: Thermal overload unit giving overload protection in each phase of supply.

#### Motor protection

General: Provide over-current protection as part of the equipment assembly for each motor starter.



Mounting: Ensure relays are not affected by the shock of mechanical contactor operation. Provide sufficient clear space for the disconnection, removal and replacement of heaters, without disconnecting other equipment and wiring.

Reset: Manual.

3-phase operation: Provide triple pole relays with differential trip bar operation for single phase protection, and ambient temperature compensation.

Single phase motor protection: Comply with **Thermal overload protection relays** and provide overload units matching the motor heating curve characteristics.

3-phase motor protection: Provide thermal overload protection relays for each motor, or select one of the following:

- Thermistor overload relay with thermal overload relay.
- Electronic motor protection relay.
- Programmable electronic motor protection relay.

# I AUTOMATIC CONTROLS

## 1 GENERAL

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### 1.1 AIMS

#### Responsibilities

General: Provide automatic control systems to perform the documented control functions.

### 1.2 CROSS REFERENCES

#### General

General: Conform to the *General requirements* worksection.

#### Associated worksections

Associated worksections: Conform to the following:

- *Mechanical electrical.*

### 1.3 SUBMISSIONS

#### Software

General: Submit proposed project specific software and documentation in hard copy form with fully developed plain English functional descriptions of all systems and supporting material such as point schedules and set points. Provide manuals and other explanatory material needed to interpret the descriptions if requested.

Simulation: Demonstrate by software simulation that the project specific software achieves the required functions using simulated inputs and outputs.

#### Product data

Submit:

- Data sheets for each hardware component.

## 2 PRODUCTS

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### 2.1 CONTROL COMPONENTS

#### General

Requirements: Provide sensors and controls components that are:

- Of corrosion resistant construction.
- Suitable for the respective operating environment.

- Not affected by the accumulation of dust or moisture, extraneous influences or variation in supply voltage from nominal value.
- Selected for a response time appropriate to the application.
- Provided with tunnel type screw terminals for cable connection.

### Software

Inclusions: As part of the automatic control installation provide:

- Software to perform the required project specific functions.
- Facilities to alter time schedules, set points and manually override control functions.
- Diagnostic routines within the controller to continuously monitor for faults and to raise alarms.
- Time scheduling including provision for weekends, holidays and automatic adjustment to daylight saving times.
- Control algorithms for standard control functions to meet the functional specification including proportional-integral-derivative (PID) loops and calculate psychrometric properties.

## 2.2 CONTROLLERS

### General

Type: Modular and expandable electronic controllers either application specific or universal type programmed for the required functions. Mount controllers within the mechanical control switchboard.

Memory: Hold programs and set points in non-volatile memory or provide > 30 day battery backup of memory.

Programming: Provide for programming through attached laptop computer. Provide for upload and download of programs and logged data.

Display: Provide backlit alphanumeric liquid crystal display (LCD) for sensed values, faults and the like.

Operator interface: In addition to the laptop computer interface provide the controller with keyboard or push buttons operating through a menu system to permit password limited access to change set points, time schedules and manually override control functions.

Connections: Provide connections for the following:

- External modem.
- Laptop computer.
- Each external input or output point.

## 2.3 SENSORS

### General

Performance: Provide tamperproof sensors that are stable and accurate over time and require maintenance or re-calibration at  $\geq 12$  month intervals.

Sensor locations: Locate sensors so they are protected from extraneous influences and easily accessible for calibration and maintenance.

### Construction

Room sensors: House sensors in an ABS or polycarbonate case ventilated to the room air and thermally insulated from the wall.

Duct mounted sensors: Position sensor > 100 mm into air stream. Provide an ABS or polycarbonate case designed specifically for duct mounting. Screw sensor to duct wall. Provide manufacturer's spacer, if necessary, on insulated ducts.

Pipe mounted sensors: Mount sensor in stainless steel tube and insert into thermometer pockets or test plug fittings in pipework. Provide a thermometer pocket or test plug fitting adjacent to each sensor for calibration purposes. Provide sensor with a metal, ABS or polycarbonate case. Protect against internal condensation.

Vermin: Protect sensors exposed to the building exterior from the entry of insects.

### Accuracy

Temperature sensors: Within  $\pm 0.3^{\circ}\text{C}$  over the temperature range required for the project application.

Humidity sensors: Within  $\pm 5\%$  over the range 10 – 90% relative humidity.

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## 3 EXECUTION

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### 3.1 GENERAL

#### General

Automatic control cabling: Conform to *Mechanical electrical*.

Control panels: Conform to *Mechanical electrical*.

### 3.2 AUTOMATIC CONTROL FUNCTIONS

#### General

General: Provide an automatic control installation to perform the specified functions.

#### Operation hours

All equipment shall operate during business hours, however each fan coil unit might be switched on independently after hours if required.

#### Starting and stopping of the air conditioning system

Each fan coil unit is controlled by a wired remote controller located as shown on the drawings.

Provide interface cards to FCU-1, FCU-2 and FCU-3 to allow the activation of the outside air fan OAF-1. OAF-1 will be interlocked with FCU-1, FCU-2 and FCU-3 systems.

After hour operation of fan coil units is to be activated by individual remote controllers.

### 3.3 ELECTRIC CONTROL

#### Wired remote controllers

Provide wired remote controllers with in-built temperature sensors which can be enabled or disabled by a dip switch.

Main functions:

- Start/Stop.
- Setting temperature.
- Selecting fan speed.
- Programming by timer a time for operation start and stop within 72 hours.
- Monitoring room temperature, pre-setting temperature and selecting cool/heat operation mode (automatically for heat recovery system).
- Monitoring malfunctions in the system.

#### Control relays

Provide control relays which are capable of receiving proportional low voltage d.c. control signal. The control relay shall be single pole double throw type with differential adjustment and rated at 240 V AC, 1 Amp inductive minimum. The control relay shall have LED indicators to designate action of the control signal.

## J MECHANICAL COMMISSIONING

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide commissioning of all mechanical systems.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

##### Associated worksections

Associated worksections: Conform to the following:

- *Mechanical piping.*

#### 1.3 STANDARDS

##### General

Measurement of fan and duct air quantities > 1000 L/s: To ISO 5802.

Testing, balancing and commissioning except fan and duct air quantity measurement: To ASHRAE Standard 111 or CIBSE Commissioning Codes A, B, C, R and W.

Statistical analysis: To ASHRAE Guideline 2 (RA 96) – Engineering Analysis of Experimental Data.

Orifice plates and venturi meters: To BS 1042.

Microbial control: To AS/NZS 3666.1.

#### 1.4 INTERPRETATIONS

##### Definitions

General: For the purposes of this worksection the definitions given below apply.

