

**Retention of Climate  
Control System**

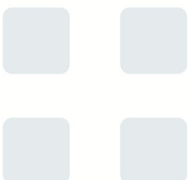
**2/3 North Mews  
London, WC1N.**

**Environmental Noise Assessment**

**September 2011**

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Principal Consultant

**Doc Ref:** 102015.ph.09.11.Issue1



## 1. INTRODUCTION

- 1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).
- 1.2 APL has been instructed by the Applicant, Shreeji Properties Ltd to consider and advise upon the noise implications of the retention of the installation of a climate control system.
- 1.3 The climate control system consists of one outdoor air condenser unit that is located on a first floor flat roof adjacent to the rear first floor offices.
- 1.4 It is understood the Local Planning Authority (LPA) require further information on noise levels from the retention of the installation in order to fully assess the potential noise impact upon the surrounding neighbourhood.
- 1.5 This report provides the response to the LPA, on behalf of the Applicant.

## 2. BASELINE SITUATION

- 2.1 The Application Site (the "site") is situated at 2/3 North Mews, London, WC1N.
- 2.2 The site consists of a circa 1980's office building arranged over six floors including a basement and sub basement level. The property is located on the eastern side of North Mews close to its junction with Roger Street. The second floor offices benefit from a newly installed climate control system which includes the installation of an external condenser unit at first floor flat roof level.
- 2.3 The position of the air condenser unit is shown in Figure 1. The site and its surroundings can be seen in Figures 1 to 8.
- 2.4 The nearest noise sensitive façade belongs to the rear façade of the first floor offices of 2/3 North Mews (as shown in Figure 1). The distance from the location of the nearest noise sensitive façade to the location of the condenser unit was estimated from site measurements to be 1m.
- 2.5 Information in regard of the noise level from the air condenser unit has been provided by Sanyo HVAC (copy of the data sheet is provided in Appendix A). The unit is itemised below:

(a) 1No. Sanyo SPW-C1305DXHN8

### 3. NOISE OUTLINE

3.1 In order to produce an environmental noise assessment, consideration must be given to the locality of the installation.

3.2 Measurements of background noise were obtained over a 24 hour period at a location deemed representative of background noise levels experienced at the nearest noise sensitive façade. Measurements were obtained on the first floor flat roof adjacent to the condenser unit. The condenser unit was not operational whilst the monitoring equipment was being installed.

3.3 The nearest noise sensitive façade is defined in para 28.2 of the Local Development Framework 2010-2025 Section DP28 Noise and Vibration as:

*“The effect of noise and vibration can be minimised by separating uses sensitive to noise from development that generates noise and by taking measures to reduce any impact. Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces, while noise is generated by rail, road and air traffic, industry, entertainment (e.g. nightclubs, restaurants and bars) and other uses.”*

3.4 The particulars of the measurement exercise are recorded below:

Date:	30 <sup>th</sup> – 31 <sup>st</sup> August 2011
Start Time:	13:43 hrs.
Location:	Flat roof, rear of 2/3 North Mews, London
Weather:	No wind, no precipitation.

3.5 The measurements carried out during the exercise are recorded below:

L<sub>90</sub> percentile level (dB re 20µPa) at 15 minute intervals

3.6 The measurements obtained during the exercise are presented in Appendix B.

3.7 For the sake of clarity, the lowest measured background noise over the anticipated operational hours of the condenser unit is highlighted. As the unit will be utilised for climate control of office accommodation, it is anticipated that the operational hours will be on a demand basis during the period 07:00 – 20:00hrs.

- 3.8 Information regarding the noise levels not to be exceeded by the installation was extracted from the LPA (London Borough of Camden) Local Development Framework 2010-2025 Section DP28 Noise and Vibration:

**Table E: Noise levels from plant and machinery at which planning permission will not be granted**

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB <sub>L<sub>Aeq</sub></sub>

- 3.9 The noise level of the condenser unit was established from the data sheet provided (Appendix A) as detailed.

