ASLI MECHANICAL SDN. BHD..

Airflow and Acoustic Research and Development Study of 4-way Square Ceiling Diffusers

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Airflow And Acoustic Research And Development Study
of 4-way Square Ceiling Diffusers

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1.0 INTRODUCTION

This report presents the results of acoustic and airflow development tests carried out on 3 sizes of 4-way square ceiling diffuser units supplied by ASLI MECHANICAL SDN. BHD., as described below.

This report is issued as a NATA certified report under the terms of Vipac's NATA accreditation No's 1163 and 1506.

2.0 UNIT UNDER TEST

Table 1 : Description of Units Under Test

#	Unit Description	Face Size (mm)	Reducer Neck Size (mm)
1	Square 4-way Ceiling Diffuser with Reducer Throw Pattern 20°-30° From Horizontal	600 x 600	195 x 195
2		600 x 600	245 x 245
3		600 x 600	295 x 295

3.0 TEST CONDITIONS AND APPLICABLE STANDARDS

The unit was tested at a range of flow conditions, as shown on the Test Certificates.

The test set up was in general accordance with Air Diffusion Council (USA) Equipment Test Code 1062: GRD-84. Measurements were taken in general accordance with the following standards:

ACOUSTICS
Australian Standard 1217.2-1985. "Acoustic - Determination of Sound Power Levels of Noise Sources Part 2 - Precision Methods for Broad-Band Sources in Reverberation Rooms".

AIRFLOW
Air Diffusion Council (USA) Equipment Test Code 1062: GRD-84.

THROW & STATIC PRESSURE DROP
Air Diffusion Council (USA) Equipment Test Code 1062: GRD-84.

4.0 TEST SET UP AND PROCEDURE

Vipac's Reverberation Test Room has a volume of 170m^3 has been qualified in accordance with the procedures in AS 1217.2 - 1985 for determination of sound power in octave bands with Centre Frequencies from 125 Hz to 8000 Hz.

The unit under test was set up in the Air Distribution (Reverberation) Test Chamber and connected to a quiet air supply.

The unit was supplied with ambient temperature air at the specified airflows. The environmental test conditions in the reverberation chamber varied for each test within the following ranges:

Test Air Temperature	12 degrees C ± 2.0 degree C
Room Air Temperature	14 degrees C ± 2.0 degree C
Barometric Pressure	1035 millibar ± 5 millibar
Relative Humidity	60 ± 10%

Following calibration checks, sound pressure levels were measured and converted to sound power levels using the comparison method of AS1217.2 - 1985 (ie. using a reference sound source of known Sound Power to determine room correction).

Airflow rate was measured using orifice plates. Static pressure drop was recorded using a (Static Pressure) probe and an inclined manometer. Throw was measured using a hotwire anemometer. Figure 1 shows the test set up. Figure 2 shows the test unit.