- Accuracy: The closeness of the agreement between the result of a measurement and the true value of the particular quantity being measured.
- Error: The measured value minus the true value of the particular quantity being measured.
- Resolution: The smallest difference between indications of a displaying device that can be meaningfully distinguished.

## 1.5 INDEPENDENT CERTIFICATION OF COMMISSIONING AGENT

### General

Use only a Registered testing authority.

## 1.6 COMPLETION PROGRAM

### General

Submissions: Provide a program consistent with, and forming part of, the construction program. Set out the proposed program for completion, commissioning, testing and instruction. Identify related works and timing of the works pre-requisite to successful and timely completion of the works.

Revisions: Revise the program as the project proceeds.

Running in period: Include time in the program for the running period prior to Practical Completion.

## 1.7 RELATED TESTS

### Retesting

General: Failure to meet specified performance under test: Identify and correct cause of failure and repeat test.

### Statutory authorities

General: Provide demonstrations and tests for witnessing by the statutory authorities. Complete testing of systems before witness testing by the statutory authorities.

### Other trades

General: Provide assistance to other trades for testing related non-mechanical systems.

## 2 EXECUTION

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### 2.1 COMMISSIONING

#### General

General: When the installation is complete, commission the installation. Make the adjustments necessary to achieve the designated performance under continuous operating service conditions, including balancing, setting the controls, checking the operation of overload and safety devices, and correcting malfunctions.

#### Reports

General: Submit reports indicating observations and results of tests and compliance or non-compliance with requirements.

#### Notice

General: Give sufficient notice for inspection to be made of the commissioning of the installation.

### Starting up

General: Coordinate schedules for starting up of various systems and equipment. Give 5 working days notice before starting up each item.

Checks: Before starting, verify that each piece of equipment has been checked for proper lubrication, drive rotation, belt tension, control sequence, circuit protection or for other conditions which may cause damage.

Tests: Verify that tests, meter readings, and specified electrical characteristics agree with those required by the manufacturer.

Wiring: Verify wiring and support components for equipment are complete and tested.

Manufacturers' representatives: Have authorised manufacturers' representatives present on site to inspect, check, and approve equipment or system installation before starting up, and to supervise placing equipment and operation.

Starting up: Execute starting up under supervision of manufacturers' representative and appropriate contractors' personnel, in accordance with manufacturers' instructions.

Report: Submit a report demonstrating that equipment has been properly installed and is functioning correctly.

## 2.2 RECOMMISSIONING

### General

Recommissioning: The partial or full repeat of the work specified as commissioning but conducted after the system has been completed during or after the maintenance period.

### Recommissioning frequency

General: Annual.

### Recommissioning instructions

General: Provide the following in the mechanical maintenance manuals in addition to that specified in the *General requirements* worksection:

- Instructions for recommissioning the system.
- Recommended tasks to be conducted when recommissioning.
- Schedules to be used for recording recommissioning data so that changes in the system over time can be identified.

## 2.3 INSTRUMENTATION

### Calibration and certification

General: Use only instruments that have been calibrated by a Registered testing authority. Provide copies of certification if requested.

Maximum period since last calibration: As recommended by manufacturer but  $\leq 12$  months, except as noted below.

### Air quantity at diffusers, outlets and grilles

Hood adjustment factors: Determine adjustment factor for each hood and associated anemometer by one of the following methods:



- Certified by a Registered testing authority for the type of diffuser or grille and direction of air flow being measured.
- Determined by duct pitot traverse for the particular type of diffuser or grille and direction of air flow being used on the project.

Instruments:

- Accuracy: Better than  $\pm 5\%$  of measured value.
- Resolution: Better than 1% of measured value.
- Range: Minimum measured velocity for instrument not more than 50% of measured velocity.

### Total system air flow

General: For systems handling over 1000 L/s measure total system air quantity to ISO 5802.

### Air pressures and differential pressures

Instrument specifications:

- Pressures  $\leq 50$  Pa: Electronic meter or inclined manometer with 50 Pa full scale, accuracy better than 5% full scale.
- Pressures  $> 50$  Pa: Electronic meter, mechanical meter or inclined manometer with full scale not more than 400% measured value, accuracy better than 2.5% full scale.

### Temperature

Air temperature instruments specifications:

- Accuracy:  $\pm 0.2$  K or better at measured value.

Chilled water and condenser water temperature instrument specification:

- Accuracy:  $\pm 0.2$  K or better at measured value.

Instrument specifications for other temperature applications:

- Accuracy:  $\pm 0.5$  K or better at measured value.
- Scale divisions (mercury-in-glass): 1.0 K or better.

### Electrical

Instrument specifications:

- Voltage  $< 600$  V ac: Accuracy  $\pm 3\%$  of full scale.
- Voltage  $< 30$  V dc: Accuracy  $\pm 3\%$  of full scale.
- Currents  $< 100$  A: Accuracy  $\pm 3\%$  of full scale.
- Maximum period between calibration: As recommended by manufacturer but not more than 6 months.

### Rotational speed

Instrument specifications:

- Accuracy:  $\pm 5\%$  of measured value.

- Maximum period between calibration: As recommended by manufacturer but not more than 24 months.

### Recording instruments

Specifications for instruments collecting measured values over time:

- Accuracy: At least equal to that specified for the corresponding physical parameter above.
- Type: Electronic data logger with appropriate sensors or thermohydrograph.

Thermohydrographs: Charge sensing element before use as recommended by the manufacturer.

## 2.4 SOUND PRESSURE LEVEL MEASUREMENTS

### Sound pressure level measurements

Internal: To AS/NZS 2107.

External: To AS 1055.1.

Sound pressure levels: Measure the A-weighted sound pressure levels and the A-weighted background sound pressure levels at the designated positions.

Sound pressure level analysis: Measure the sound pressure level and the background sound pressure level over the full range of octave band centre frequencies from 31.5 Hz to 8 kHz at the designated positions.

Correction for background noise: To AS/NZS 2107 Table B1.

Measurement positions: If a test position is designated only by reference to a room or space, do not take measurements less than 1 m from the floor, ground or walls.

## 2.5 AIR BALANCING

### General

General: Balance each air handling system.

Completion: Balancing is complete as follows:

- All air quantities are within the tolerances in **Air quantity tolerance table**.
- Each air quantity measured is within the instrument tolerance of the previous reading on the same component with the same instrument.
- Resistance across the cooling coil bank (if present) is equal to the wetted coil resistance.
- Resistance of the filter bank (if present) is equal to that of the filter when fully loaded with dirt.
- For fans with variable speed drives, the frequency to the motor is  $\leq 50$  Hz.
- At least one outlet on each branch has its damper at the minimum pressure drop position.
- At least one sub-branch damper is at the minimum pressure drop position.
- At least one branch damper is at the minimum pressure drop position.
- The fan speed or pitch angle is at the lowest value consistent with the above.

