

**THIS FOLDER WAS CHECKED BY
ARUP ON**

21.3.03

**The checking process was to ensure that 3 identical
sets of each Volume of the Operating and
Maintenance Manuals existed**



Our Ref: 121/5192/ML/ML/439

10th February 2000

Benchmark Ltd
Stirling Square
5-7 Carlton Gardens
London
SW1Y 5AD

For the attention of Mr B O' Leary

Dear Sirs

Re: Carlton Gardens, Commissioning Documentation

Dear Brian,

Further to my recent discussion with Mr M. Barford of Mace Ltd, please find herewith for your retention a copy of commissioning data for the above project, please feel free to contact the writer should you have any queries with the above.

Yours sincerely

M. Lambourne
M. Engineer

Cc: Mr M. Barford
Fax: 0171 839 3081



Drake & Scull Engineering Ltd

Shenley Pavilions, Chalkdell Drive, Shenley Wood, Milton Keynes, Buckinghamshire MK5 6LB
Telephone: 01908 506005 Facsimile: 01908 506066
www.drake-scull.co.uk

An EMCOR Company

Registered Office: 1 Thameside Centre, Kew Bridge Road, Kew Bridge, Middlesex TW8 0HF
Registered in England No. 3667540



**5-7 CARLTON GARDENS
LONDON SW1**

**OPERATING & MAINTENANCE
INSTRUCTIONS
for the
MECHANICAL SERVICES**

**VOLUME 1
1.5.1 – Section J**

*Collated By :
Commissioning Management Ltd
5, St Peters Court
Colchester
Essex
CO1 1WD*

*Tel : 01206 761911
Fax : 01206 761932*

MASTER INDEX

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	D	Operation of the Installation
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VOLUME 1 - MECHANICAL SERVICES

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VOLUME 1.2

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Armstrong Via Preussag	HOSEREEL BOOSTERS
Contract Components Ltd.	DUCT ACCESS DOORS
Diffusion Environmental Ltd.	FAN COIL UNITS
ACL Drayton	THERMOSTATIC RADIATOR VALVES
Estec Environmental Ltd.	CHLORINATION & WATER TREATMENT
F.E. Cole & Son Ltd.	DUCTWORK
Fire Protection Ltd.	FIRE DUCTS
Grundfos Pumps Ltd	SUMP PUMPS
Guntner UK	DRY COOLER
Hamworthy	BOILERS
Holden & Brooke Ltd	PUMPS, PRESSURISATION UNITS & COLD WATER BOOSTERS
Holmes	VALVES
Hudevad Britain	RADIATORS
IMI Rycroft Ltd	CALORIFIERS
Liff Industries	WATER CONDITIONERS
McQuay International AAF Ltd.	AIR HANDLERS & CHILLERS
Matthew & Yates	FANS
Minikin & Sons Ltd	FLEXIBLE CONNECTIONS
Noico Ltd.	INERTIA BASES
Preussag Fire Protection Ltd.	SPRINKLERS, HOSEREELS
SPC	DRY RISERS
Stepspeed Ltd.	HEATING COILS
Waterloo Air Management	THERMAL INSULATION
Woods Air Movement	DAMPERS, PRESSURE CONTROL VALVES
Set Point	FANS
	ROOM A/C UNIT

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Building Services Operating and Maintenance Instructions
5-7 Carlton Gardens, London SW1

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Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	CHRIS TUFFIN.
	Company:	CML LTD.
FAX NO:		MEMO ON SITE.
FROM:		MARK LAMBOURNE.
NO: OF PAGES (Including this page)		10.
DATE:		15 JULY 99.

RE. CARLTON GARDENS.

REF. SF01.

Chris/

PLEASE FIND ATTACHED COMMISSIONING
PAPERWORK FOR ABOVE FAN, NOW
NON RTN DAMPERS ARE INSTALLED.
RESULTS SEEM SATISFACTORY.

REGARDS.

(Mark)

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UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCOTT ENGINEERING
PROJECT	5-7 CARLTON GARDEN'S
SYSTEM	Boiler Room Supply SF01

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

B. T. J. MACE

Dated

*OK load. Pressure/size noted.
Reported To SS.
Mace*



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	Boiler Room Supply	SF 01	

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>			
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input type="checkbox"/>
3. PULLEYS:	<input type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>		
4. V BELTS:	<input type="checkbox"/>	<u>MOTORS</u>	<input type="checkbox"/>
(i) TENSIONED	<input checked="" type="checkbox"/>	1. BEARINGS:	<input type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>		
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	SYSTEM CHECKS	<input type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input type="checkbox"/>
10. FILTERS:	<input type="checkbox"/>	6. DIFFUSER FITTED	<input type="checkbox"/>
(i) FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>		
<u>MOTORS (VISUAL CHECKS)</u>			
1. ELECTRICAL CONNECTIONS:	<input type="checkbox"/>		
(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>		
(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>		
(iii) COVER FITTED	<input checked="" type="checkbox"/>		

COMMENTS					
OVERLOAD RANGE TOO LOW. F.L.C. 2.6amps OVERLOAD RANGE 1.6 TO 2.5amps					
<input checked="" type="checkbox"/>	SATISFACTORY	<input type="checkbox"/>	NOT APPLICABLE	<input type="checkbox"/>	ACTION REQUIRED
TEST ENGINEER	M. BOSELLI	DATE	12/17/99	SHT.	OF



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7 CARLTON GARDENS
SYSTEM	BOILER ROOM SUPPLY SFOL

BALANCED IN ACCORDANCE WITH THE CIPSE
CODES USING THE FOLLOWING (CALIBRATED)
INSTRUMENTS.

MICROMANOMETER NO 7526.

ANEMOMETER UKA004.



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	Boiler Room Supply SFO1/1&2		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	45JM/20/216/1013
FAN TYPE	AXIAL	PITCH ANGLE	10°
SIZE	450mm	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.960	350
DESIGN SYSTEM VOLUME		0.960	
TESTED SYSTEM VOLUME & PRESSURE	0.942 @ 98%	Dis. 37	Suci. 262
		Total	299

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	573923/10D 12
VOLTAGE	415 / 3 / 50	POWER	1.1 Kw
FULL LOAD CURRENT	2.6	RUNNING CURRENT	1.8 1.9 1.9
DESIGN SPEED	2850		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	DRIVE	QUANTITY	FAN.
	MOTOR		
BULEY DIA.	N/A		N/A
HAFT DIA	N/A		N/A
BUSH REF.	N/A		N/A
MEAS. RPM	NO ACCESS		NO ACCESS

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	D.O.L.
OIL RANGE	1.6 - 2.5 *	OIL SETTING	2.S.
TIMER	N/A	FUSE RATING	6AMP

COMMENTS

OVERLOAD RANGE TOO LOW.