(a) 1No. Sanyo SPW-C1305DXHN8 @ 61dBA @ 1m

## 4. EQUIPMENT

- 4.1 All measurements were obtained using the following equipment:

- Svantek Svan Type 948 Class 1 Serial No. 6988
- Rion Calibrator Type NC-74 Class 1 Serial No. 00410215

- 4.2 The relevant equipment carries full and current traceable calibration. The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

## 5. CALCULATIONS

- 5.1 In order to predict the noise impact of the climate control system, consideration has been given to noise egress from the roof mounted condenser unit.
- 5.2 A prediction exercise was undertaken. The calculation exercise utilised information provided by Mitsubishi HVAC (copy of the data sheet is provided in Appendix A).
- 5.3 The total attenuation was calculated by considering distance attenuation from the location of the unit to the nearest noise sensitive façade. Given the location of the unit a correction of +3dB was added to the noise output of the condenser in consideration of their location against a reflecting plane (floor).
- 5.4 Noise leaving the condenser unit was propagated to the nearest noise sensitive façade using point source propagation. The distance from the location of the unit to the nearest noise sensitive façade was estimated from measurements obtained on site as 1m.
- 5.5 The calculation exercise provided the following results:

Source(s)	$L_p$ dBA
1No. Sanyo SPW-C1305DXHN8	61
TOTAL condenser noise	61
Unit at 1m (after corrections)	64 $[61-20\log_{10}(1)+3]$

Table 1

- 5.6 In order to comply with the requirements of the LPA, any noise from the retention of the installation of one condensing unit should not exceed a level of 35 dBA (10dB below the lowest measured background noise over the operational hours of the unit).
- 5.7 The lowest measured background noise level was 45dB  $L_{A90}$  that occurred during the hours 18:28 – 18:43 hrs on 30<sup>th</sup> August 2011.
- 5.8 It is evident from the measurements obtained that the condenser unit was not operational during the measurement period.

## 6. CONCLUSION

- 6.1 The foregoing assessment indicates that the proposed installation will not meet the requirements imposed by the LPA. Further mitigation measures will be required.
- 6.2 The following is recommended:
- (a) *Relocate the unit to a position that is not adjacent to a noise sensitive façade. APL should be consulted prior to considering this option further;*
  - (b) *Place the unit in an acoustic enclosure.*
- 6.3 A number of manufacturers provide proprietary and bespoke acoustic enclosures. A typical example of such an enclosure is manufactured by Environ.
- 6.4 The Environ range of enclosures (see Appendix C) is specifically designed for small and medium sized unit applications and is suitable for units that have vertical air flow characteristics. Environ can also provide bespoke units where there are dimensional constraints. The overall transmission loss of a standard system equates to 27-28dBA. A typical example of their enclosure is shown below.



**Typical Environ enclosure**

- 6.5 By utilising such a system, the expected noise level at the nearest noise sensitive façade will comply with the requirements imposed by the LPA.