### Air quantity tolerances

General: Balance air handling systems to the designated air quantities within the tolerances in the **Air quantity tolerance table**. For the purposes of the **Air quantity tolerance table** the following definitions apply:

- Terminal: A supply, return or exhaust diffuser, grille or equivalent device discharging air into, or drawing air from, a space.
- Sub-branch: A duct connected to one or more terminals.
- Branch: A duct with no terminals connected to it.
- Total air quantity: The sum of air flows to the connected terminals, branches or sub-branches under the conditions of measurement.

### Air quantity tolerance table

System type	Terminal air quantity tolerance	Branch air quantity tolerance	Total air quantity tolerance
Low velocity supply, return or exhaust system where all terminals on any one sub-branch serve the same space	+20% -0%	+10% -0%	+10% -0%
Low velocity supply, return or exhaust system where the terminals on any one sub-branch serve more than one space	+15% -0%	+10% -0%	+10% -0%
Supply systems for induction units	+5% -0%	+5% -0%	+10% -0%

### Diversity

General: For variable air volume (VAV) and other systems where the sum of the design terminal air quantities is greater than the design fan air quantity, adjust the system as follows:

- The flow rate at the terminals is within tolerance for all possible load situations.
- The fan flow is within the tolerance limits for total air quantity in the **Air quantity tolerance table**.

### Measurement methods

Total and branch air quantities > 1000 L/s: Measure to ISO 5802.

Other air quantities: Use balancing and measurement methods recommended by ASHRAE or CIBSE.

Do not use the following methods for air quantity measurement:

- Coil, damper or filter traverse using any kind of instrument.
- Measurement using an instrument operating with air flow in the reverse direction to that for which it has been certified.
- Air quantity measurement derived from fan curves or fan performance tables.

### Preparation for air balancing

General: Before starting air balancing make sure that:

- All building work that may affect the air balance is complete. Make sure that:
  - All ceiling tiles are in place.
  - All doors are hung and door grilles (if applicable) are installed.
  - All doors and windows are open or shut consistent with their normal state.
  - The building is airtight.
  - The builder's work ducts, shafts and ceiling plenums are sealed airtight.
- All ductwork complete and clean.
- There are no air leaks that can be felt. Check for leaks through doors, access panels, penetrations and joints in air handling units.
- Flexible duct is installed as specified and has not been damaged.
- All fire and balancing dampers are open.
- All interrelated air handling systems are complete and operating concurrently.
- Fans, coils filters and other mechanical components are complete and operating correctly.
- All electrical components including overloads and safety devices are complete and operating correctly.
- All other related work is complete and operating correctly.

#### **Additional adjustment of air quantities**

General: Notwithstanding that air quantities may have been measured and are within tolerance. If so directed, adjust space air quantities to:

- Minimise drafts.
- Achieve temperatures in individual rooms or parts of rooms that are within the stated design conditions.

Resubmit reports: If air quantities are altered after submission of air balance reports, resubmit reports showing new values.

#### **On completion of air balancing**

General: When air balancing is complete:

- Mark final position of dampers.
- Seal test holes in ductwork.
  - Duct pressure class  $\leq 500$ : Rubber or plastic plugs.
  - Duct pressure class  $> 500$ : Cover plates of same material as the duct.
- Set system into normal operation.
- Submit air balance reports.

## 2.6 AIR BALANCE REPORTS

### General

General: Include the following on the air balance reports:

- Date, time and place of test.
- Instrumentation used and its date of calibration.
- Name, position and signature of person responsible for test.
- Ambient temperature and/or other relevant factors.
- For each terminal grille and diffuser:
  - Grille or diffuser reference number as shown on the shop drawings. List outlets on a branch by branch basis.
  - Design air quantity.
  - Measured value (e.g. L/s, m/s).
  - Hood or instrument factor.
  - Grille or diffuser manufacturers area factor if applicable.
  - Site measured air quantity in L/s calculated from the above.
  - Measured air quantity as a percentage of design air quantity.
  - Sum of measured branch and system air quantities and percentage of design.
- For each fan:
  - Fan designation and location.
  - Total air quantity measurement method.
  - Location of measurement point.
  - Simulated wet cooling coil pressure drop and dirty filter pressure drop.
  - Design air quantity.
  - Pitot readings (if used) or other measured values used to independently determine total fan air quantity.
  - Site measured air quantity in L/s calculated from the above.
  - Measured air quantity as a percentage of design air quantity.
  - Measured air quantity as a percentage of the sum of the individual diffuser and grille air quantities.
  - Blade pitch and/or fan speed as applicable.
  - Variable speed drive frequency (if VSD is installed).
  - Measured motor current and name plate full load current.
  - Show the final operating point on the fan characteristic curve.

- Static pressure differentials across:
  - Each filter bank when clean.
  - Each cooling and heating coil.
  - Each fan.
- Duct static pressure at:
  - Entry to filters.
  - Entry to each fan.
  - At duct discharge from air handling unit.
  - At each riser connection for supply and return systems serving multiple floors.

## 2.7 AUTOMATIC CONTROLS

### General

General: Test all controls hardware and software for correct operation.

### Sensor calibration

General: Calibrate all sensors to within the specified accuracy of the sensor.

## 2.8 SAFETY CONTROLS

### Testing

General: Test each safety control and facility by simulating the unsafe condition that the control is intended to protect against.

Monitoring: Ensure that adequate monitoring and safety measures are in place for the test.

## 2.9 HANDOVER PERIOD

### General

General: Provide a handover period after the installation has passed completion tests and before Practical completion.

Handover period:  $\geq 5$  days.

Plant Operation: Operate the mechanical systems continuously during the handover period provide one or more experienced operators in constant attendance in working hours and on call at other times to monitor the plant operation and make necessary adjustments to keep it operating properly.

## 2.10 COMPLETION TESTS

### General

General: Carry out completion tests.

### Heating and airconditioning performance tests

General: In addition to balancing and commissioning, test performance of air conditioning systems during the maintenance period.

Instrumentation: Electronic data logger with temperature and humidity sensors or thermohydrograph. Conform to **Instrumentation**.

Automatic control system: If the automatic control system has been specified to have facilities for logging sensed values, provide trend logs of sensor values over the same periods.

Performance: Record dry-bulb and relative humidity at each location continuously for 2 separate periods of at least 24 hours.

Reports: Provide graphical printout of values recorded by instrument together with control system log graphs where this facility is provided.

### **Motors**

Motor-driven equipment performance tests: Test for performance. Adjust thermal overloads for actual current and record measured current and overload settings.

## **2.11 CERTIFICATION**

### **General**

Contract documents: Provide certification that the installation complies in all respects with the contract documents.

Statutory requirements: Provide certification of compliance with the relevant statutory requirements.