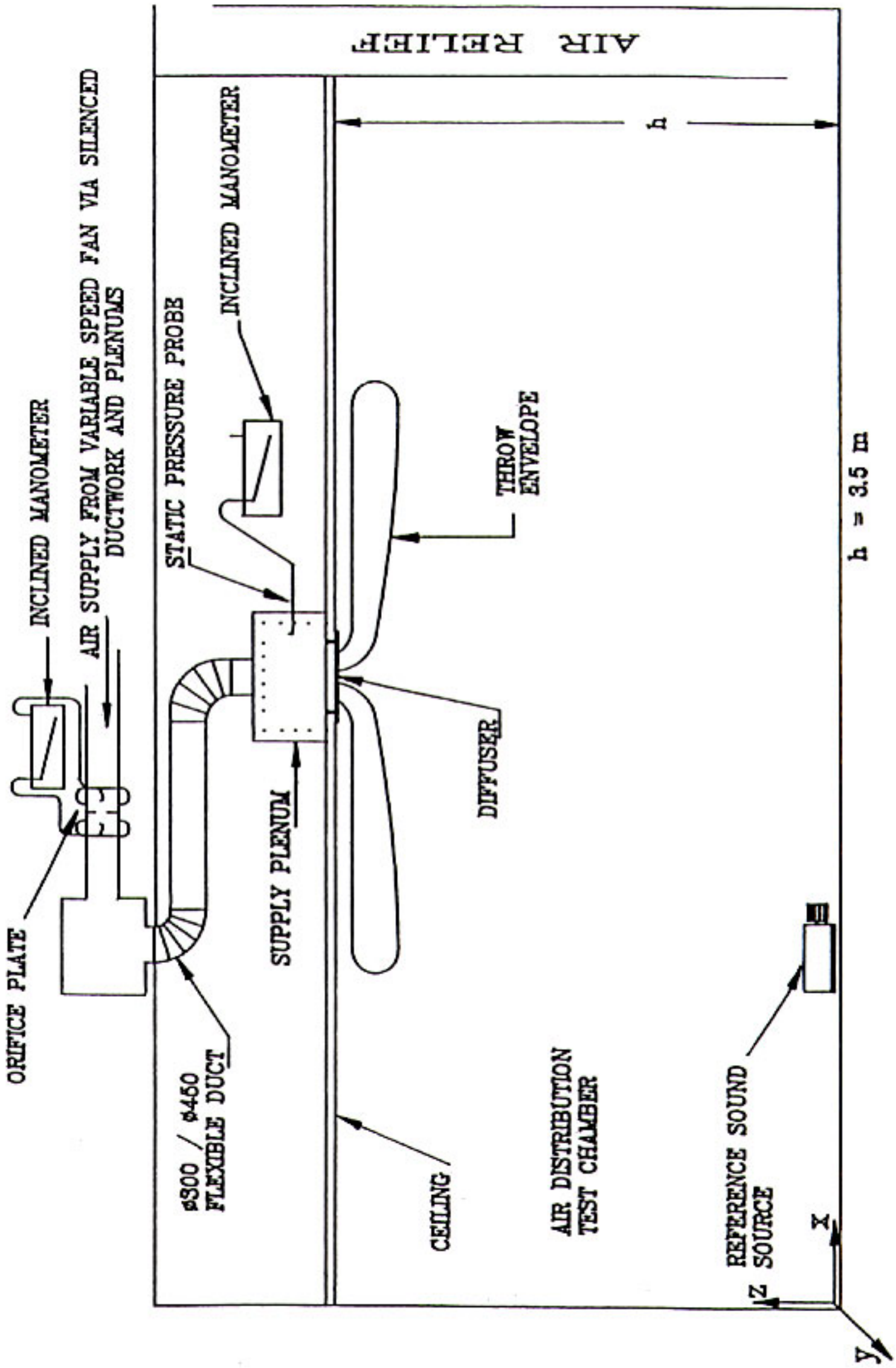