## Figures



**Rear of 2/3 North Mews, London**



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



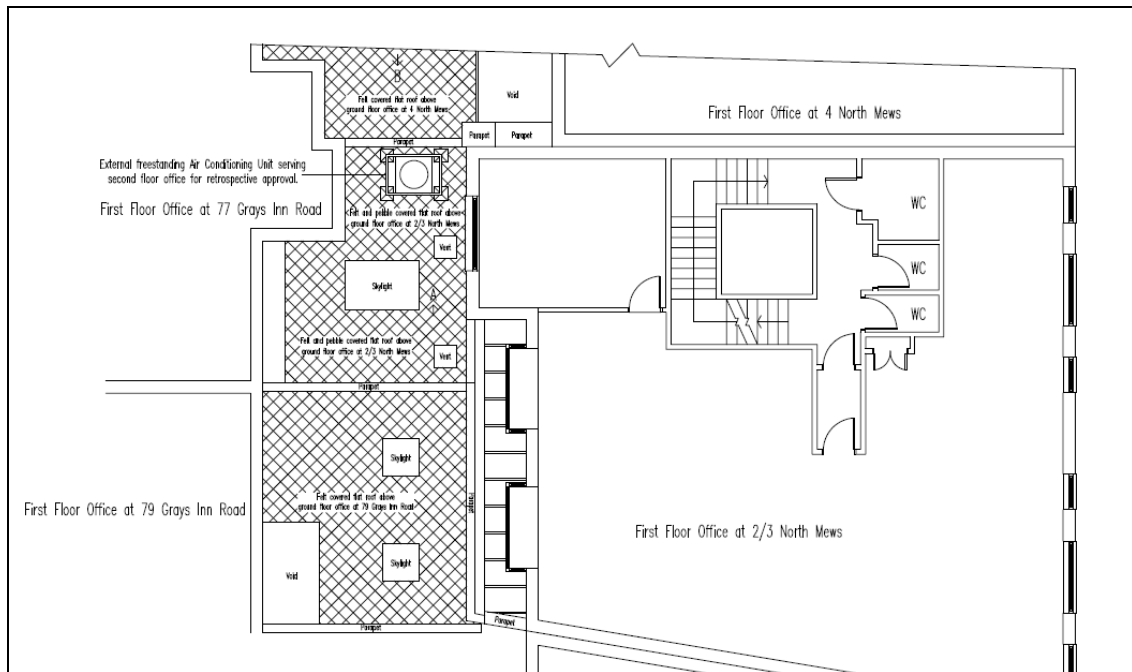


Figure 8

## **Appendix A**


# 2WAY ECO i

## 5N series

### MULTI SYSTEM

## Outdoor unit specifications,

### Outdoor unit specifications

Appearance							
HP			8	10	12	14	16
Model name (SPW-)			C0705DXHN8	C0905DXHN8	C1155DXHN8	C1305DXHN8	C1405DXHN8
Power supply			380/400/415V-3 phase/50Hz				
Capacity	Cooling	(kW)	22.4	28.0	33.5	40.0	45.0
		(BTU/h)	76,400	95,500	114,300	136,500	153,600
	Heating	(kW)	25.0	31.5	37.5	45.0	50.0
		(BTU/h)	85,300	107,500	128,000	153,600	170,600
COP	Cooling	(W/W)	3.74	3.54	3.50	3.45	3.38
	Heating	(W/W)	4.05	4.06	3.91	3.91	3.79
Dimensions(H×W×D) (mm)			1,887 × 890 × 890 (+60)				
Net weight (kg)			245	295	295	345	345
Electrical rating	Cooling	Running amperes (A)	10.1/9.6/9.3	12.9/12.3/11.8	15.6/14.9/14.3	19.6/18.6/17.9	22.5/21.3/20.6
		Power input (kW)	5.99	7.90	9.58	11.6	13.3
	Heating	Running amperes (A)	10.4/9.9/9.5	12.7/12.0/11.6	15.7/14.9/14.3	19.4/18.5/17.8	22.3/21.2/20.4
		Power input (kW)	6.17	7.75	9.60	11.5	13.2
	Starting amperes (A)		1/1/1	59/62/64	66/69/72	68/71/73	78/80/82
Air circulation (m³/min)			150	160	180	200	220
Refrigerant amount at shipment (kg)			11.8				
Piping connection	Gas pipe (mm)	ø19.05	ø22.22	ø25.4	ø25.4	ø28.58	
	Liquid pipe (mm)	ø9.52	ø9.52	ø12.7	ø12.7	ø12.7	
	Balance pipe (mm)	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	
Ambient temperature operating range			Cooling/dry: -10℃~+ 43℃ (DB), Heating: -20℃~+15℃ (WB)				
Pressure sound	Normal mode dB(A)	54.5	55.0	56.0	61.0	62.0	
	Silent mode dB(A)	51.5	52.0	53.0	58.0	59.0	
Power sound	Normal mode dB(A)	65.5	66.5	67.5	71.5	72.0	

\* The values for performance and electric characteristics apply under the following test conditions.

At the time of cooling: Indoor suction air temperature 27°C DB, 19°C WB, outdoor suction air temperature 35°C DB

At the time of heating: Indoor suction air temperature 20°C DB, outdoor suction air temperature 7°C DB, 6°C WB

Data subject to change without notice.