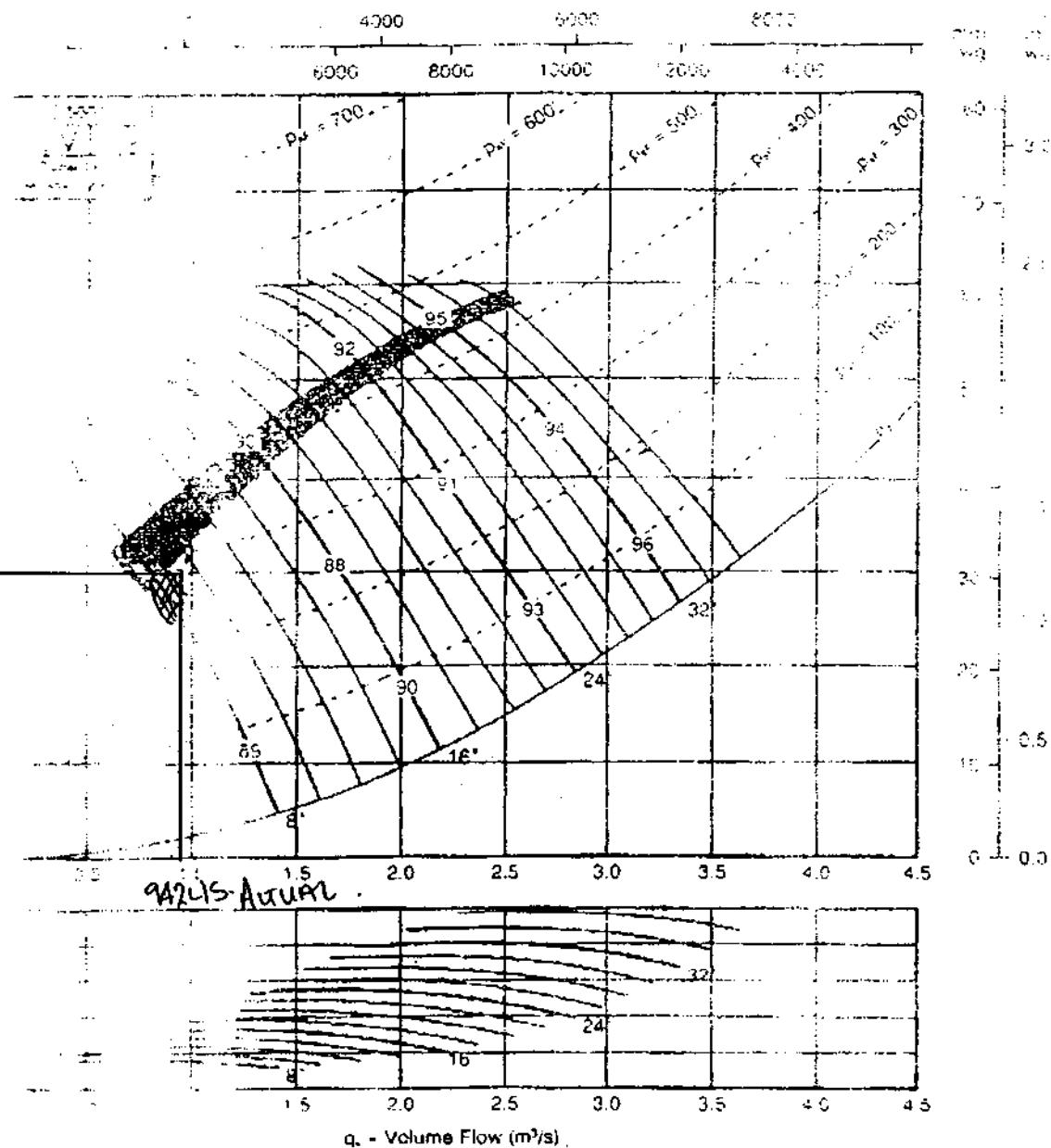
ERCOFOIL

Fan Code: 45JM/20/2/3/...



150 mm 2910 rev/min 3 Blades 50 Hz

Sound Power Level
in selected installations.



AS/NZS 4871:1985

- overall inlet sound power levels, derived from measurements taken in Woods laboratory; sound power levels in eight octave bands, apply the following corrections to the overall level. Use above shaded area, or lower corrections when operating point is below shaded area.

Inlet Level	Frequency (Hz)	Pitch Angle	Outlet Levels											
			2k	4k	8k	16k	32k	63k	125k	250k	500k	1k	2k	4k
4	-8	-16	-26					-16	-14	-14	-14	-14	-14	-20
5	-7	-13	-15					-14	-8	-11	-9	-4	-4	-12
6	-2	-15	-20					-8	-6	-5	-5	-2	-2	-12
7	-10	-15	-18					-7	-2	-2	-2	-1	-1	-10
8	-3	-25	-27					-7	-5	-5	-5	-2	-2	-10
9	2	-25	-27					-7	-5	-5	-5	-2	-2	-10



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	Boiler Room Supply SFO1 FAN 2

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
FAN INLET	0.960	400x600	0.24	4.0

VELOCITY PROFILE(m/s)

	E	S	D	E	F	G	H
1	3.3	3.7	3.9	3.8			
2	4.0	4.7	4.7	4.0			
3	3.3	3.7	4.1	3.9			
4							
5							
6							
7							
8							
9							
10							
						TOTAL	47.1

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.93	0.942	98	147.

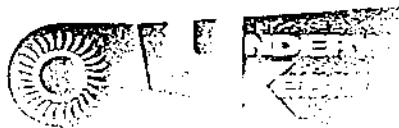
COMMENTS/ TP. LOCATION

DRAKE & SCULL LTD

17 Euston Road

London NW1 2PF

12/11/99



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BOILER ROOM SUPPLY SFO1 FAN 1

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
FAN INLET	0.960	400 x 600	0.24	4.0.

FAN NO 1

VELOCITY PROFILE (m/s)

	A	B	C	D	E
1	3.8	3.8	3.4	3.8	
2	4.0	4.4	4.3	3.7	
3	3.8	3.8	3.9	3.8	
4					
5					
6					
7					
8					
9					
10					
TOTAL					46.5

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.88	0.931	97	139

COMMENTS/TP. LOCATION

1978 RELEASE UNDER E.O. 14176

1980-1981

U.S. Fish Commission.

14/11/99



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG
PROJECT	5-7 CARLTON GARDENS
SYSTEM	Boiler Room Supply

INSTRUMENT REFS:-

TEST ENGINEER

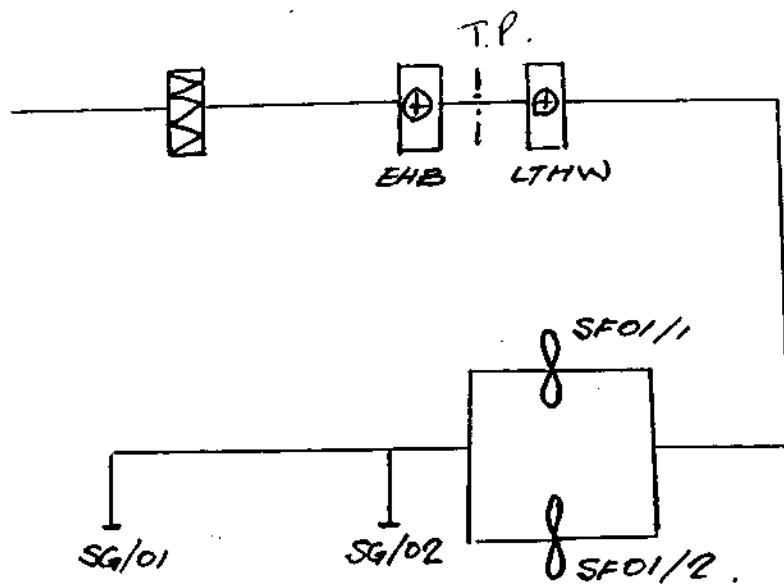
DATE 12/17/99

SHT. OF



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING	
PROJECT	5-7 CARLTON GARDENS	
SYSTEM	BOILER ROOM SUPPLY.	SF 01





UNDERWOOD KEBBLE
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FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS LONDON
SYSTEM	BASEMENT GENERAL SUPPLY SFO2

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

Dated



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	Basement General Supply SF02

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>		<u>FANS</u>	
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>		
4. V BELTS:	<input checked="" type="checkbox"/>	<u>MOTORS</u>	<input checked="" type="checkbox"/>
(i) TENSIONED	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>		
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	<u>SYSTEM CHECKS</u>	<input checked="" type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
10. FILTERS:	<input checked="" type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(i) FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>		
<u>MOTORS (VISUAL CHECKS)</u>			
1. ELECTRICAL CONNECTIONS:			
(i) O'LOADS CORRECT	<input type="checkbox"/>		
(ii) TERMINALS SECURE	<input type="checkbox"/>		
(iii) COVER FITTED	<input type="checkbox"/>		

SATISFACTORY	NOT APPLICABLE	ACTION REQUIRED
✓	X	O
TEST ENGINEER MR	DATE 23/8/98	SHT. 2 OF 8



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING.
PROJECT	S-7 CARLTON GARDENS.
SYSTEM	BASEMENT TOILET EXTRACT. EH07/142

THE ABOVE SYSTEM HAS BEEN BALANCED
USING A HOOD (150x150mm) & ANEMOMETER.
A FACTOR OF 0.826 HAS BEEN APPLIED
DUE TO CHANGES IN DESIGN & AREAS SERVED
THIS FAN IS NOW 149% OF DESIGN 0.160m³/s.
ORIGINAL SYSTEM DESIGN 0.220m³/s.
NOTE
SYSTEM IS EXCESSIVELY NOISY.

CALIBRATED INSTRUMENTS USED:-

ANEMOMETER UKA004.

MICROMANOMETER TS26

AMPHROBE UKA04



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	BASEMENT TOILET EXTRACT EXH07/1.		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573923 / 158
FAN TYPE	CENTRIFUGAL UNIT	PITCH ANGLE	N/A PP.
SIZE	TF / DT F1		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.260	150
DESIGN SYSTEM VOLUME		0.160	
TESTED SYSTEM VOLUME & PRESSURE		0.242 @ 15% Dis. 06 Suct. 295	Total 301

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	No DETAIL.
VOLTAGE	240 / 1 / 50	POWER	0.75
FULL LOAD CURRENT	1.9	RUNNING CURRENT	1.8.
DESIGN SPEED	1400		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	— " —	QUANTITY	— " —
	MOTOR		FAN
PULLEY DIA.	— " —		— " —
SHAFT DIA	— " —		— " —
BUSH REF.	— " —		— " —
MEAS. RPM	No Access		No Access.

STARTER

M'FACTURER	TELE MECANIQUE	TYPE	D.O.L.
O/L RANGE	1.6 TO 2.0	O/L SETTING	1.9
TIMER	N/A PP.	FUSE RATING	6A 1P.