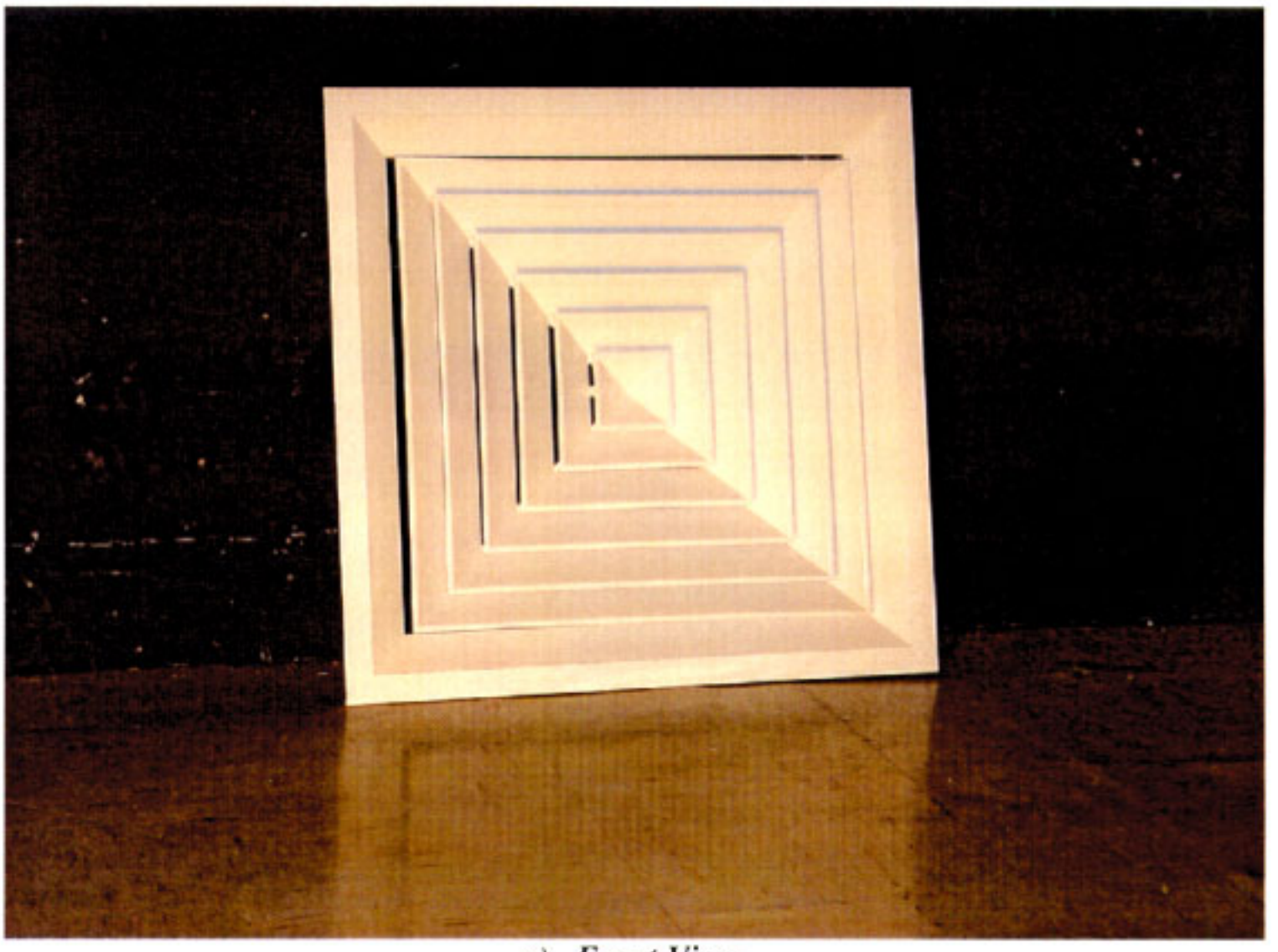