\* The operating sound has been measured in an anechoic chamber, and it is the value one meter in front of the outdoor unit at a height of 1.5 m. With actual installation, the indication value normally differs widely according to the surrounding noise and reverberations.

## **Appendix B**

## Background noise measurements obtained at rear of 2/3 North Mews, London

Address	Time	Measurment Time	LAeq	LAE	LAmay	Lamin	LA05	LA10	LA50	LA90
1	30/08/2011 13:43	0:15:00	52	82	82	44	54	52	49	47
2	30/08/2011 13:58	0:15:00	52	82	72	43	53	52	49	47
3	30/08/2011 14:13	0:15:00	50	80	61	44	53	52	49	47
4	30/08/2011 14:28	0:15:00	51	81	68	44	56	54	50	46
5	30/08/2011 14:43	0:15:00	56	86	75	43	57	54	50	47
6	30/08/2011 14:58	0:15:00	51	80	62	44	54	53	50	47
7	30/08/2011 15:13	0:15:00	53	83	70	44	59	54	49	47
8	30/08/2011 15:28	0:15:00	54	84	74	44	55	53	50	48
9	30/08/2011 15:43	0:15:00	50	80	63	43	54	53	49	47
10	30/08/2011 15:58	0:15:00	53	83	71	43	57	54	50	46
11	30/08/2011 16:13	0:15:00	51	81	65	44	54	53	50	47
12	30/08/2011 16:28	0:15:00	50	80	64	43	54	53	49	46
13	30/08/2011 16:43	0:15:00	51	81	66	41	57	54	49	46
14	30/08/2011 16:58	0:15:00	54	84	71	42	59	54	50	47
15	30/08/2011 17:13	0:15:00	55	85	78	45	57	54	50	48
16	30/08/2011 17:28	0:15:00	50	80	59	43	53	52	49	47
17	30/08/2011 17:43	0:15:00	51	81	68	44	55	53	50	47
18	30/08/2011 17:58	0:15:00	50	79	59	43	52	52	49	46
19	30/08/2011 18:13	0:15:00	50	80	66	43	54	53	49	47
20	30/08/2011 18:28	0:15:00	50	79	59	41	53	52	49	45
21	30/08/2011 18:43	0:15:00	49	79	58	41	53	52	49	45
22	30/08/2011 18:58	0:15:00	51	81	67	40	56	53	48	45
23	30/08/2011 19:13	0:15:00	50	79	61	39	53	52	49	44
24	30/08/2011 19:28	0:15:00	50	80	69	40	53	52	48	44
25	30/08/2011 19:43	0:15:00	48	78	58	39	52	51	48	43
26	30/08/2011 19:58	0:15:00	48	78	59	39	52	51	47	43
27	30/08/2011 20:13	0:15:00	49	79	62	39	52	51	48	44
28	30/08/2011 20:28	0:15:00	48	77	59	39	51	50	47	43
29	30/08/2011 20:43	0:15:00	48	78	60	37	52	51	47	43
30	30/08/2011 20:58	0:15:00	48	77	60	38	51	50	47	42
31	30/08/2011 21:13	0:15:00	49	79	58	38	53	52	48	43
32	30/08/2011 21:28	0:15:00	50	79	67	37	56	52	48	40
33	30/08/2011 21:43	0:15:00	49	79	64	38	53	52	48	43
34	30/08/2011 21:58	0:15:00	48	78	60	37	53	51	46	41
35	30/08/2011 22:13	0:15:00	47	77	59	35	51	50	47	41
36	30/08/2011 22:28	0:15:00	47	77	57	36	52	51	46	41
37	30/08/2011 22:43	0:15:00	48	77	57	37	51	50	47	41
38	30/08/2011 22:58	0:15:00	48	78	60	36	53	51	47	42
39	30/08/2011 23:13	0:15:00	48	77	58	36	52	51	47	41
40	30/08/2011 23:28	0:15:00	47	77	57	36	52	50	46	40
41	30/08/2011 23:43	0:15:00	47	77	65	36	52	50	46	40
42	30/08/2011 23:58	0:15:00	46	76	58	35	51	50	45	39
43	31/08/2011 00:13	0:15:00	47	76	57	34	51	50	45	38
44	31/08/2011 00:28	0:15:00	47	77	63	34	52	50	45	37
45	31/08/2011 00:43	0:15:00	46	76	57	35	51	50	44	38
46	31/08/2011 00:58	0:15:00	46	76	62	33	51	50	44	37
47	31/08/2011 01:13	0:15:00	45	75	57	33	51	49	42	35
48	31/08/2011 01:28	0:15:00	46	76	64	33	51	50	43	35