## K MECHANICAL MAINTENANCE

### 1 GENERAL

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#### 1.1 AIMS

##### Responsibilities

General: Provide comprehensive maintenance of the mechanical systems.

Selections: As documented.

Maintenance period: The greater of 12 months from the date of completion of commissioning of the systems and the duration of the Defects Liability Period.

The Defects Liability Period is normally specified in the general conditions of contract and dealt with in *Preliminaries*. Do not repeat it here.

The figure of 12 months is intended to ensure that the maintenance is provided over all operating seasons. If the Defects Liability Period is 6 months, for example, the systems might never operate in full heating or cooling mode.

#### 1.2 CROSS REFERENCES

##### General

General: Conform to the *General requirements* worksection.

The *General requirements* worksection contains umbrella requirements for referenced documents, inspections, tests, samples, contractor's submissions, proprietary items, manufacturers' recommendations, warranties, record drawings, operation and maintenance manuals, and the like.

They need not be specified here unless you need to relocate them, for example if this is to be the specification for a package contract. In this case make sure that the interlocking contracts leave no loopholes, such as work by non-existent 'others', and have no overlaps.

##### Associated worksections

Associated worksections: Conform to the following:

*Mechanical commissioning*.

List worksections cross referenced by this worksection. (*General requirements* references the *Common requirements* worksections. Do not repeat them here.) You may also wish to direct the contractor to other worksections where there may be work that is closely associated with this work.

If using *General requirements (Mechanical)* (for example in a trade package specification) delete references to *Mechanical general requirements*. In other cases the *Mechanical general requirements* worksection should not be deleted as it contains material on which this worksection depends.

#### 1.3 STANDARD

##### General

Air handling system maintenance: Maintain to AS 1851.6.

AS 1851 Section 18 relates to maintenance of systems that come under AS/NZS 1668.1. It does however contain a range of general maintenance procedures that could be applied to non-AS/NZS 1668.1 systems.

Microbial control: Maintain to AS/NZS 3666.2 and AS/NZS 3666.3.



The AS/NZS 3666 series of standards covers microbial control. Contract documents must include adequate provisions for plant access so that its requirements can be met. This can be a problem with some types of air handling unit which do not permit adequate access to both sides of cooling coils for inspection and cleaning.

Pressure equipment:

Maintain to AS 3873.

Inspect to AS 3788.

Respiratory protective devices: Maintain to AS/NZS 1715.

## 1.4 INSPECTION

### Notice

Inspection: Give notice so that an inspection may be held simultaneously with the end of maintenance period service.

## 1.5 OPERATION AND MAINTENANCE MANUALS

Adequately prepared maintenance manuals should form the basis of any self-contained maintenance contract. See for example AS/NZS 1668.1 clause 4.15 for requirements for documentation in relation to fire mode. If the installation is complex, documentation may need to include details of testing procedure used (AS/NZS 1668.1, Appendix F).

It is important that the manuals contain provisions for performance benchmarking so that any deterioration in the system over time can be identified.

### Additional information

General: Provide operation and maintenance manuals for the whole of the mechanical work. Include the following in addition to that specified in the *General requirements* worksection:

Installation description: General description of the installation.

Systems descriptions: Technical description of the systems installed, written to ensure that the principal's staff fully understand the scope and facilities provided. Identify function, normal operating characteristics, and limiting conditions.

Systems performance: Technical description of the mode of operation of the systems installed.

Equipment descriptions:

Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.

Supplements to product data to illustrate relations of component parts. Include typed text as necessary.

Operation procedures:

Safe starting up, running-in, operating and shutting down procedures for systems installed. Include logical step-by-step sequence of instructions for each procedure.

Control sequences and flow diagrams for systems installed.

Legend for colour-coded services.

Schedules of fixed and variable equipment settings established during commissioning and maintenance.

Procedures for seasonal changeovers.

If the installation includes cooling towers, a Water efficiency management plan.

Certificates:

Copies of test certificates for the mechanical installation and equipment used in the installation.

Test and balancing reports.

All control system testing and commissioning results.

This permits calibration drift to be checked and tracked.

7 day record of all trends at commissioning.

For small systems with no trend logging provisions, omit the last item.

Instructions and schedules for complying with AS 1851.6, AS/NZS 3666.2 and AS/NZS 3666.3.

Maintenance manual requirements are specified in the *General requirements* worksection. Additional requirements specific to mechanical services and the particular project should be included here.

## 1.6 PERIODIC MAINTENANCE AND PERFORMANCE REPORT

Maintenance is often a hidden process and its success or failure may not be evident until there is a catastrophic failure or until preparatory surveys for major refurbishment reveal that plant is prematurely at the end of its economic life. One way to make maintenance less hidden is to produce regular reports on the overall performance of both the systems and their maintenance. In addition to summarising the maintenance carried out the aim of such periodic reports is to highlight environmental and energy issues for maintenance. Amend the listed requirements to suit the specific project.

### General

General: At the frequency documented, provide a report summarising the maintenance performed and the performance of the mechanical plant in the preceding period. Set out the report in a form that permits comparison with previous reports. Include the following as minimum requirements:

Dates and number of site labour hours for programmed maintenance. Exclude travelling time.

Dates, number of site labour hours and nature of work for corrective maintenance. Exclude travelling time.

Dates and number of site labour hours for defects liability rectification if within the defects liability period. Exclude travelling time.

## 2 EXECUTION

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### 2.1 MAINTENANCE REQUIREMENTS

#### General

General: Provide all labour and material necessary to maintain the mechanical installation including, but not limited, to filter media, belts, refrigerants, lubricants and all items commonly referred to as consumable.

The purpose of this clause is to ensure that the plant is adequately maintained until the principal's staff have adequate information to operate it on a day to day basis.

#### Site control

General: Report to the principal's designated representative on arriving at and before leaving the site.

### 2.2 MAINTENANCE DURING CONSTRUCTION

#### General

General: During the construction period and until all maintenance and operation manuals have been completed and submitted and all operator instruction is complete, provide all maintenance including but not limited to:

Daily operation including starting and stopping of the plant.

All routine service tasks.

Emergency visits.

## 2.3 CLEANING

### General

General: Progressively clean the interior of pipework, ductwork and air handling components as they are installed. Inspect the interior of dampers and valves on installation and remove obstructions.

Immediately before the date practical completion:

Clean all parts of the installation.

Clean interior of switchboards, switchgear, contactors and other electrical contacts.

Clean interior or air handling plant.

Clean strainer baskets.

The intent of this clause is that the equipment and plant be in a clean, as new condition, fair wear and tear excepted because of commissioning. Hence air filters are specifically mentioned for attention, if commissioning has unnecessarily loaded them with dirt. This can be avoided by the use of roughing filters during commissioning.