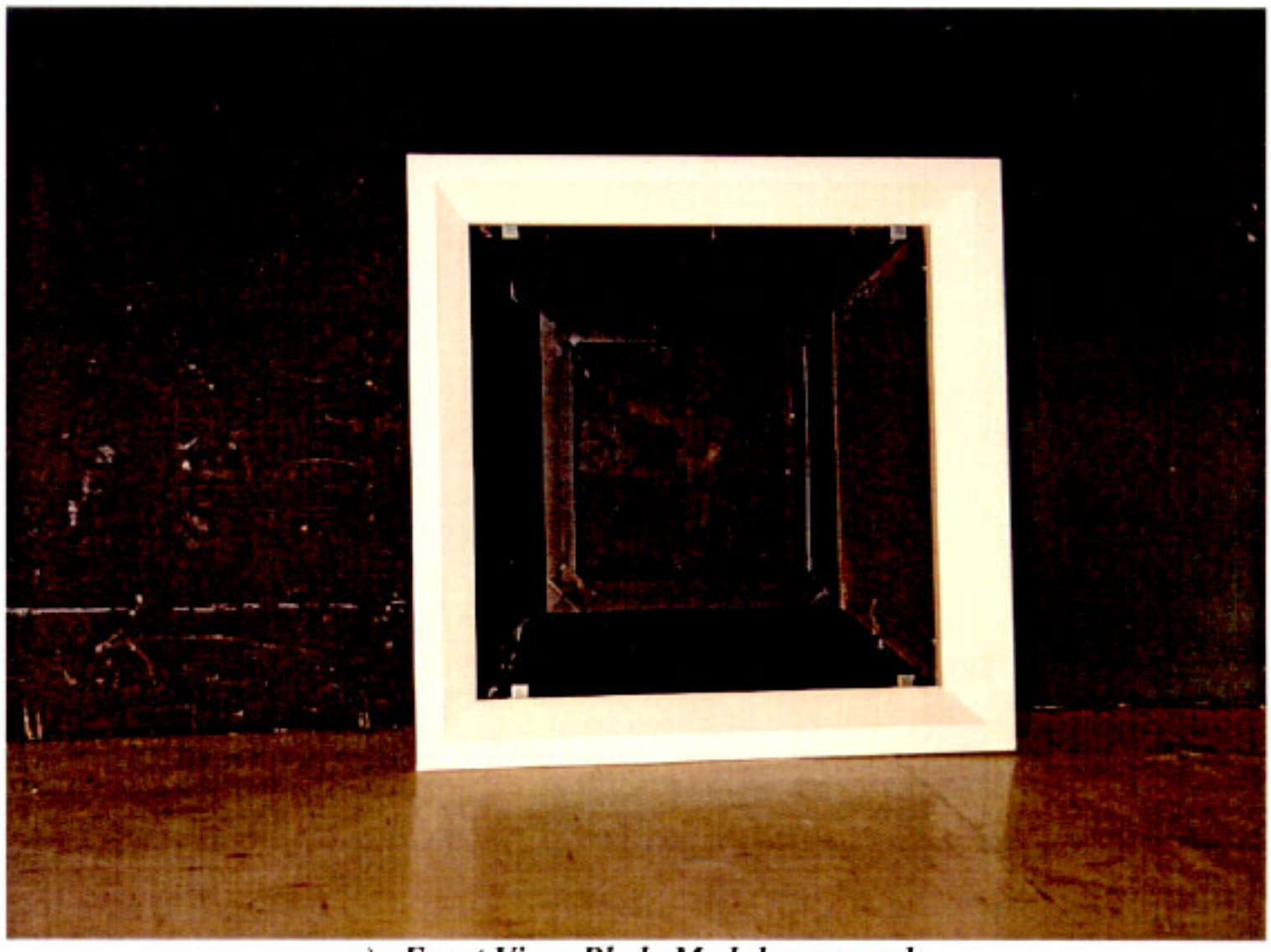
Figure 1: Schematic of Test Set-up



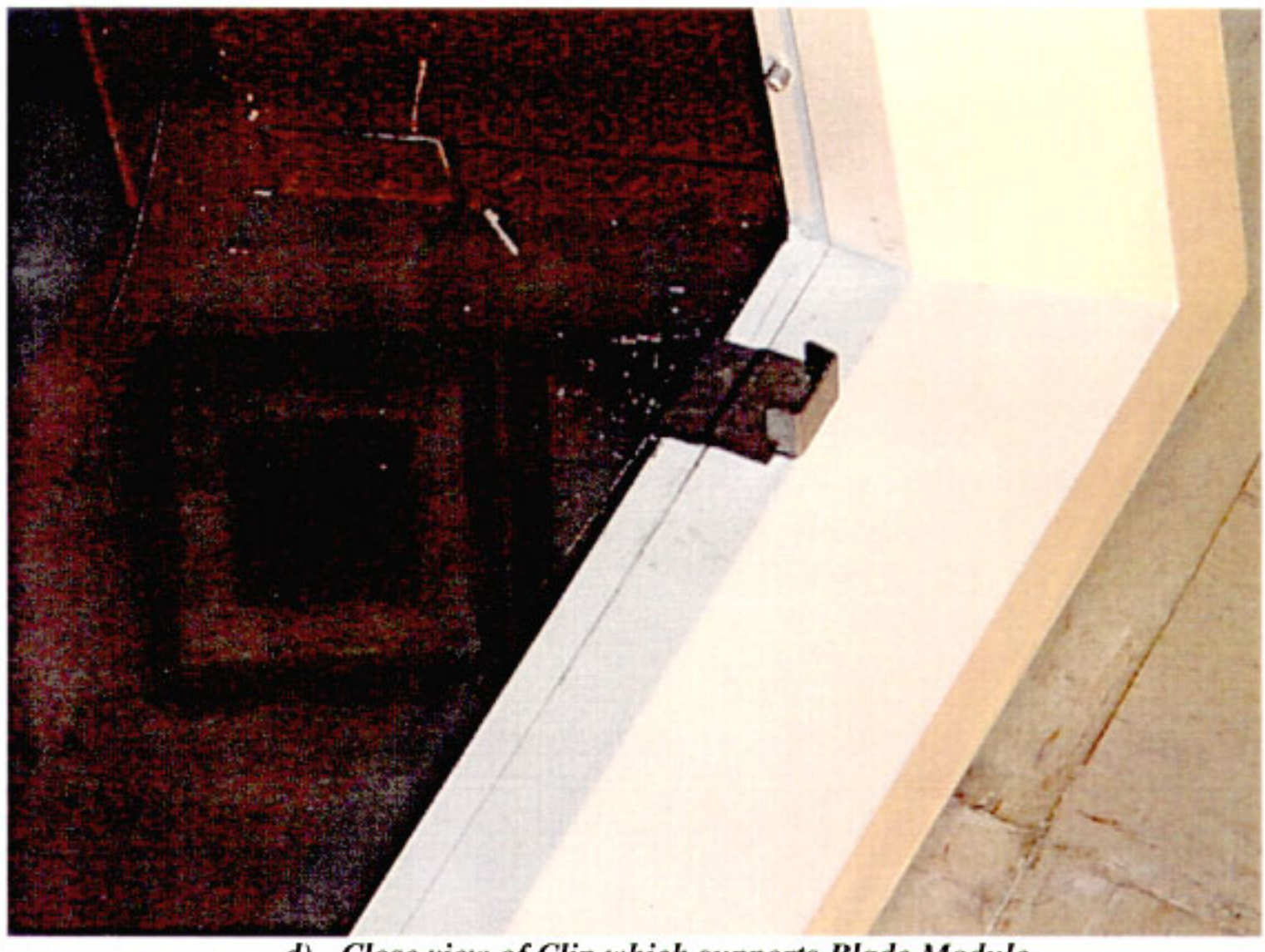
a) Front View

b) Rear View, from left, reducer sizes 295x295, 245x245, 195x195

Figure 2 : Test Samples



c) Front View, Blade Module removed



d) Close view of Clip which supports Blade Module

Figure 2 (cont') : Test Samples

5.0 INSTRUMENTATION

INSTRUMENT	MAKE & MODEL	CALIBRATION		SERIAL NO.
		BY	DATE	
Sound Level Meter	LD2900	Vipac	May 2001	A0316
Microphone	B&K 4145	Vipac	May 2001	25415619
Acoustic Calibrator	B&K 4230	Vipac	7/6/00	860700
Sound Power Reference Source	Pope	Vipac	1/5/2001	-
Manometers (2)	Airflow Developments Type 504	Gas Technology Services	June 2001	36862 PM6-168
Orifice Plates	Vipac	Vipac	May 2001	-
Hotwire Probe	TSI 8330	TSI	12/11/97	97110174
Thermometer	Digital T200KC	-	-	-

6.0 ORDERS OF ACCURACY

Sound Pressure Level:	Octave Band Centre Frequency (Hz)	Standard Deviation (1) (dB)
	125	±3.0
	250	±2.0
	500 to 4000	±1.5
	8000	±3.0

Pressure Drop: ± 5% or 0.5 Pa whichever is greater

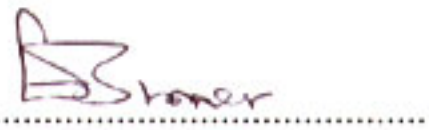