## Background noise measurements obtained at rear of 2/3 North Mews, London

Address	Time	Measurment Time	LAeq	LAE	LAmx	Lamin	LA05	LA10	LA50	LA90
49	31/08/2011 01:43	0:15:00	45	75	66	33	51	49	41	34
50	31/08/2011 01:58	0:15:00	43	73	55	33	49	47	40	35
51	31/08/2011 02:13	0:15:00	44	74	61	32	50	47	40	35
52	31/08/2011 02:28	0:15:00	43	73	58	33	49	47	40	35
53	31/08/2011 02:43	0:15:00	44	74	59	33	50	48	40	35
54	31/08/2011 02:58	0:15:00	54	83	75	32	57	50	41	34
55	31/08/2011 03:13	0:15:00	54	83	71	34	60	55	45	38
56	31/08/2011 03:28	0:15:00	44	74	59	33	50	48	40	35
57	31/08/2011 03:43	0:15:00	43	72	60	33	49	48	38	35
58	31/08/2011 03:58	0:15:00	46	75	60	34	51	50	42	36
59	31/08/2011 04:13	0:15:00	45	74	56	32	51	49	41	34
60	31/08/2011 04:28	0:15:00	45	74	59	32	50	49	42	35
61	31/08/2011 04:43	0:15:00	45	75	60	35	51	49	42	38
62	31/08/2011 04:58	0:15:00	46	75	63	35	50	49	43	39
63	31/08/2011 05:13	0:15:00	46	76	59	34	52	50	43	37
64	31/08/2011 05:28	0:15:00	48	78	60	35	53	51	46	39
65	31/08/2011 05:43	0:15:00	48	77	63	37	52	51	46	40
66	31/08/2011 05:58	0:15:00	49	79	66	43	53	52	48	46
67	31/08/2011 06:13	0:15:00	52	81	64	45	56	54	50	47
68	31/08/2011 06:28	0:15:00	56	86	78	45	61	56	50	47
69	31/08/2011 06:43	0:15:00	54	84	73	45	59	55	50	47
70	31/08/2011 06:58	0:15:00	54	83	69	45	58	55	50	47
71	31/08/2011 07:13	0:15:00	52	81	66	45	55	54	51	48
72	31/08/2011 07:28	0:15:00	54	83	71	46	56	54	51	48
73	31/08/2011 07:43	0:15:00	51	81	62	46	55	53	51	49
74	31/08/2011 07:58	0:15:00	53	83	69	45	58	55	51	49
75	31/08/2011 08:13	0:15:00	52	81	60	46	55	54	51	48
76	31/08/2011 08:28	0:15:00	51	81	60	47	54	53	51	49
77	31/08/2011 08:43	0:15:00	52	81	64	47	55	54	51	49
78	31/08/2011 08:58	0:15:00	51	81	57	46	53	53	51	49
79	31/08/2011 09:13	0:15:00	52	81	65	47	55	54	51	49
80	31/08/2011 09:28	0:15:00	51	81	58	47	54	53	51	49
81	31/08/2011 09:43	0:15:00	51	81	64	46	54	53	51	49
82	31/08/2011 09:58	0:15:00	52	81	75	46	55	53	51	48
83	31/08/2011 10:13	0:15:00	51	81	63	45	55	54	50	48
84	31/08/2011 10:28	0:15:00	52	82	71	44	55	53	50	47
85	31/08/2011 10:43	0:15:00	51	80	64	44	53	52	50	48
86	31/08/2011 10:58	0:15:00	51	80	67	44	55	53	50	47
87	31/08/2011 11:13	0:15:00	53	82	74	44	53	52	49	47
88	31/08/2011 11:28	0:15:00	53	82	73	43	57	54	50	47
89	31/08/2011 11:43	0:15:00	52	81	69	44	56	54	50	48
90	31/08/2011 11:58	0:15:00	50	79	60	44	52	51	49	47
91	31/08/2011 12:13	0:15:00	50	80	60	44	54	53	49	47
92	31/08/2011 12:28	0:15:00	52	82	69	44	57	54	50	47
93	31/08/2011 12:43	0:15:00	52	81	68	45	57	54	50	47
94	31/08/2011 12:58	0:15:00	52	82	73	44	55	53	50	47
95	31/08/2011 13:13	0:13:33	55	84	74	48	59	57	52	50