COMMENTS

INSTRUMENT REFS:-

TEST ENGINEER M.B. DATE 20/3/99 SHT. 4 OF 12

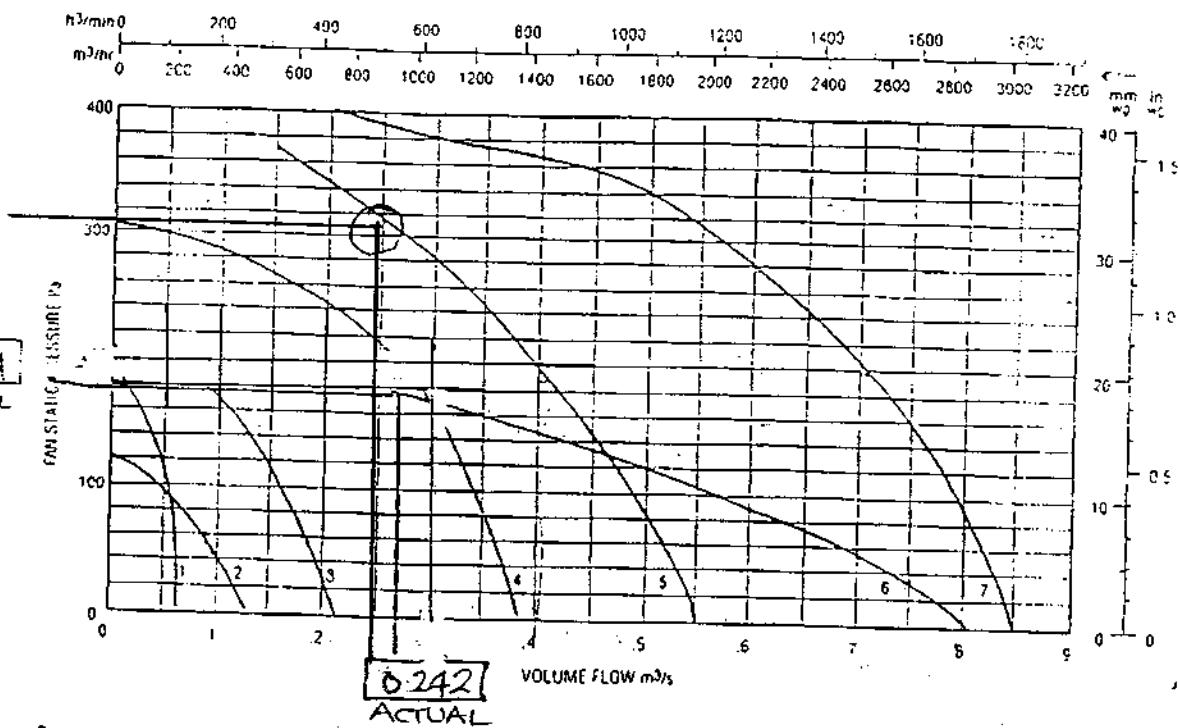
EXH 07/1

PARALLEL FAN UNITS

DIRECT DRIVE UNITS



Fan Performance



Electrical Data (220-240 V / 50Hz/1φ)

Code	Watts Input	Starting Current* (A)	Running current (A)	Speed rev/min
TF/DTF1	75	0.76x2	0.52	2000
TF/DTF2	170	1.8x2	1.1	1275
TF/DTF3	225	2.3x2	1.5	1275
TF/DTF4	350	3.1x2	1.6	1350
TF/DTF5	700	6.9x2	3.1	1350
TF/DTF6	840	6.9x2	3.1	940
TF/DTF7	1420	13.6x2	6.2	1400

Enquire for other voltages and frequencies.

*Momentarily both fans will start (indiv start only).

Sound Power Level Spectra in dB re 1 pW

Code	Octave Band Centre Frequency								Sound Level dBA @ 3 m	Breakout Sound Level dBA @ 3 m
	63	125	250	500	1K	2K	4K	8K		
TF/DTF-1A	67	65	62	59	55	53	50	47	44	39
TF/DTF-1AL	67	65	62	58	52	49	46	44	42	37
TF/DTF-2A	67	65	58	51	53	52	50	47	42	37
TF/DTF-2AL	67	65	58	50	50	48	46	44	39	34
TF/DTF-3A	68	66	59	50	54	53	51	48	43	38
TF/DTF-3AL	68	66	59	49	51	49	47	45	40	35
TF/DTF-4A	72	70	63	54	58	57	55	52	47	39
TF/DTF-4AL	72	70	63	53	55	53	51	49	44	36
TF/DTF-5A	74	72	65	56	60	58	57	54	49	41
TF/DTF-5AL	74	72	65	55	57	55	53	51	47	39
TF/DTF-6A	79	75	73	70	71	71	65	63	58	50
TF/DTF-6AL	79	75	73	69	68	67	61	59	54	46
TF/DTF-7A	89	85	75	75	79	80	76	70	66	60
TF/DTF-7AL	89	85	75	74	76	76	72	66	64	56

*See note on Sound Levels, Page 3

Sound pressure levels are expressed in dBA @ 1m distance.
The overall sound pressure level is calculated by summing up all octave bands.

Model ref A1 = Acoustically Damped (P1)
Model ref A = Unlined Unit

SHEET 5 OF 12



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT TOILET EXTRACT EXH07/2

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	1573923 / 15Y
FAN TYPE	CENTRIFUGAL UNIT	PITCH ANGLE	N/A.P.P.
SIZE	TF1 DTF1		
SPECIFIED VOLUME & PRESSURE		m³/sec	Pascals
DESIGN SYSTEM VOLUME		0.260	150
TESTED SYSTEM VOLUME & PRESSURE		0.160	
		0.238 @ 149	Dis. 04 Suct. 272
			Total 276 ΔP.

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	NO DETAIL
VOLTAGE	240 / 1 50	POWER	0.75
FULL LOAD CURRENT	1.9	RUNNING CURRENT	1.7
DESIGN SPEED	1400		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	— 1 —	QUANTITY	— 1 —
	MOTOR		FAN
PULLEY DIA.	— 1 —	— 1 —	— 1 —
SHAFT DIA	— 1 —	— 1 —	— 1 —
BUSH REF.	— 1 —	— 1 —	— 1 —
MEAS. RPM	No Access		No Access

STARTER

M'FACTURER	TELE MECANIQUE	TYPE	D.O.L.
O/L RANGE	1.6 - 2.5	O/L SETTING	1.9
TIMER	N/A.P.P.	FUSE RATING	6 A.H.P.

COMMENTS

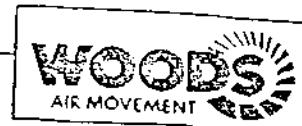
INSTRUMENT REFS:-

TEST ENGINEER M.B. DATE 20/3/99 SHT. 6 OF 12

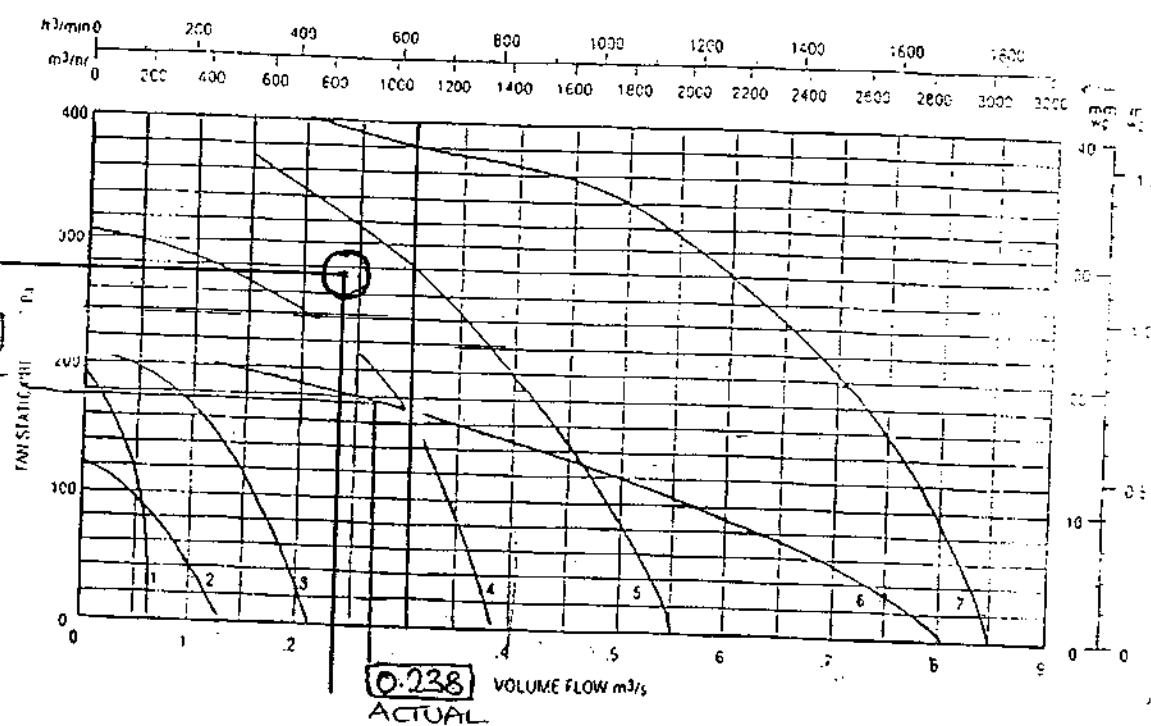
PARALLEL FAN UNITS

EXH 07/2

DIRECT DRIVE UNITS



Fan Performance



Electrical Data (220-240 V / 50Hz / 1φ)

Code	Watts Input	Starting Current* (A)	Running current (A)	Speed rev/min
TF/DTF1	75	0.75x2	0.52	
TF/DTF2	170	1.8x2	1.1	2000
TF/DTF3	225	2.3x2	1.5	1275
TF/DTF4	350	3.1x2	1.6	1275
TF/DTF5	700	6.9x2	3.1	1350
TF/DTF6	640	6.9x2	3.1	1250
TF/DTF7	1420	13.6x2	6.2	940

Enquire for other voltages and frequencies.