## 2.4 CORRECTIVE MAINTENANCE

### General

General: Respond to call outs for breakdowns or other faults requiring corrective maintenance. Rectify faults and replace faulty materials and equipment.

Remedial work: Carry out any remedial work, including temporary work, necessary to restore the systems to safe and satisfactory operation. Do not leave site until correct operation has been proved. Do not leave the plant in an unsafe condition.

Temporary work: Promptly replace temporary work with permanent rectification.

Corrective maintenance is also referred to as breakdown or emergency maintenance.

### Contact details

General: Provide contact details including after hours and emergency mobile and/or pager details to permit notification of emergency conditions.

It is essential for critical installations that adequate contact details are available.

### Response time

General: Attend site for emergency service within the time period documented.

Include response time in **Maintenance requirements schedule**.

Calculation of response period: Response period starts at the time of notification to the contactors nominated contact point.

### Failure to respond

General: Should the contractor fail to respond to site within the period stated in the schedules, the principal may, without incurring any liability or obligation and without limiting any other redress, engage persons other than the contractor to undertake emergency work on the systems. Fully reimburse the principal for any costs incurred.

This clause allows the principal to engage another contractor to remedy work on the system to rectify defects if the contractor does not respond within the documented maximum time.

## 2.5 REGULAR MAINTENANCE

### General

General: Make routine service visits at the frequency documented. Service items of equipment in accordance with the maintenance schedules in the operation and maintenance manuals.

Include frequency of maintenance visits in **Maintenance requirements schedule**.

See 'Client Tool Kit for Mechanical Services Service Industry' published by AMCA. This gives the AMCA's recommended annual service hours for common mechanical plant items.

The list of maintenance tasks in this worksection is not comprehensive. Maintenance should be based on the documented procedures and schedules in the maintenance manuals. (See the *General requirements* worksection). Amend list of tasks to suit project.

#### Frequency of visits

This subclause is not included in this basic version.

### Notification of defects

General: When defects in the installation are identified notify the principal in writing.

See AS/NZS 3666.2 clause 2.6.3.

### All systems

General: Provide maintenance work including but not limited to the following.

Attend to reported defects and complaints.

Check for and repair corrosion.

Remove rubbish and clean equipment.

Thoroughly check for and rectify any unsafe conditions.

Replace faulty or damaged parts and consumable components.

Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.

Identification of pipes, conduits and ducts: Maintain to AS 1345.

Safety signs: Maintain to AS 1319.

#### Chillers, Cooling towers and cooling water systems and Boilers and burners

These subclauses are not included in this basic version.

### Air handling systems

General: Perform the following tasks on each air handling system and ventilation system:

Maintain air handling and water systems.

Carry out Level 1, 2, 3 and 4 maintenance routines to AS 1851.6 on air handling systems that are within the scope of AS/NZS 1668.1.

Carry out maintenance required by AS/NZS 3666.2 including inspecting and, if necessary cleaning, both sides of cooling coils and condensate pans.

Check coils for fin damage and repair.

Check and clean fan impellers and blades.

Check fan balance.

Rectify air leaks including leaks in air handling units.

Check motorised damper operation and lubricate linkages.

Check that motorised dampers seal tight when closed.

Check air handling and water systems for temperature, pressure, flow and leakage. Repair all leaks.

Check penetrations and outside air intakes and exhaust outlets for foreign matter water entry and leaks. Clean where necessary.

Check condition of insulation and vapour barriers for damage and repair.

Air filters:

Frequency of servicing should conform to the requirements of AS 1324.1 clause 3.4. Refer to AS/NZS 3666.2 clause 2.3 for maintenance of filters for microbial control, and AS 1851.6 for maintenance of filters for fire and smoke control.

Maintain to AS 1324.1 Section 3.

Check air filters monthly for damage, bypassing or obstruction.

Replace filters that have reached their dirty pressure drop. If none stated take dirty pressure drop as 125 Pa.

Check zero calibration of filter pressure gauges at no air flow.

Check that electric duct heaters are not tripped.

Inspect the interior of ductwork in the vicinity of moisture producing equipment in accordance with AS/NZS 3666.2.

Air filters: Air filter service companies must comply with relevant legislation e.g. covering trade waste. While there has been a move in the industry towards disposable filters, washing of low-efficiency filters is still common. This reduces their efficiency, so in order to comply with AS/NZS 3666.1 after washing, a filter of higher minimum efficiency should be installed.

**Humidifiers, Piped systems, Tanks and piping for potable water and Water treatment**

These subclauses are not included in this basic version.

### Refrigeration systems

General: Perform the following tasks:

Check refrigeration systems for temperature, pressure including analysis of oil and refrigerant.

Check refrigerant charge by measuring and recording superheat and subcooling. Adjust charge and superheat to manufacturer's recommendations. Record amount of refrigerant added or removed.

Hermetic compressors: Analyse refrigerant gas. Determine the acid and moisture content of the gas.

Check refrigeration system controls.

Check for leaks using electronic leak detector.

Check air cooled condenser coils for fin damage, dirt or obstruction. Clean and repair.

Carry out wet system maintenance required by AS/NZS 3666.2.

Hermetic and semi-hermetic compressors: See also AS/NZS 1677.2 Section 6. Retain if required e.g. for larger compressors.

### Drives

General: Perform the following tasks:

Check drives and couplings.

Check belt drives for belt wear and tension. Replace worn or broken belts.

Check pulley alignment and re-align if out of alignment.

Check motors and machinery for excessive operating temperature, bearing noise and excessive vibration.

Lubricate equipment.

### Automatic controls

General: Perform the following tasks:

Check operation and safety controls for variable speed drives. Check and record output frequency.

Record readings of thermometers, gauges, meters, current draw of motors and heaters, sample readings, control set points and controlled space conditions.

Check sensor calibration.

Check electrical and control systems, including safety limits for temperature, pressure and humidity.

### Electrical

General: Perform the following tasks:

Check for hot joints, burnt insulation, burn contacts and the like and repair.

Check electrical connections for tightness.

Check operation of all electrical components.

Check indicating lights and replace defective lamps.

Check and record motor currents.

Check overload settings.

Check and report any changes to controls and wiring.

Standards:

Electrical equipment generally: To AS/NZS 3760.

Switchboards: To AS 2467.

Repair and overhaul of rotating electrical equipment: To AS 4307.1.

## 2.6 END OF MAINTENANCE PERIOD SERVICE

### General

The intention of this clause is to ensure that the last maintenance visit is comprehensive and includes all annual service tasks even though it may occur slightly before the time for an annual service. This will also assist in identifying defects before the defects liability period expires.

General: Within one month before the end of the maintenance period, carry out the following service tasks:

Undertake all work scheduled to be carried out on an annual basis.