## **Appendix C**



## Acoustic Enclosure Systems for Air Conditioning and Refrigeration Plant

### ■ environmodula 2.1.25AC VERTICAL DISCHARGE

Noise control for medium to large Air Conditioning systems that have multi-directional air flow characteristics.

These units can be notoriously difficult to treat acoustically, often resulting in an over engineered, unsightly and expensive solution for the user, notwithstanding the difficulties of obtaining planning authority consent.

With environmodula all of these potential pitfalls can be overcome.



#### An introduction:

By design, environmodula applies its patented noise control features to best advantage, ensuring maximum acoustic performance.

With advanced noise control technology underpinned by quality engineering and manufacturing standards, environmodula solutions help alleviate local authority approval issues, whilst eliminating the noise problem for the user.

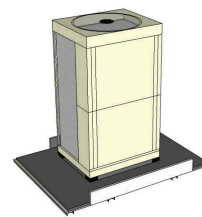
With almost infinite plant application compatibility and deriving its name from its design, environmodula is available in a variety of sizes, allowing it to be tailored to meet specific applications for new build or retro-fit noise abatement. And as an ideal noise control solution for larger air handling and heat pump units with multiple air intake and discharge requirements, environmodula delivers unparalleled noise reduction performance and airflow optimisation.

The enclosures are engineered for simple, quick construction and are designed as a 'flat pack' accessory for AC Contractors to assemble during the system installation - with a minimal number of parts in a kit, environmodula can be assembled quickly and easily by two men.

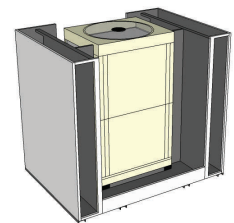
The integrated airways are sized to suit the requirements of the enclosed plant and full service and maintenance access is provided by the provision of removable access panels.

Simple selection documentation is used to establish the correct sizing of the airways to optimise equipment performance and the completed enclosures are available in a variety of colours and finishes to suit the environment in which they operate.

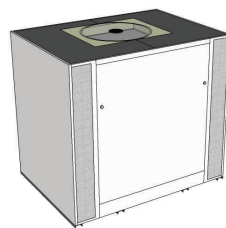
environmodula is secure and gives greater flexibility regarding the positioning of plant and machinery, especially where space is at a premium. Being 'Visually Quiet', no moving parts are visible - so the enclosed plant remains out of sight and out of mind.....