*Momentarily both fans will start (initial start only).

Sound Power Level Spectra in dB re 1 pW

Code	Octave Band Centre Frequency								Sound Level dBA @ 3 m	Breakout Sound Level dBA @ 3 m
	63	125	250	500	1K	2K	4K	8K		
TF/DTF-1A	67	65	62	59	55	53	50	47	44	39
TF/DTF-1AL	67	65	62	58	52	49	46	44	42	37
TF/DTF-2A	67	65	58	51	53	52	50	47	42	37
TF/DTF-2AL	67	65	58	50	50	48	46	44	42	37
TF/DTF-3A	68	66	59	50	54	53	51	48	39	34
TF/DTF-3AL	68	66	59	50	51	49	47	45	40	38
TF/DTF-4A	72	70	63	49	51	49	47	45	40	35
TF/DTF-4AL	72	70	63	54	58	57	55	52	47	36
TF/DTF-5A	74	72	65	53	55	53	51	49	44	36
TF/DTF-5AL	74	72	65	56	60	59	57	54	49	41
TF/DTF-6A	79	75	65	55	57	55	53	51	47	39
TF/DTF-6AL	79	75	73	70	71	71	65	63	52	50
TF/DTF-7A	69	65	73	69	68	67	61	59	54	46
TF/DTF-7AL	69	65	73	75	79	80	71	68	58	51

Sound level in octave bands measured at 1m.

Sound pressure level measured at 1m distance in dB re 1 pW. All figures are approximate and subject to +/- 3dB variation.



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SCULL ENGINEERING				
PROJECT	5-7 CARLTON GARDENS				
SYSTEM	BASEMENT TOILET EXTRACT EXH07/1				

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
FAN INLET	0.160	280	0.062	2.58

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.665*dia	d6 0.968*dia
a	4.1	4.1	4.0	4.0	3.6	3.2
b	3.8	4.0	4.1	4.2	3.9	3.8
c						
d	7.9	8.1	8.1	8.2	7.5	7.0
	TOTAL 46.8					

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.90	0.242	151	260

COMMENTS/ TP. LOCATION

INSTRUMENT REF:

TEST ENGINEER

M.B

DATE 20/3/99 SHT. 8 OF 12



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SCULL ENGINEERING				
PROJECT	5-7 CARLTON GARDENS				
SYSTEM	BASEMENT TOILET EXTRACT EXHOT 1/2				

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
FAN INLET	0.160	280	0.062	2.58

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	d6 0.968*dia
a	4.0	4.0	4.0	3.9	3.5	3.1
b	3.8	4.0	4.0	4.1	3.9	3.8
c						
d	7.8	8.0	8.0	8.0	7.4	6.9
	TOTAL 46.1					

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.84	0.238	149	256

COMMENTS/ TP. LOCATION

FACTOR FOR ANEMOMETER:

$$\frac{\text{MICRO VOL}}{\text{ANNE VOL}} = \frac{0.238 \text{ m}^3/\text{s}}{0.288 \text{ m}^3/\text{s}} = 0.826$$

INSTRUMENT REF:-

TEST ENGINEER

m B

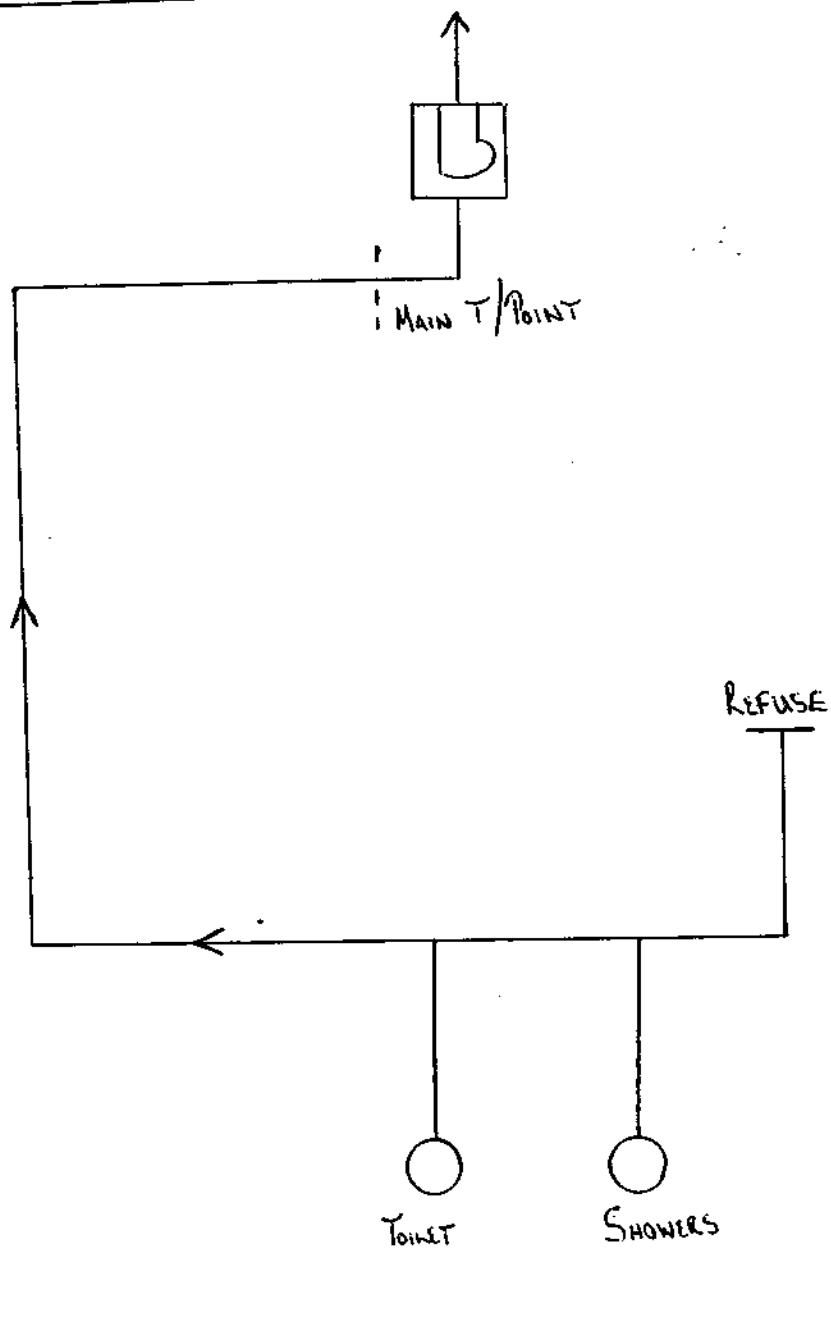
DATE 20/8/79

SHT. 9 OF 12



SCHEMATIC/NOTE SHEET

CLIENT	DRAVE & SCHAFF ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT TOILET EXTRACT EXH07.



TEST ENGINEER

m.B.

DATE 20/8/99

SHT. 10 OF 12



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7 CARLTON GARDENS
SYSTEM	BASEMENT TOILET EXTRACT Ex H107.

INSTRUMENT REFS:- WKA04

TEST ENGINEER

DATE 20/8/99 SHT. 11 OF 12



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SKULL ENGINEERING.				
PROJECT	5-7 CARLTON GARDENS.				
SYSTEM	BASEMENT TOILET EXTRACT EXH07/2				

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
1	0.22	280	0.062	3.55

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	d6 0.968*dia
a	3.4	5.0	5.3	5.3	5.1	4.6
b	3.6	4.5	5.3	5.3	5.2	7.0
c						
d						
	TOTAL 59.6					

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.97	0.308	140	-220

COMMENTS/ TP. LOCATION

ABOVE TEST PERFORMED WITH ALL DAMPERS &
V.C.D'S FULLY OPEN.