Replace air filters if the resistance exceeds 80% of the 'dirty' resistance of the filter bank.

Undertake work specified in **Recommissioning**.

Drain, clean and refill cooling towers, water basins and tanks, and clean screens, strainers, distribution troughs, spray nozzles and drip trays.

Drain, dismantle, inspect and reinstate boilers and pressure vessels, to AS/NZS 3788.

Remove, clean and inspect water heads at heat exchangers. Clean and inspect heat exchanger pipes, pipe plates and water chests.

Clean moisture eliminators and heating and cooling coil surfaces.

Remove external scale and corrosion, prepare and repaint the affected surfaces.

Provide Infra-red scan of switchboards.

### RECOMMISSIONING

This clause is not included in this basic version.

## 2.7 STATUTORY CERTIFICATION

### General

Annual certification: Inspect and certify all items required to be inspected annually under statutory requirements including but not limited to air handling systems required for fire operation, boilers and pressure vessels. Submit certification to the principal.

### MAINTENANCE RECORDS

This clause is not included in this basic version.

### 3 SELECTIONS

---

#### 3.1 MAINTENANCE

##### Maintenance requirements schedule

Provision	Requirement
Call out response time not to exceed	4 Hours
Maximum time between programmed service visits	3 months
Frequency of periodic maintenance and performance reports	3 months
Recommissioning frequency	Annually

**END OF SECTION- TECHNICAL SPECIFICATION**



# BOURKE GOVERNMENT OFFICE BLOCK

## AIR CONDITIONING SYSTEMS

SCHEDULE OF REVERSE CYCLE AIR-COOLED AIR-CONDITIONING SYSTEMS

UNIT No.	LOCATION/ AREA SERVED	SUPPLY AIR L/s	EXTERNAL STATIC PRESSURE Pa	FRESH AIR L/s	COOLING CAPACITY (see Note)		HEATING CAPACITY kW (see Note)	NOISE LEVEL dBA	TYPE	CONDENSING UNIT			
					TOTAL kW	SENSIBLE kW				UNIT NO.	ELECTRICAL DATA		REFRIGERANT
											VOLT/PH/Hz	POWER INPUT kW	
FCU-1	OFFICE 1 & STORE 1	1200	220	70	20.0	16.2	22.4	51	SPLIT DUCTED, INVERTER	CU-1	415/3/50	6.0	R410A
FCU-2	OFFICE 2, OFFICE 3, OFFICE 4 & OFFICE 5	1350	220	90	25.0	19.6	28.0	51	SPLIT DUCTED, INVERTER	CU-2	415/3/50	9.0	R410A
FCU-3	MEETING RM	900	150	90	12.5	11.3	14.9	48	SPLIT DUCTED, INVERTER	CU-3	240/1/50	4.2	R410A
FCU-4	FILE SERVER	300	100	10	5.7	4.5	7.0	34	SPLIT DUCTED, INVERTER	CU-4	240/1/50	2.4	R410A

NOTE: CAPACITIES BASED ON THE FOLLOWING CONDITIONS:  
COOLING: INDOOR 27°CDB, 19°CWB OUTDOOR 35°CDB, 24°CWB  
HEATING: INDOOR 20°CDB OUTDOOR 7°CDB, 6°CWB

SCHEDULE OF OUTSIDE AIR FAN

FAN No.	LOCATION	FCU SERVING	TYPE	DUTY L/s	EXT. STATIC PRESS. Pa	MIN. MOTOR kW	VOLT/ PHASE/ HZ	MAX. SPEED r/s	FAN DIA. mm	AVERAGE dBA @ 3m
OAF-1	ABOVE OFFICE 1	FCU-1, FCU-2, FCU-3 & FCU-4	IN-LINE CENTRIFUGAL	260	160	0.25	240/1/50	22	310	48

SCHEDULE OF DESIGN CONDITIONS

AMBIENT		INDOOR	
SUMMER	WINTER	SUMMER	WINTER
40°C DB	3.8°C DB	24 °C DB	21°C DB
23°C WB	N/A	50%	N/A

SCHEDULE OF SQUARE CEILING THERMAL DIFFUSERS

SUPPLY AIR RANGE L/s	NECK SIZE mm x mm	FACE SIZE mm x mm	TYPE
0 - 200	300x300	450x450	see Note
201-320	450x450	600x600	

NOTE: HOLYOAKE CMP-T MODEL OR EQUIVALENT

SCHEDULE OF RETURN GRILLES

AIR FLOW RANGE L/s	MIN. NECK SIZE mm x mm	TYPE
0-320	400 x 400	EGG CRATE
321-500	500x500	
501-810	600x600	

FACE SIZE TO BE THE SAME OF SUPPLY AIR DIFFUSERS

SCHEDULE OF FLEXIBLE DUCTWORK

MAX. AIR QUANTITY (L/s)	INSIDE DIAMETER (mm)
0 - 40	150
41 - 85	200
86 - 130	250
131 - 210	300
211 - 260	350
261 - 320	400

SCHEDULE OF AIR FILTER

DESIGNATION No.	DESCRIPTION	THICKNESS (mm)	MEDIA TYPE	MAX. FACE VELOCITY (m/s)	INITIAL RESISTANCE Pa	PERFORMANCE RATING COMPLY WITH AS 1324
AF-1	V-FORM PLEATED FIXED PANEL	50	DRY DISPOSABLE	1.6	30	F5

