



**MECHANICAL SERVICES
APARTMENT AIR CONDITONING
REVIEW**

for

**ALTAIR APARTMENTS
3 KINGS CROSS ROAD
KING CROSS, NSW**

Prepared by:

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For:

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3 King Cross Road
KINGS CROSS NSW 2000

6910M
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1.0 INTRODUCTION

The body corporate at Altair Apartments are currently investigating the feasibility of increasing the power supply to the building by an additional 380amps (3 phase) in order to facilitate the potential air conditioning of apartments. Shelmerdines Consulting Engineers have been engaged to undertake a review of the potential air conditioning requirements and determine an equitable manner in which to facilitate and control the uptake of air conditioning by apartment owners.

To address the equitable allocation of the available power supply we have carried out preliminary heat load calculation for each apartment type and calculated the allowable power allocation on a prorated basis.

2.0 METHODOLOGY

Peak cooling loads have been calculated using Acads-BSG CAMEL software program, Version 5.11.1. The program uses the Carrier Air Conditioning Load Estimation Method as outlined and endorsed by the AIRAH Application Manual DA-9 "Air Conditioning Systems – Load Estimation and Associated Psychrometrics".

The program analyses the apartment orientation, extent & construction of external walls, extent & type of external glazing, external shading, floor & roof loads, internal loads, extent of infiltration, etc, to determine the cooling & heating demands of each apartment.

Peak (day time) cooling loads have been calculated for the potential conditioned spaces including Living, Dining, Kitchen, corridors and Bedroom areas. Loads do not include for unconditioned areas, such as; bathrooms, cupboards, services risers, etc.

Note the air conditioning cooling capacity required for each apartment is predominately impacted by the orientation & extent of glazing & extent of external walls as opposed to the floor area of the apartment. For example it is therefore probable that apartments with both a northern & western glazed façade will require more cooling than a larger apartment with only a northern façade.

Heat load calculations are based on typical apartment types for comparison purposes only to establish comparable power allowances. Actual cooling capacity requirements for individual apartments should be assessed independently on a case by case basis. Air conditioning system capacities shall not exceed the Allocated Diversified Amps Available tabled attached.

Apartment areas tabled are based on the estimated area of conditioned space for each typical apartment type. Areas may not match apartment surveyed/titled areas.

2.1 Cooling Load Calculation Design Conditions

The heating and cooling load calculations were based the following design conditions:

Inside:

Summer:	23.0°C DB	50% RH
Winter:	21.0°C DB	

Outside:

Summer:	32.8°C DB	22.6°C WB
Winter:	7°C DB	

Glazing:

Type:	Clear Single Glazed
U Factor:	5.80 W/m ² K
Shading Co:	Combined glass/blind shading of 0.4/0.6
Internal Shading:	Yes

Outside Air:	Naturally ventilated
Infiltration:	0.5 air changes/hour
Occupancy:	4 people per apartment (max) based on 2 residents plus 2 guests.
Activity:	74W/Person Sensible load. 56W/Person Latent load

Lighting and Equipment load:

Lighting:	5.0 W/m ²
Equipment	5.0 W/m ²

Partition load:

The common corridor, bathroom WC and Laundries were considered unconditioned spaces.

Partition loads were calculated per area of unconditioned space under the following conditions:

- Delta T used for partitions between bathrooms and conditioned spaces is taken as 50% of temperature differences.
- Delta T used for internal partitions, floors and ceilings between conditioned spaces of apartments is taken as 25% of temperature difference, assuming 50% of adjacent apartments are unconditioned (unoccupied).
- Proportional temperature difference of 2 degrees between conditioned space and unconditioned corridors and other common areas.

All calculated loads include a Cooling and Heating Safety Factor of: 10%

2.2 Building Construction:**External Walls:**Block work Wall construction

Type:	110mm Brick, R1.5 Batts, 10mm Plasterboard
U-Value:	0.51 W/m ² K
Density:	224 kg/m ² (Camel Library Reference)

Internal Walls:Conditioned spaces/Corridors & Inter-tenancy walls

Type:	Nominal 90mm inter-tenancy wall
U-Value:	2.0 W/m ² K

Internal Floors:

Type:	200mm Concrete, carpet & underlay
U-Value:	1.3 W/m ² K

Internal Ceilings:

Type:	200mm Concrete with plasterboard ceiling
U-Value:	1.65 W/m ² K

Concrete Roof:Concrete roof construction (R-values)

Type:	150HW Concrete, 10mm Roof Membrane, Roof Space, 13mm Plasterboard
U-Value:	1.16 W/m ² K
Density:	383 kg/m ² (Camel Library Reference)

3.0 AIR CONDITIONING – DIVERSIFIED POWER ALLOCATION

The attached table summarises the calculated diversified single phase power allocation available for each apartment type, subject to the proposed upgrade of an additional 380 Amp (3 Phase) power supply.

A diversification factor of 64% has been applied to the total power available based on 80% building occupancy with air conditioning units drawing 80% of full load amps.

The Full Load Amps Ratings of proposed apartment air conditioning units shall not exceed the single phase Allocated Diversified Amps Available tabled.

4.0 AIR CONDITIONING – CONFIGURATION REQUIREMENTS

The air conditioning systems to be installed shall typically be reverse-cycle, air-cooled split or multi-split systems.

Indoor units shall be wall mounted, above ceiling/bulkhead ducted units or hotel style bulkhead units.

Condensing units shall be installed on balconies for Levels 1-16. Depending on practical considerations, condensing units serving apartments on Level 17-19 shall be, ideally, installed on the roof (to replace existing Level 17-19 condensing units).

Condensate from the indoor units shall be piped to a suitable drain point within each apartment.

Refrigerant pipework exposed on balconies shall be concealed in a proprietary ducting system.