INSTRUMENT PFT

TEST ENGINEER R. BEEN

DATE 17-06-99, SHT. 12 OF 12



DUCT TRAVERSE

CLIENT	DRAKE & SCULL.		
PROJECT	5-7 CARLTON GARDENS.		
SYSTEM	BASEMENT GENERAL SUPPLY SFOZ.		

TP REF	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
Main.	0.311	355d	0.099m²	3.14

VELOCITY PROFILE(m/s)



A	S4	B	C	D	E	F	G	H
1	5.4	5.1		6.0	5.8			
2	5.3	5.7		5.7	5.7			
3	5.2	5.2		5.7	5.5			
4	5.4	4.7		5.2	4.2			
5	5.4	4.1		5.0	3.9			
6	5.9	3.4		5.3	3.0			
7								
8								
9								
10	32.6	28.2		32.9	28.1		61.0	
						TOTAL	60.8	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
5.07	0.502	161%	100.

92.

COMMENTS/ TP. LOCATION

INLET DUCTWORK NOT CONNECTED. GRILLES NOT FITTED
INITIAL FAN TEST WITH ALL V.C.D'S & O.B.D'S
FULLY OPEN.

Set - 07
Dodge. 76.
173

INSTRUMENT REF:

TEST ENGINEER M. BURNELL DATE 22/4/99 SHT. OF

Woods Air Movement Limited
 Tufnell Way, Colchester, CO4 5AR, UK.
 Telephone: +44 (0)1206 544122
 Facsimile: +44 (0)1206 574434
 E-mail: enquiry@woods-fans.com
 Website: www.woods-fans.com



DRAKE & SCULL ENGINEERING LTD
 REDCLIFFE HOUSE
 10 WHITEHOUSE STREET
 BEDMINSTER
 BRISTOL
 AVON BS3 4AU
 SF02

DRAKE & SCULL LTD	LTD
25/09/1998 (16)	
ARJS	
Our Order No 573923/11X	
Date 15/10/98	

We submit herewith our Certificate of Test as required for
 your Order 12/5192 dated 13/08/98

Quantity	Description	Diameter	Impeller	Duct	Angle	Frame
1	35JM/16/2/5/14 3 L BT5	355mm	JML	L	+10	BT5
Speed	Poles	Supply	F L Amps	F L Watts	S C Amps	Cos 0
2840	2	380/420-50-3	.90/ 1.60	530	3.60/ 6.20	.85
TEST VOLTS	Capacitor	Winding Design	Flash Volts	Secs	TEST LIMITS	
400		A113AAC	1900	5		
Reference	Lt / Load Amps	Lt / Load Watts	RPM	Vac		
	0.48 0.49 0.47	262	2908		DUCT F.I.D	
	0.55 0.55 0.54	314	2884		AIR STALL	

We certify the above to be a true record and that the equipment has passed the flash test specified above, and has an insulation resistance above 10 Megohms.

Signed for and on behalf of
Tom Moray

WOODS AIR MOVEMENT LIMITED

Registered in England No. 233771.

Registered office as above

Holding Company—The General Electric Company, p.l.c.



BS EN ISO 9001



INVESTOR IN PEOPLE



MEMBER

a **SBC** company

P. No. 28383

JM AEROFOIL

BS 5750 Pt 1
EN 29001
ISO 9001

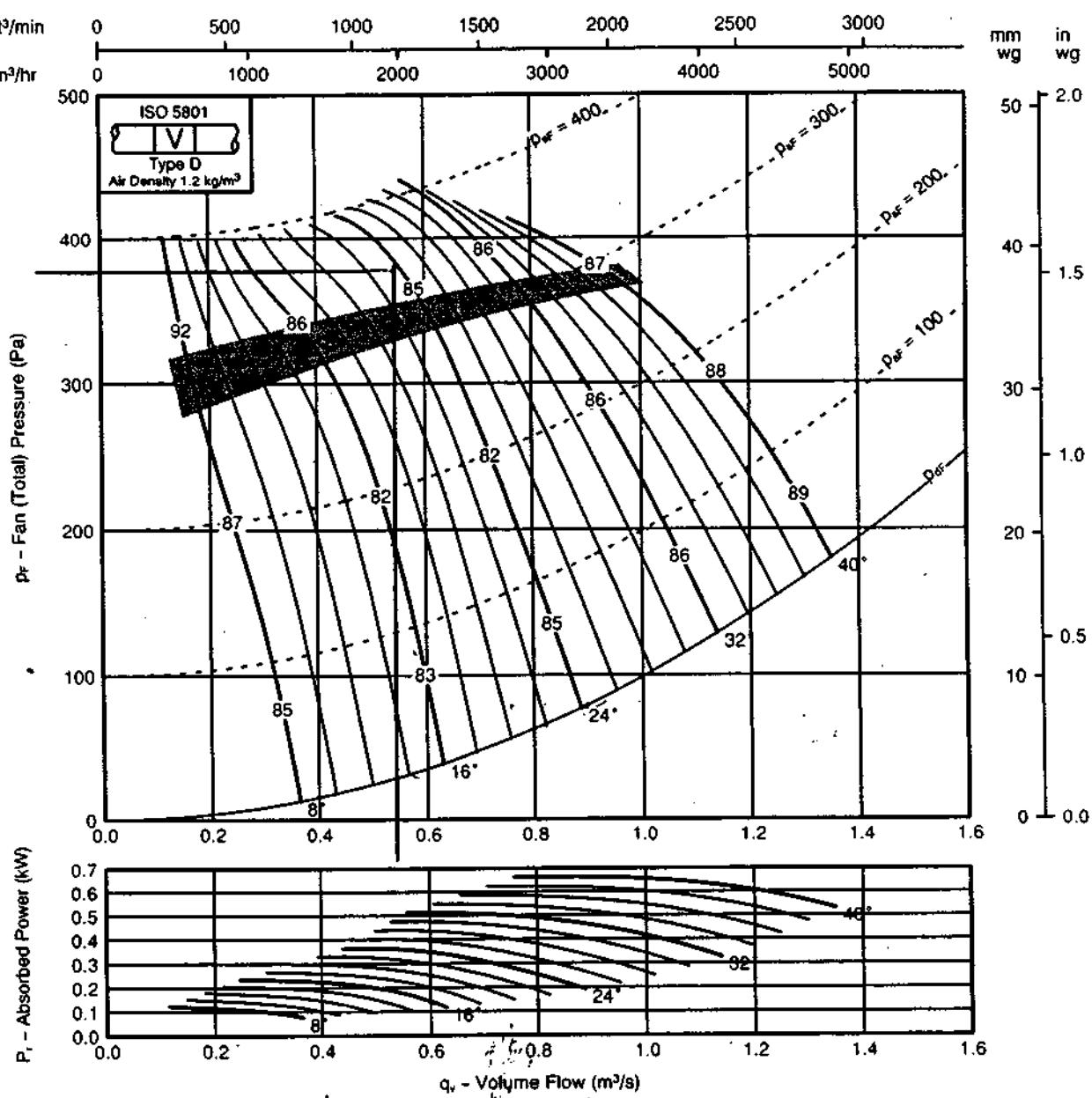
Fan Code: 31JM/16/2/5/...



315 mm 2840 rev/min 5 Blades 50 Hz

Performance Data ISO 5801:

Performance shown is specifically for fully ducted installations.

**Sound Data BS848 Part 2 1985:**

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
8	-12	-7	-6	-5	-9	-17	-24	-30	8	-10	-7	-3	-4	-8	-16	-24	-29
	-16	-13	-8	-8	-3	-11	-17	-25		-14	-12	-6	-8	-3	-11	-16	-23
16	-14	-11	-4	-9	-5	-14	-20	-27	16	-13	-11	-1	-8	-5	-13	-20	-27
	-15	-10	-5	-7	-7	-11	-15	-21		-13	-10	-2	-7	-6	-11	-15	-21
24 - 40	-9	-4	-6	-10	-12	-17	-20	-25	24 - 40	-7	-4	-6	-9	-11	-15	-18	-23
	-9	-7	-5	-10	-10	-14	-18	-23		-7	-6	-1	-9	-10	-13	-16	-22

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
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Fax No: 0171 9303364

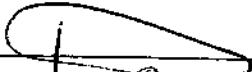
TO:	Name:	CHRIS TIFFIN
	Company:	CML
FAX NO:		MEMO
FROM:		MARK LAMBOURNE
NO: OF PAGES (Including this page)		7
DATE:		17 JUNE 99

RE CALUTON GARDENS

CHRIS

PLEASE FIND ATTACHED COMMISSIONING
SHEETS TIC FOR SF03 BMS ROOM SUPPLY
THE RESULTS INDICATE DESIGN HAS
BEEN ACHIEVED

REGARDS


Mark

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UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING	
PROJECT	CARLTON GARDENS LONDON	
SYSTEM	BMS SUPPLY FAN	SFO3

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative _____
for & on behalf of _____

Dated _____



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	BMS	Supply Fan	SF03

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>			
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>	<u>MOTORS</u>	
4. V BELTS:	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
(i) TENSIONED	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	<u>SYSTEM CHECKS</u>	
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
10. FILTERS:	<input checked="" type="checkbox"/>		
(i) FITTED	<input checked="" type="checkbox"/>		
(ii) CLEAN	<input checked="" type="checkbox"/>		
<u>MOTORS (VISUAL CHECKS)</u>			
1. ELECTRICAL CONNECTIONS:	<input checked="" type="checkbox"/>		
(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>		
(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>		
(iii) COVER FITTED	<input checked="" type="checkbox"/>		
<u>COMMENTS</u>			

<input checked="" type="checkbox"/>	SATISFACTORY	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input type="radio"/>	ACTION REQUIRED
TEST ENGINEER	D. McClellan		DATE	26/5/99	SHT. 2 OF 6



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING	
PROJECT	5-7 CARLTON GARDENS.	
SYSTEM	BMS SUPPLY.	SF3.