Airflow: ± 5% or 10 l/s whichever is greater

7.0 RESULTS

The results obtained are shown in the attached Test Certificates.

Report Prepared by:
VIPAC ENGINEERS AND SCIENTISTS LTD.

GREG THEODORIDIS
PROJECT ENGINEER



NORM BRONER
N.A.T.A. SIGNATORY

TEST CERTIFICATE No. 1

ACOUSTIC AND AIRFLOW PERFORMANCE TEST OF AIR OUTLETS AND INLETS

SUPPLIED BY:	**ASLI MECHANICAL SDN. BHD.**
TESTED BY:	**VIPAC ENGINEERS & SCIENTISTS LTD**
TEST DATE:	**16/8/2001**
CLIENT:	**ASLI MECHANICAL SDN. BHD.**
UNIT:	**Square 4-way Ceiling Diffuser with Reducer** **Reducer Neck Size: 295mm x 295mm** **Face Size: 600mm x 600mm** **Throw Pattern: 20-30° from Horizontal**

TEST CONDITIONS				**SOUND POWER LEVEL, dB re 1E-12 W OCTAVE BAND CENTRE FREQUENCY (Hz)**						
Qs (l/s)	**Ps (Pa)**	**T (m)**	**NR**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
207	13	3	17	<40.8	36.2	27.5	26.9	<19.4	<17.5	<18.0
237	17	3.4	21	<43.8	37.4	29.7	30.8	21.9	<18.0	<18.8
282	23	3.7	28	<44.4	41.6	40.4	37.9	30.6	<19.8	<19.1
334	31	4	35	46.1	41.1	48.5	43.4	37.8	27.4	<19.7
399	43	>4	38	49.4	45.4	51.6	48.2	44.6	34.2	<22.4