DRAWING LIST

DRAWING No.	DETAILS
M01	LEGEND, EQUIPMENT SCHEDULES, NOTES AND POWER DIAGRAMS
M02	NEW AND DEMOLITION PLANS

LEGEND

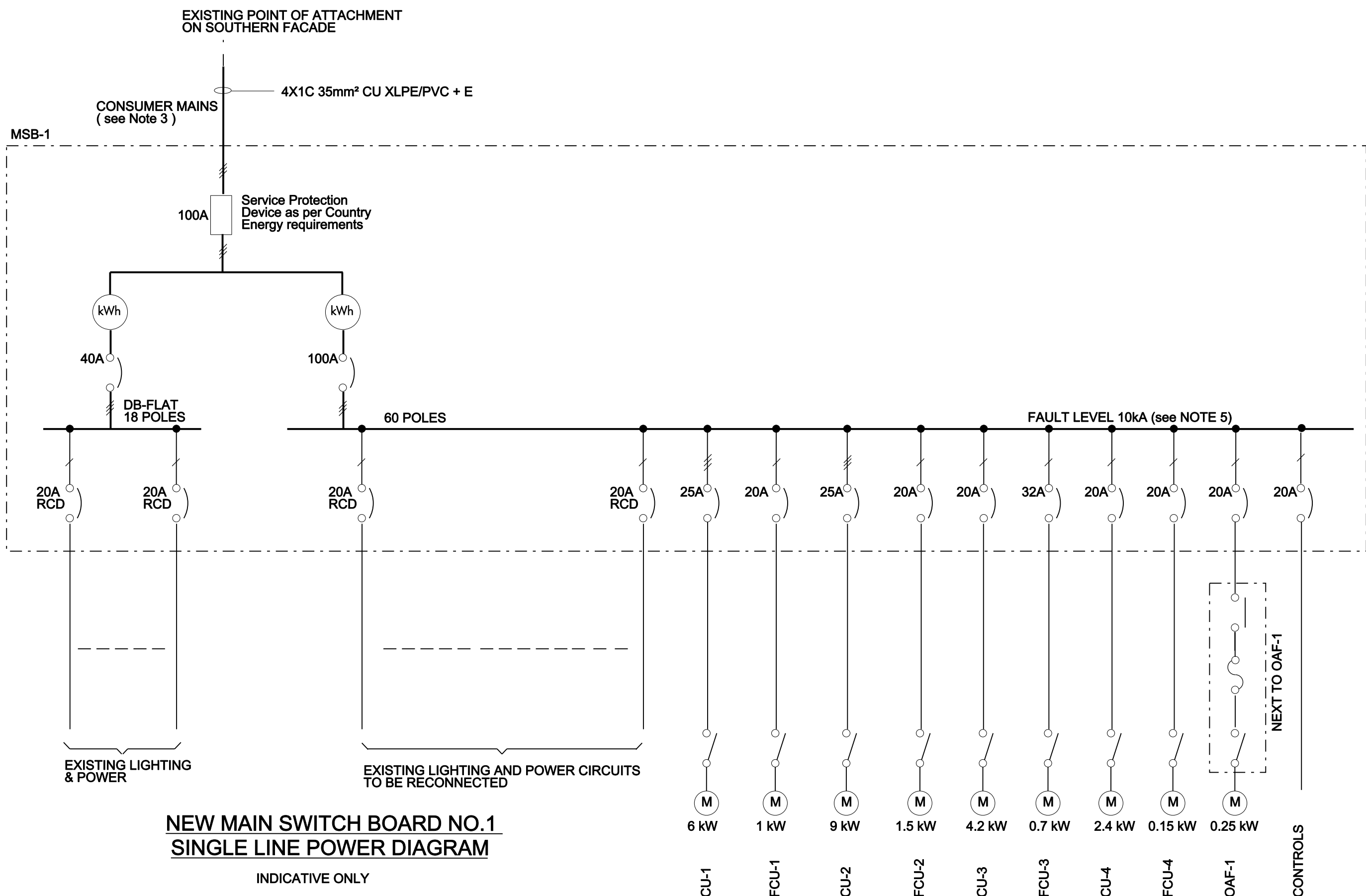
	EXISTING DUCTWORK TO BE DEMOLISHED/REMOVED
	EXISTING CEILING DIFFUSERS TO BE DELETED
	EXTERNALLY INSULATED DUCTWORK 25mm THICK MIN. OR R1.5 UNLESS STATED OTHERWISE
	INTERNALLY INSULATED DUCTWORK 25mm THICK MIN. OR R1.5 UNLESS STATED OTHERWISE
EAF	EXHAUST AIR FAN
FCU	FAN COIL UNIT (INDOOR UNIT)
CU	CONDENSING UNIT (OUTDOOR UNIT)
AF	AIR FILTER
	FLEXIBLE CONNECTION
	WIRED REMOTE CONTROLLER WITH THERMOSTAT AT 1500mm FFL
	EXTERNALLY INSULATED FLEXIBLE DUCT R1.5 WITH DUCT SPIGOT
R470	RETURN AIR GRILLE EGG CRATE TYPE - 470 L/s
	2-WAY, 3-WAY, 4-WAY CEILING THERMAL DIFFUSER 210 L/s
	CEILING ACCESS PANEL 800x800 mm UNLESS STATED OTHERWISE
	REFRIGERANT PIPING
	CONDENSATE DRAIN PIPING
	1 PHASE
	3 PHASE
	CIRCUIT BREAKER
	CONTACTOR - NORMALLY OPEN
	MOTOR OVERLOAD PROTECTION
	ISOLATING SWITCH
	MOTOR
MSB-1	MAIN SWITCH BOARD NO.1
	KILOWATT-HOUR METER

### MECHANICAL GENERAL NOTES

- THE POSITIONS OF EXISTING GRILLES/DIFFUSERS, A/C UNITS AND DUCTWORK AS SHOWN ON DRAWINGS MAY VARY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION ON-SITE.
- PROVIDE FLEXIBLE CONNECTIONS TO FANS.
- PROVIDE TURNING VANES OR ALTERNATIVELY USE RADIUS BENDS AND TEES TO ALL DUCT BENDS AND TEES.
- DUCT SIZES SHOWN ARE CLEAR INTERNAL AIRWAY SIZES.
- PROVIDE VIBRATION ISOLATORS AND FLEXIBLE CONNECTION TO FANS AND A/C UNITS  
PROVIDE ACOUSTIC BLANKET AROUND FLEXIBLE CONNECTIONS TO PREVENT NOISE BREAK-OUT.  
PROVIDE STREAM SPLITTER DAMPERS AT EACH BRANCH DUCT AND BUTTERFLY DAMPERS AT EACH FLEXIBLE DUCT SPIGOT.
- 
- PROVIDE SAFETY DRIP TRAY TO A/C INDOOR UNIT OF CEILING MOUNTED DUCT TYPE.
- PROVIDE PIPE COVER TO EXPOSED PIPES AND PAINT TO MATCH THE COLOR OF EXISTING BUILDING WALLS.
- FLASHING OF ALL DUCTS, PIPES, CONDUITS, ETC. WHICH PENETRATE OUTSIDE WALLS OR ROOFS.
- PROVIDE CONDENSATE DRAIN PUMP TO A/C INDOOR UNIT WHEN REQUIRED.
- CONCEAL PIPES IN CEILINGS/WALLS WHERE POSSIBLE.
- PROVIDE 100MM HIGH CONCRETE PLINTH TO THE OUTDOOR CONDENSING UNITS.
- MAKE GOOD ANY DAMAGE AND OPENINGS DUE TO THE WORK OF THIS CONTRACT.
- STATIC PRESSURE OF FANS ARE INDICATIVE ONLY.  
THE ACTUAL RESISTANCE OF EACH SYSTEM AS INSTALLED IS TO BE DETERMINED BY THE CONTRACTOR.