FAN

MANUFACTURER	Woods	IDENT/SERIAL No	
FAN TYPE	AXIAL	PITCH ANGLE	80
SIZE	31/JM/16/2/S/8		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.05	200
DESIGN SYSTEM VOLUME		0.05	
TESTED SYSTEM VOLUME & PRESSURE		0.05@100%	Dis. 186. Suct. 168
		Total	554

MOTOR

MANUFACTURER	Woods	IDENT/SERIAL No	S78923112R
VOLTAGE	415/3/50	POWER	0.23 kW
FULL LOAD CURRENT	0.6	RUNNING CURRENT	0.4
DESIGN SPEED	2840		

DRIVE

MANUFACTURER	DIRECT DRIVE	TYPE	1
BELT SIZE	1	QUANTITY	"
	MOTOR		FAN
PULLEY DIA.	N/A/P		N/A/P
SHAFT DIA	N/A/P		N/A/P
BUSH REF.	N/A/P		N/A/P
MEAS. RPM	NO ACCESS		NO ACCESS

STARTER

MANUFACTURER	TELE-MECANIQUE	TYPE	D.O.L
O/L RANGE	1.6-2.5	O/L SETTING	1.6
TIMER	N/A/P	FUSE RATING	

COMMENTS

* OVERLOAD RANGE AMPS TO HIGH

RED

Yellow

Blue

INSTRUMENT REFS:-

TEST ENGINEER

D. McCLEAN

DATE 26/5/99

SHT. 3 OF 6

GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BMS SUPPLY SF04

INSTRUMENT REFS:-

TEST ENGINEER D. Macc (con)

DATE

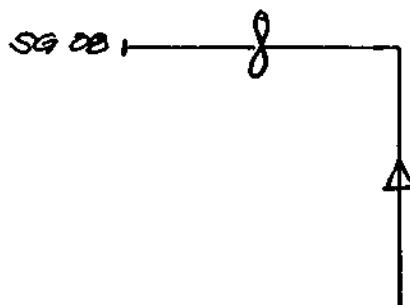
26/5/99

SHT.5 OF 6



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BMS SUPPLY SF 3.



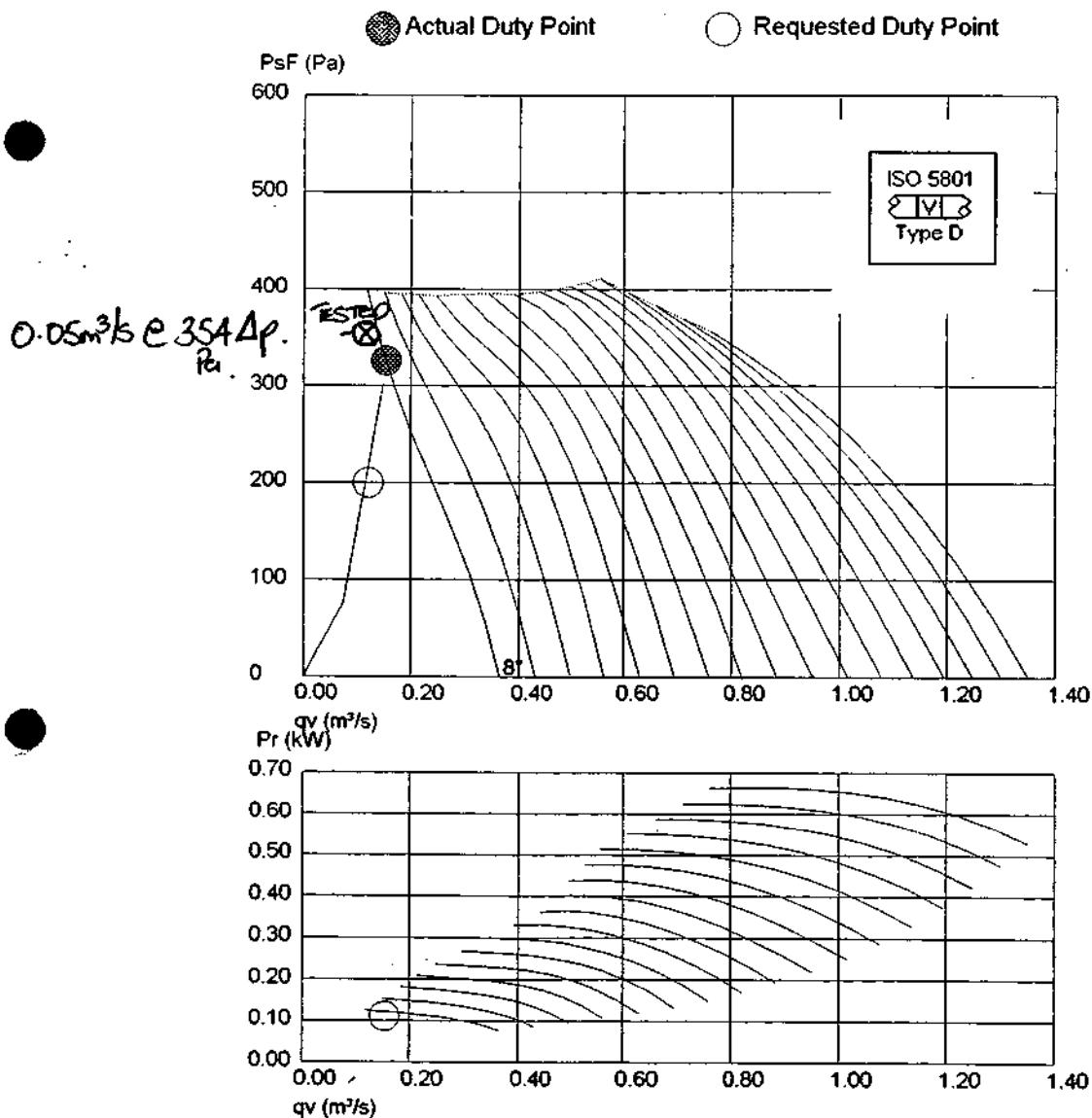
WOODS OF COLCHESTER LTD.



JM AEROFOIL

Quote Number : QOPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 31JM/16/2/5/8

Date: 12/08/98
 Fan Reference : SF03



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 PF Fan (Total) Pressure, qv Volume Flow Rate

Woods of Colchester Ltd.

Tufnell Way, Colchester, Essex, CO4 5AR, England

Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

a SGC group company

Copyright Woods of Colchester Ltd. England 1997
 Fan Selector v1.1.05

JM AEROFOIL



Fan Code: 31JM/16/2/5/...