Noise and vibration of installed air conditioning systems shall be in accordance with EPA & council requirements.

For comparison purposes we have reviewed the allocated diversified amps against suitable wall mounted split units (Daikin 'FXK(X)M-P' Series) and wall mounted multihead/VRV units (Daikin 'Super Multi NX' & 'VRV iv S' Series) to ensure suitable capacity air conditioning units can be selected based on the allocated amp limitations.

5.0 AIR CONDITIONING – APPLICATION & APPROVAL

Apartment owners seeking to install air conditioning will need to make application to the body corporate in accordance with the body corporate by-laws. Air condition shall not be installed without body corporate approval.

Installation of air conditioning may be subject to council approval.

6910 - Altair Apartments

3 Kings Cross Rd, Rushcutters Bay NSW 2011

Additional Available Capacity

1140 Amps (1 Phase)

Existing capacity serving Level 17-19

296 Amps (1 Phase) - 98.7 Amps 3 phase

Total

1436 Amps (1 Phase)

Diversity

64% (80% occupied running at 80% capacity)

Diversified Capacity

2244 Amps (1 Phase)



Shelmerdines
Consulting Engineers

Apartment Numbers	Apartment Type	No. of Apts	No. of Bedrooms	Orientation	Area (m ²)	Total Cooling (kW)	Total Heating (kW)	Cooling (W/m ²)	Heating (W/m ²)	Prorata Amps Available (1 Phase)	Allocated Diversified Amps Available (1 Phase)
101, 102, 103	I	3	1	N	74	7.4	4.5	100	61	8.6	13.4
401w, 501w, 601w, 701w	U, P	4	1	NW	58	9.3	6.5	160	112	10.7	16.8
403w, 406e, 503w, 506e, 603w, 607e, 703w, 707e	X, R	8	1	N	42	4.7	3.8	112	90	5.4	8.5
404w, 409e, 504w, 509e, 604w, 611e, 704w, 711e	Y, S	8	1	S	47	4.1	3.9	87	83	4.7	7.4
405w, 505w, 605w, 705w	V, Q	4	1	SW	58	9.0	6.5	155	112	10.4	16.3
402w, 502w, 602w, 702w	W, T	4	1.5	N	63	5.6	4.8	89	76	6.5	10.1
407e, 507e, 608e, 708e	Z, K	4	1.5	N	64	5.2	4.4	81	69	6.0	9.4
605w, 610e, 705w, 710e, 805w, 810e, 905w, 910e, 1005w, 1005e, 1105w, 1110e, 1205w, 1210e, 1304w, 1308e, 1404w, 1408e, 1504w, 1508e, 1604w, 1608e, 1703w, 1706e, 1803w, 1806e	L	26	1.5	WSE	56	7.6	6.4	136	114	8.8	13.7
802w, 803w, 807e, 808e, 902w, 903w, 907e, 908e, 1002w, 1003w, 1007e, 1008e, 1102w, 1103w, 1107e, 1108e, 1202w, 1203w, 1207e, 1208e	M	20	1.5	N	48	4.1	3.5	85	73	4.7	7.4
1302w, 1306e, 1402w, 1406e, 1502w, 1506e, 1602w, 1606e	K	8	1.5	N	72	5.6	4.9	78	68	6.5	10.1
801w, 901w, 1001w, 1101w, 1201w	H	5	2	NWS	74	14.0	9.7	189	131	16.2	25.3
809e, 909e, 1009e, 1109e, 1209e	H	5	2	NES	74	11.7	9.7	158	131	13.5	21.1
804w, 806e, 904w, 906e, 1004w, 1006e, 1104w, 1106e, 1204w, 1206e	J	10	2	NS	86	6.7	6.9	78	80	7.7	12.1
508e, 609e	F	2	2.5	NES	92	12.5	10.8	136	117	14.4	22.6
1303w, 1305e, 1405e, 1503w, 1505e, 1603w	G	6	2.5	NS	110	8.2	8.3	75	75	9.5	14.8
408e, 709e	N, D	2	3	NES	92	12.5	10.8	136	117	14.4	22.6
1301w, 1401w, 1501w, 1601w	D	4	3	NWS	100	15.5	11.3	155	113	17.9	28.0
1307e, 1407e, 1507e, 1607e	D	4	3	NES	100	12.9	11.3	129	113	14.9	23.3
1403w, 1605e	E	2	3	NS	110	8.2	8.3	75	75	9.5	14.8
1701w, 1801w	B	2	3	NWS	150	19.2	14.8	128	99	11.0*	17.2*
1705e, 1805e	B	2	3	NES	150	15.9	14.8	106	99	11.0*	17.2*
1702w, 1704e, 1802w, 1804e	C	4	3	NS	140	10.0	10.2	71	73	18.0	28.1
1901w	A	1	3	NWS	190	23.9	23.4	126	123	20.8*	32.5*
1902e	A	1	3	NES	190	20.4	23.4	107	123	20.8*	32.5*
Total - Apartments		139								1436.0	2341.3
Total - Retail		1			240						70.0**

Notes:

1. The cooling & heating loads noted above are calculated for comparison purposes only.
2. The cooling and heating loads of individual apartments should be reviewed in detail to determine actual air conditioning cooling & heating requirements.
3. The available amps nominated for each apartment type have been prorated based on the nominal cooling capacity
4. All amp ratings calculated above are quoted as single phase amps, except where noted (* - 3 phase)
5. Apartment air conditioning unit Full Load Amps Ratings shall not exceed the single phase Allocated Diversified Amps Available noted above
6. Note air conditioning unit minimum circuit amps rating will be greater than the rated Full Load Amps
7. ** - Allocated (single phase) amps for Retail is based on current AC systems installed & is not included in, or impacted by, the proposed additional power supply