### ELECTRICAL NOTES

- PROVIDE NEW MAIN SWITCHBOARD (MSB) AND REMOVE THE OLD MSB. RECONNECT ALL THE EXISTING CIRCUIT TO THE NEW MSB EXCEPT AS NOTE 2 BELOW.
- DISCONNECT AND REMOVE THE EXISTING SUBMAIN FROM THE MSB TO THE EVAPORATIVE COOLERS (2 OFF, 3 PHASE).
- DISCONNECT AND REMOVE THE EXISTING METERING, SERVICE FUSES, CONSUMER MAINS AND ASSOCIATED EQUIPMENT AT THE END OF PROJECT.
- INSTALL SIX 1x14 WATT PIERLITE HIGH 5T5 SERIES WITH WIRE GUARD SPACED APART BY APPROXIMATELY 5M ABOVE THE CATWALK IN THE CEILING SPACE AND WIRED TO TO THE MSB. PROVIDE SWITCH IN THE CEILING SPACE NEAR CEILING ACCESS PANEL.
- CONFIRM THE MSB FAULT LEVEL WITH COUNTRY ENERGY.
- ALL WORK TO COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA.



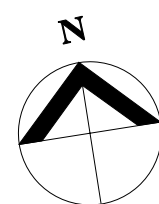
ISSUE	
NO	DATE
09.04.09	ISSUED FOR TENDER

MECHANICAL  
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NSW DEPARTMENT OF COMMERCE  
T 9372 8111 F 9372 8144  
08/04/09



Government Architect's Office

PETER MOULD  
NSW Government Architect  
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Sydney NSW 2000  
AUSTRALIA

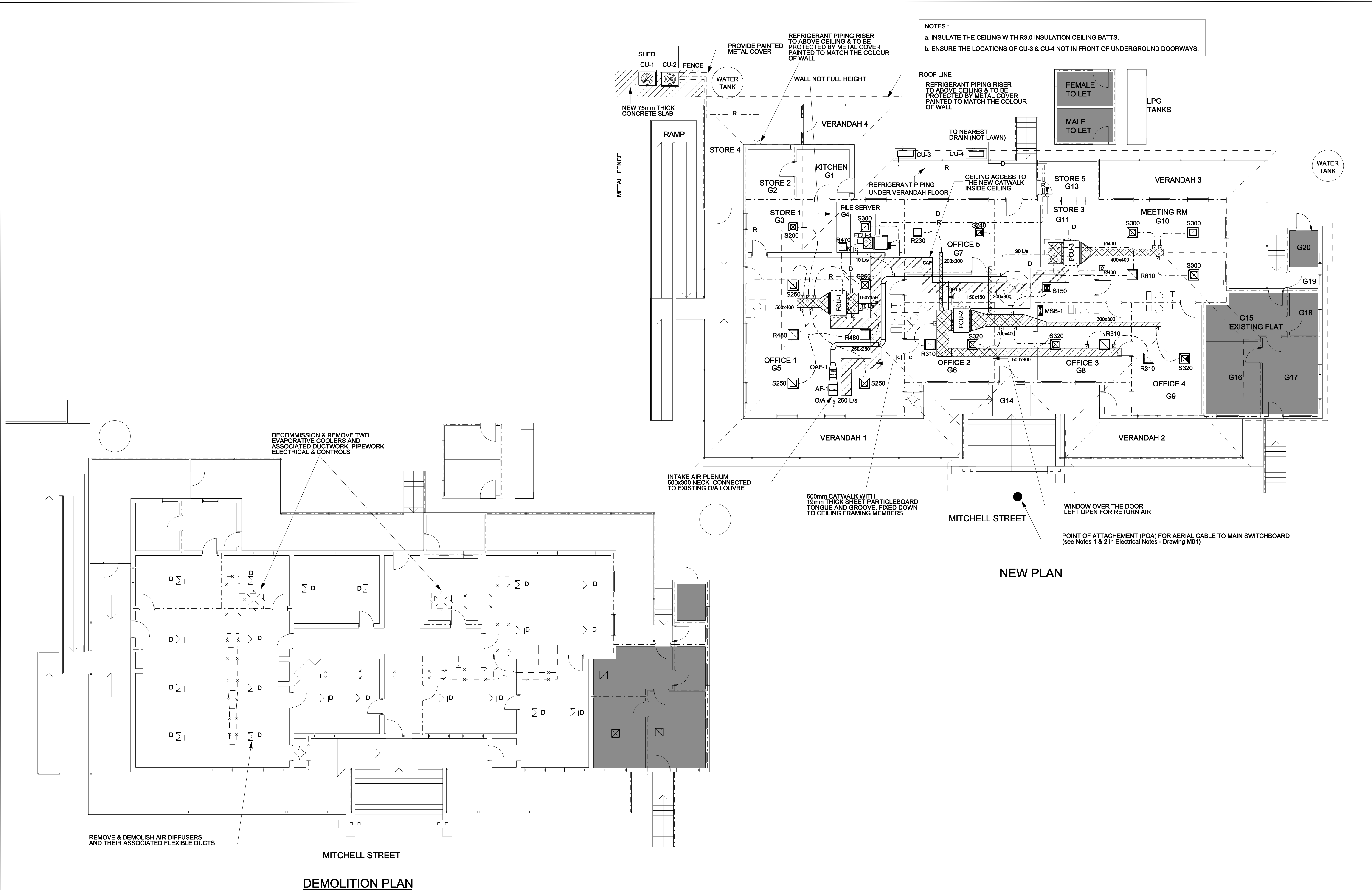


BOURKE GOVERNMENT  
OFFICE BLOCK  
AIR CONDITIONING SYSTEMS  
LEGEND, EQUIPMENT SCHEDULES,  
GENERAL NOTES & POWER DIAGRAM

PLAN RM NO	NO IN SET
2	
SCALES	N.T.S.
DESIGNED B.N.	DATE 14/04/2009
DRAFTED B.N.	VERIFIED B.S., E.Y.

SHEET NO  
M01





AREA NOT COVERED UNDER THE CONTRACT

0 10 20 30 40 50 60 70 80 90 100

FIGURED DIMENSIONS TO BE USED IN REFERENCE TO SCALING  
ALL DIMENSIONS TO BE CHECKED ON SITE

200MM

300MM ON ORIGINAL

CROWN COPYRIGHT  
NEW MINISTER FOR COMMERCE

ISSUE	
NO	DATE
09.04.09	ISSUED FOR TENDER

MECHANICAL  
GOVERNMENT ARCHITECTS' OFFICE  
NSW DEPARTMENT OF COMMERCE  
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08/04/09

NSW Department of  
Commerce

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Sydney NSW 2000  
AUSTRALIA

**BOURKE GOVERNMENT  
OFFICE BLOCK**  
AIR CONDITIONING SYSTEMS  
NEW & DEMOLITION PLANS

PLAN RM NO	
SCALES	1:100
DESIGNED B.N.	DATE 14/04/2009
DRAFTED B.N.	VERIFIED B.S., E.Y.

NO IN SET  
2  
SHEET NO  
**M02**