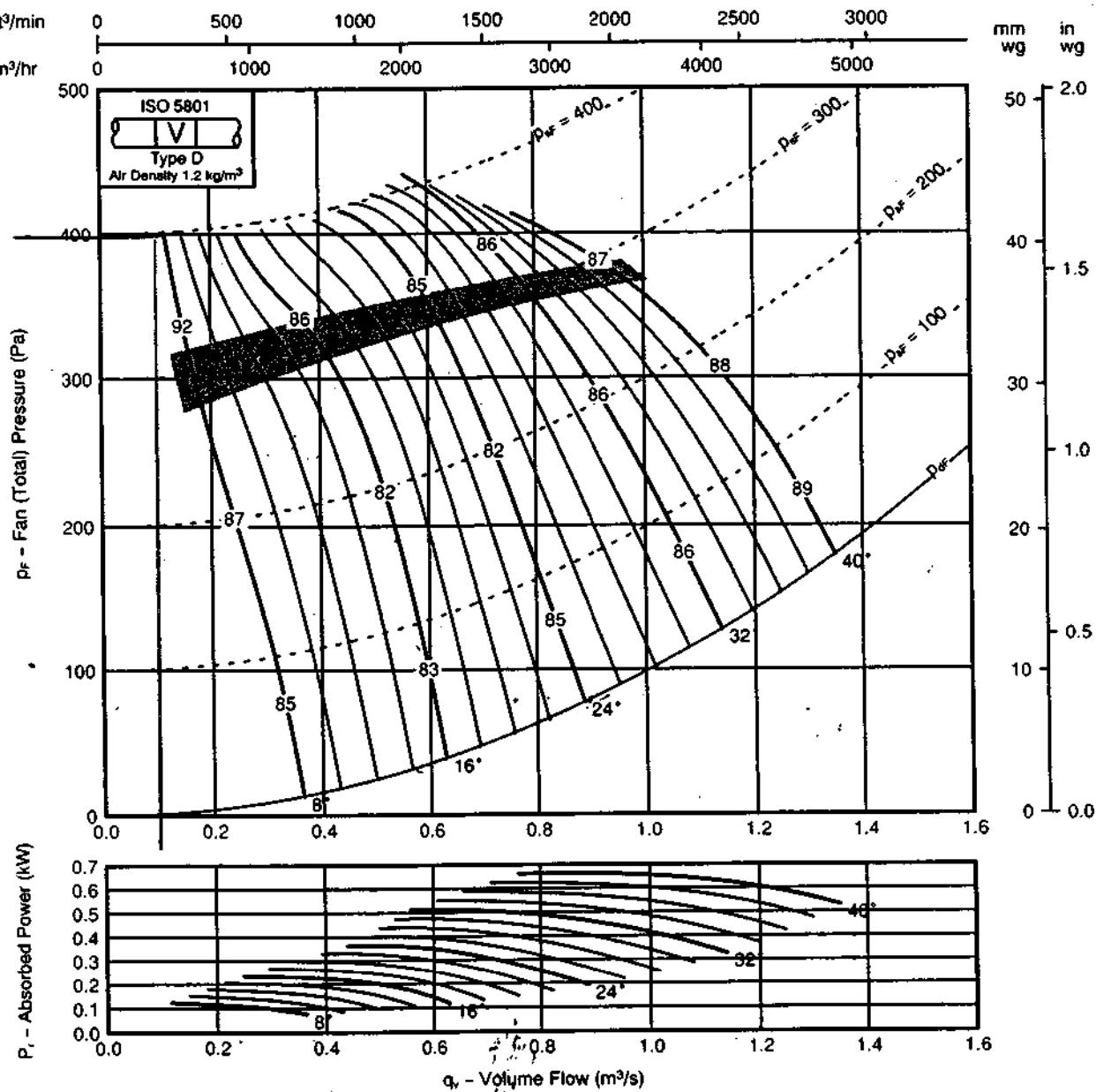


BS 5750 Pt 1
EN 29001
ISO 9001

315 mm 2840 rev/min 5 Blades 50 Hz

Performance Data ISO 5801:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		-10	-7	-3	-4	-5	-16	-24	-29
8	-12	-7	-6	-5	-9	-17	-24	-30	8	-14	-12	-6	-8	-3	-11	-16	-23
	-16	-13	-8	-6	-3	-11	-17	-25		-13	-10	-2	-7	-6	-11	-20	-27
16	-14	-11	-4	-9	-5	-14	-20	-27	16	-13	-11	-1	-8	-5	-13	-20	-21
	-15	-10	-5	-7	-7	-11	-15	-21		-13	-10	-2	-7	-6	-11	-15	-22
24 - 40	-9	-4	-6	-10	-12	-17	-20	-25	24 - 40	-7	-4	-5	-9	-11	-15	-18	-23
	-9	-7	-5	-10	-10	-14	-18	-23		-7	-6	-1	-9	-10	-13	-16	-22

Drake & Scull Engineering (UK) Ltd
 Home Counties Area Office
 One Shenley Pavilions Chalkdell Drive
 Shenley Wood Milton Keynes MK5 6LB
 Telephone: 01908 506 005
 Estimating Facsimile: 01908 504 669
 Email: lizaldrake-scull.co.uk

MWP LTD. 30 JUN 1999

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to sit
 Telephone No: 0171 930 336
 Fax No: 0171 930336

TO:	Name:	CHRIS TUFFIN
	Company:	CML
FAX NO:		MEMO
FROM:		MARK LAMBOURNE
NO: OF PAGES (Including this page)		7
DATE:		17 JUNE 99

RE. CARLTON GARDENS.

CHRIS

PLEASE FIND ATTACHED COMMISSIONING
 SHEETS ETC FOR SF03 BMS ROOM SUPPLY
 THE RESULTS INDICATE DESIGN HAS
 BEEN ACHIEVED.

REGARDS

Mta

"Y"

IN ACCORDANCE WITH
OAP STANDARD SPEC

J EH 29/6/99.



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCOTT ENGINEERING
PROJECT	CARLTON GARDENS LONDON
SYSTEM	BMS SUPPLY FAN SFC3

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

D. McClanahan

NACG LTD.

27.5.99.

Dated



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BMS SUPPLY FAN SF03

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>			
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
4. V BELTS:	<input checked="" type="checkbox"/>	<u>MOTORS</u>	<input checked="" type="checkbox"/>
(i) TENSIONED	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	<u>SYSTEM CHECKS</u>	<input checked="" type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
10. FILTERS:	<input checked="" type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(i) FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>		
<u>MOTORS (VISUAL CHECKS)</u>			
1. ELECTRICAL CONNECTIONS:	<input checked="" type="checkbox"/>	WHAT ACTION?	
(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
(iii) COVER FITTED	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<u>COMMENTS</u>			



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	S-7 CARLTON GARDENS.		
SYSTEM	BMS SUPPLY.	SF3.	

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	
FAN TYPE	AXIAL	PITCH ANGLE	8°
SIZE	31/5M/16/2/S/8		
ESCIIFIED VOLUME & PRESSURE		m³/sec	Pascals
DESIGN SYSTEM VOLUME		0.05	200
TESTED SYSTEM VOLUME & PRESSURE		0.05 @ 100%	Dis. 186 Suct. 168
		Total	554

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	S7892312R
VOLTAGE	415/3/50	POWER	0.23 kw.
FULL LOAD CURRENT	0.6	RUNNING CURRENT	0.4
DESIGN SPEED	2840		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	"
BELT SIZE	"	QUANTITY	"
PULLEY DIA.	N/A/P	MOTOR	FAN
GHT DIA.	N/A/P		N/A/P
SHD REF.	N/A		N/A/P
MEAS. RPM	NO ACCESS		NO ACCESS

STARTER

M'FACTURER	TELE MÉCANIQUE	TYPE	D.O.C
O/L RANGE	16-25	O/L SETTING	16
TIMER	N/A/P	FUSE RATING	

COMMENTS

* OVERLOAD RANGE AMPS TO HIGH

RED

Yellow

Blue

✓ DTS To Ensure
Access Is Provided.

INSTRUMENT REFS:-

TEST ENGINEER D. MILLER DATE 26/5/49 SHT. 3 OF 6

GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BMS SUPPLY SF04

DOCUMENT REFS:-

IT ENGINEER

2000s

DATE

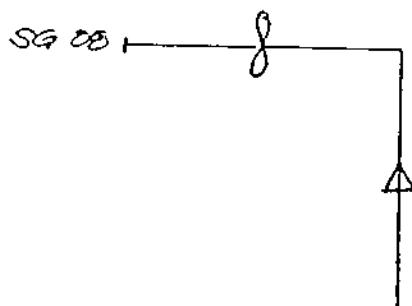
26/5/97

SHT.5 OF 6



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BMS SUPPLY SF 3.