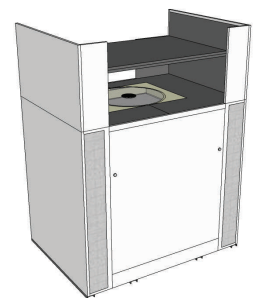
STEPS 1-2 - Base Structure



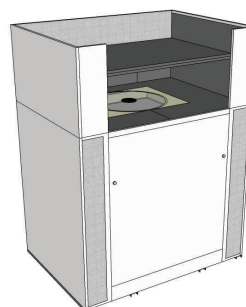
STEPS 3-5 - Air In Plenums



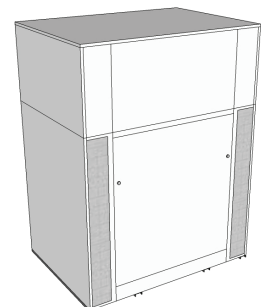
STEP 6-7 - Air Inlet Plenum Seals



STEP 8-g - Air Discharge Plenum



STEP 10 - Discharge Grilles

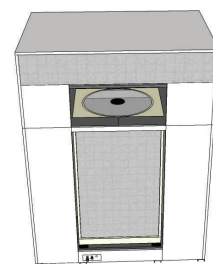
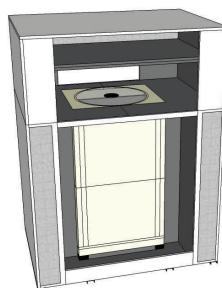
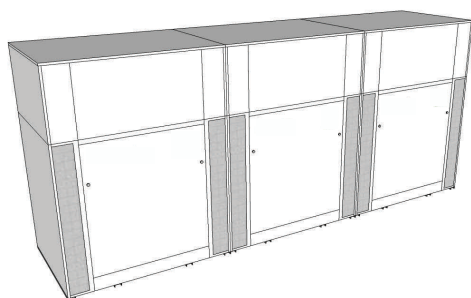


STEPS 11-12 - Complete Assembly

## ■ environmodula 2.1.25AC VERTICAL DISCHARGE

### Product features at a glance:

- Superior sound engineering characteristics with certified Transmission Loss performance
- Satisfies the most stringent local authority noise requirements as part of the planning or noise enforcement process
- Effective noise control solution for larger plant with multi-directional air flow requirements
- Optimised airways and grilles maximise airflow efficiencies
- Full enclosure design protects plant from the elements, virtually eliminates the effect of solar gain on the operating plant and reduces the need for condenser coil cleaning
- Ultra small footprint, quality build, strong and durable design
- A visually quiet, 'good neighbour' with a choice of external finishes to allow plant to blend into the surroundings



### User Benefits:

- Effectively eliminates plant noise on New Build a Retro-fit projects
- Local authority endorsed 'Best Practical Means' solution for large Air Conditioning and Heat Pump units
- No noise nuisance enhances neighbour relations
- Secure, robust and vandal proof - no additional security required
- Reduces installation time and cost compared to other acoustic solutions

### Installer Benefits:

- Supplied as a 'Flat Pack' accessory for on-site assembly
- Quick and Easy to assemble - No specialised tools necessary
- Modular sub-assemblies for ease of installation
- Integrated Services and Electrical access points.
- Commissioning, Service and Maintenance access through lockable access panels
- Noise attenuation under installation contractor control

*The Environ Integra, Modula and Lite acoustic designs are protected under patent*

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## environmodula 1.2.25AC Technical Information (May 2006)

DYNAMIC ACOUSTIC TECHNOLOGY

### Noise Measurement Information:

Test: Environ Modula Acoustic Enclosure—1470mm W x 1045mm D x 1755mm H

### Test Standard:

ISO 717/1 Acoustics - Rating of Sound Insulation in Buildings and of Building Elements - Part 1: Airborne Sound Insulation

### Sound Level Measuring Equipment:

CEL 593 C1R Precision Sound Analyser - Type 1  
CEL 284/2 Acoustic Calibrator Type 1  
JBL Loudspeaker driven by CEL White Noise Source

### Transmission Loss Data:

Transmission Loss—Environ Modula 1.2.25AC							
Octave Frequency in Hertz (dB ref $2 \times 10^{-5}$ Pascal's)							
63	125	250	500	1K	2K	4K	8K
12	13	20	29	36	37	39	39
Summary							
Transmission Loss Equates to an Overall Reduction of 25 dB(A)							

### Support Information:

Monitoring was carried out using the BS3740 technique, insofar as measurements were taken in each quadrant and the results averaged. Internal Test Room: 6m W x 12m L x 4m H. Background noise in the semi-reverberant test room was such as not to interfere with the practical measurements