LEGEND

Qs	-	Primary Air Flow Rate (l/s)
Ps	-	Supply Static Pressure (Pa)
<	-	Insufficient margin above background noise to allow accurate determination
>	-	Length of throw greater than that able to be measured
NR	-	Noise Rating number based upon room absorption of 10 dB
T	-	Throw in meters to a terminal velocity of 0.25m/s

Greg Theodoridis
PROJECT ENGINEER

Norm Broner
N.A.T.A. SIGNATORY

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TEST CERTIFICATE No. 2

ACOUSTIC AND AIRFLOW PERFORMANCE TEST OF AIR OUTLETS AND INLETS

SUPPLIED BY: ASLI MECHANICAL SDN. BHD.
TESTED BY: VIPAC ENGINEERS & SCIENTISTS LTD
TEST DATE: 16/8/2001
CLIENT: ASLI MECHANICAL SDN. BHD.
UNIT: Square 4-way Ceiling Diffuser with Reducer
Reducer Neck Size: 245mm x 245mm
Face Size: 600mm x 600mm
Throw Pattern: 20-30° from Horizontal

TEST CONDITIONS				SOUND POWER LEVEL, dB re 1E-12 W OCTAVE BAND CENTRE FREQUENCY (Hz)						
Qs (l/s)	Ps (Pa)	T (m)	NR	125	250	500	1000	2000	4000	8000
137	12	2.7	17	<40.5	<31.3	29.1	25.5	21.7	<18.1	<19.0
165	17	3.3	21	<41.7	<32.8	31.7	30.6	22.2	<19.0	<19.0
207	26	3.7	31	<42.9	36.4	45.2	41.4	31.3	<20.3	<19.1
250	36	4	37	45.9	41.3	49.3	46.6	39.0	28.3	<19.7
299	50	>4	43	52.2	46.6	51.2	53.0	46.0	36.3	23.5

LEGEND

Qs	-	Primary Air Flow Rate (l/s)
Ps	-	Supply Static Pressure (Pa)
<	-	Insufficient margin above background noise to allow accurate determination
>	-	Length of throw greater than that able to be measured
NR	-	Noise Rating number based upon room absorption of 10 dB
T	-	Throw in meters to a terminal velocity of 0.25m/s

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TEST CERTIFICATE No. 3

ACOUSTIC AND AIRFLOW PERFORMANCE TEST OF AIR OUTLETS AND INLETS

SUPPLIED BY:	**ASLI MECHANICAL SDN. BHD.**
TESTED BY:	**VIPAC ENGINEERS & SCIENTISTS LTD**
TEST DATE:	**19/8/2001**
CLIENT:	**ASLI MECHANICAL SDN. BHD.**
UNIT:	**Square 4-way Ceiling Diffuser with Reducer** **Reducer Neck Size: 195mm x 195mm** **Face Size: 600mm x 600mm** **Throw Pattern: 20-30° from Horizontal**

TEST CONDITIONS				**SOUND POWER LEVEL, dB re 1E-12 W OCTAVE BAND CENTRE FREQUENCY (Hz)**						
Qs (l/s)	**Ps (Pa)**	**T (m)**	**NR**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
107	17	3	17	<41.2	<33.4	29.3	27.1	<17.9	<16.1	<18.2
126	22	3.6	23	<42.5	<35.4	34.2	33.1	24.2	<16.8	<18.2
147	29	4	28	<43.0	38.0	39.1	38.0	30.8	<20.0	<18.4
170	40	>4	35	<45.8	42.7	44.9	44.9	37.5	27.2	<19.0
201	57	>4	41	49.5	48.2	47.7	50.7	44.6	34.6	<22.0

LEGEND

Qs	-	Primary Air Flow Rate (l/s)
Ps	-	Supply Static Pressure (Pa)
<	-	Insufficient margin above background noise to allow accurate determination
>	-	Length of throw greater than that able to be measured
NR	-	Noise Rating number based upon room absorption of 10 dB
T	-	Throw in meters to a terminal velocity of 0.25m/s

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