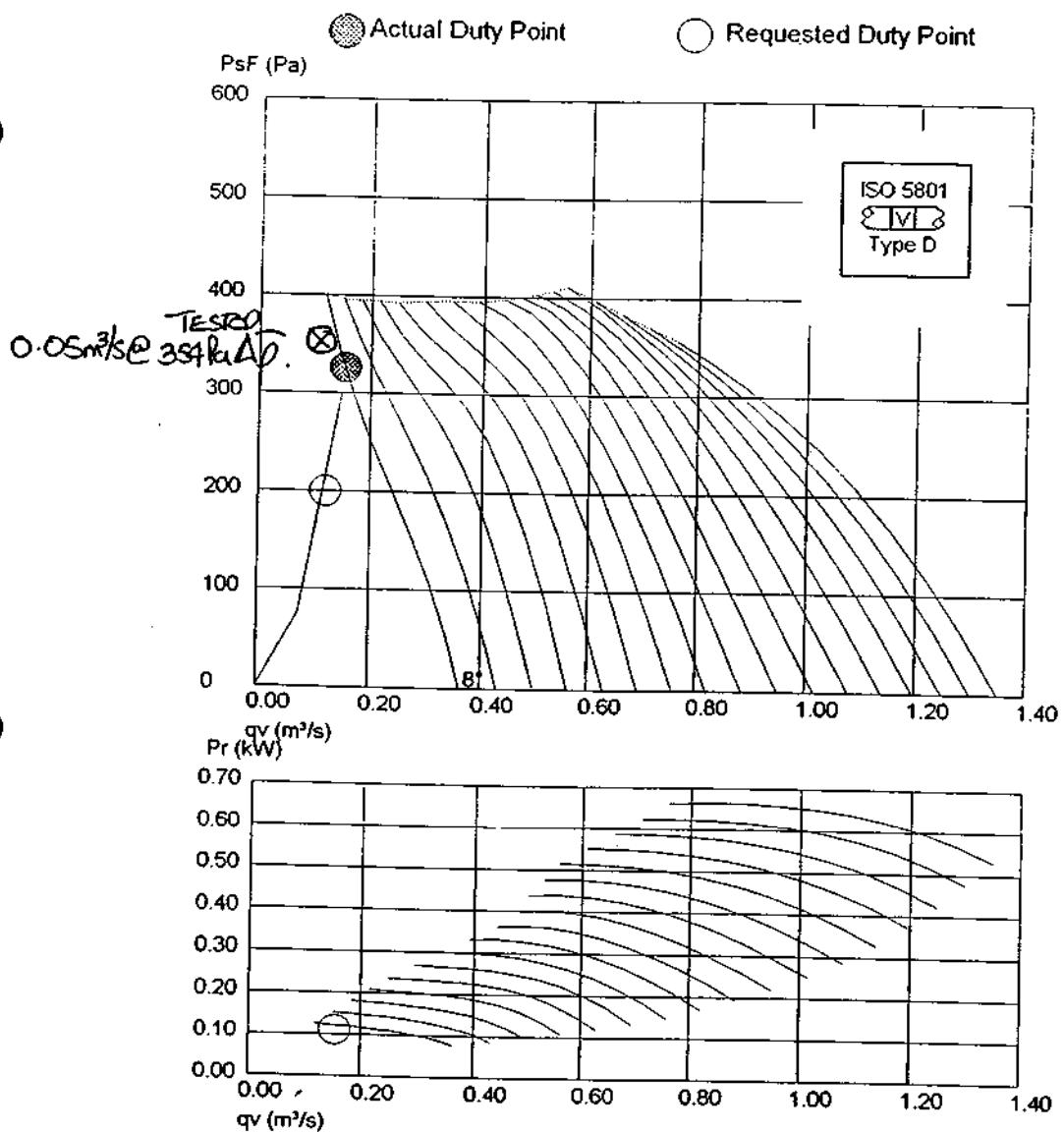
WOODS OF COLCHESTER LTD.

JM AEROFOIL



Quote Number : QPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 31JM/16/2/5/8

Date: 12/08/98
 Fan Reference : SF03



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 Pf Fan (Total) Pressure, qv Volume Flow Rate

Woods of Colchester Ltd.

Tufnell Way, Colchester, Essex, CO4 5AR, England

Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

Copyright Woods of Colchester Ltd. England 1997
 Fan Selector v1.1.05

• **SEC** group company

Woods Air Movement Limited

Tufnell Way, Colchester, CO4 5AR, UK.
 Telephone: +44 (0)1206 544122
 Facsimile: +44 (0)1206 574434
 E-mail: enquiry@woods-fans.com
 Website: www.woods-fans.com



DRAKE & SCULL ENGINEERING LTD
 REDCLIFFE HOUSE
 10 WHITEHOUSE STREET
 BEDMINSTER
 BRISTOL
 AVON BS3 4AU
 SF03

CERTIFICATE OF TEST

Our Order No 573923/12R

Date 28/09/98

We submit herewith our Certificate of Test as required for
 your Order 12/5192 dated 13/08/98

Quantity	Description	Diameter	Impeller	Duct	Angle	Frame
1	31JM/16/2/5/8-16 3 L BT5	315mm	JML	L	+ 8	BT5
Speed	Poles	Supply	F L Amps	F L Watts	S C Amps	Cos 0
2840	2	380/420-50-3	.60 / 1.00	350	3.00 / 5.20	.85
TEST VOLTS	Capacitor	Winding Design	Flash volts	Secs	TEST LIMITS	
400		A113AAD	1900	5		
Reference	Lt / Load Amps	Lt / Load Watts	RPM	Vac	DUCT F.I.D	
	0.29 0.29	0.30 160	2920		AIR STALL	
	NO INCREASE					

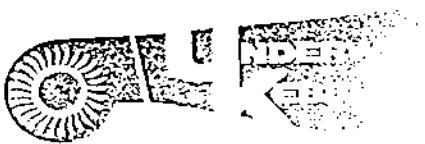
Drake & Scull Engineering (UK) Ltd	
Bristol	
- 1 OCT 1998	
Received:	
Date:	
By:	
AMCO	AMCO

We certify the above to be a true record and that the equipment has passed the flash test specified above, and has an insulation resistance above 10 Megohms

Signed for and on behalf of

Tom Morley

WOODS AIR MOVEMENT LIMITED



UNDERWOOD KEBBLE
ENGINEERING LTD

UNIT B4, THE SEEDBED CENTRE
DAVIDSON WAY, ROMFORD
ESSEX RM7 0AZ
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EXH01

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

Dated

Who witnessed?



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.	
PROJECT	5-7 CARLTON GARDENS	
SYSTEM	CARPARK EXTRACT	EX H01

PRE-RUNNING CHECKS		RUNNING CHECKS
<u>FANS</u>		
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS: (i) NOISY (ii) RUNNING HOT
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING
3. PULLEYS: (i) TIGHT ON SHAFT (ii) ALIGNED	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<u>MOTORS</u>
4. V BELTS: (i) TENSIONED (ii) ALL SIMILAR	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	1. BEARINGS: (i) NOISY (ii) RUNNING HOT
5. GUARDS: (i) SATISFACTORY	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>	<u>SYSTEM CHECKS</u>
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN
9. DRAINS: (i) FREE FROM OBSTRUCTION (ii) CLEAN (iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN
10. FILTERS: (i) FITTED (ii) CLEAN	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN
<u>MOTORS (VISUAL CHECKS)</u>		5. PRESSURE TEST CERTS COMPLETE
1. ELECTRICAL CONNECTIONS: (i) O'LOADS CORRECT (ii) TERMINALS SECURE (iii) COVER FITTED	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	6. DIFFUSER FITTED
		7. FLEXIBLE CONNS FITTED

COMMENTS				
OVERLOAD RANGE ON HIGH SPEED TOO LOW MOTOR F.L.C. 19.6A. OVERLOAD RANGE 9.0A TO 13.0A.				
SATISFACTORY	X	NOT APPLICABLE	O	ACTION REQUIRED
TEST ENGINEER	M. BESWELL	DATE	9/7/99	SHT. 2 OF 20



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EX-HO1

THE ABOVE SYSTEM HAS BEEN BALANCED USING AN ANEMOMETER DIRECTLY ONTO THE GRILLE FACE. WITH THE LIFT MOTOR ROOM BEING THE ONLY EXCEPTION WHICH HAS BEEN BALANCED USING A PIOT TRAVERSE.

CALIBRATED INSTRUMENTS USED .

MICROMANOMETER N° 7526
ANEMOMETER UK A004 .

PLEASE NOTE OVERLOAD RANGE ON HIGH SPEED CONTACTOR TOO LOW. F.L.C. 19.3A OVERLOAD RANGE 9.0 TO 13.0A



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT EXHDL FAN 1.		

FAN

M'FACTURER	WOODS	IDENT/SERIAL NO	H00JM/25/4-6/9/14H
FAN TYPE	AXIAL	PITCH ANGLE	14°
SIZE	1000mm	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	8.702 / 5.232	480	/ 225
DESIGN SYSTEM VOLUME	8.702 / 5.232		
TESTED SYSTEM VOLUME & PRESSURE	6.594 / 4.418 @ 76% @ 84%	Dis. H 187 L 87	Suct. H 320 L 149 Total H 507 / L 236A

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL NO	573923/22H ①
VOLTAGE	415 / 50 / 3PH	POWER	10.0 KW
FULL LOAD CURRENT	H 19.3A L 7.6A	RUNNING CURRENT	H 13.0 / 13.4 / 13.4 L 5.8 5.6 5.8
DESIGN SPEED			

DRIVE

M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE
	MOTOR		FAN.
BELLY DIA.	— " —	— " —	— " —
SHAFT DIA	— " —	— " —	— " —
BUSH REF.	— " —	— " —	— " —
MEAS. RPM	No Access		No. Access

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	D.O.L.
OIL RANGE	H. 9.0A TO 13.0 A.U. L. 9.0A TO 10.0 A.U.	OIL SETTING	H. 13.0 A L. 7.6A
TIMER	1 SEC	FUSE RATING	32.0A

COMMENTS

HIGH SPEED OVER LOAD TOO LOW F.L.C. 19.3.A.U.

JM AEROFOIL

EXH01

FAN N° 1
HIGH SPEED



BS 5750 Pt 1
EN 29001
ISO 9001

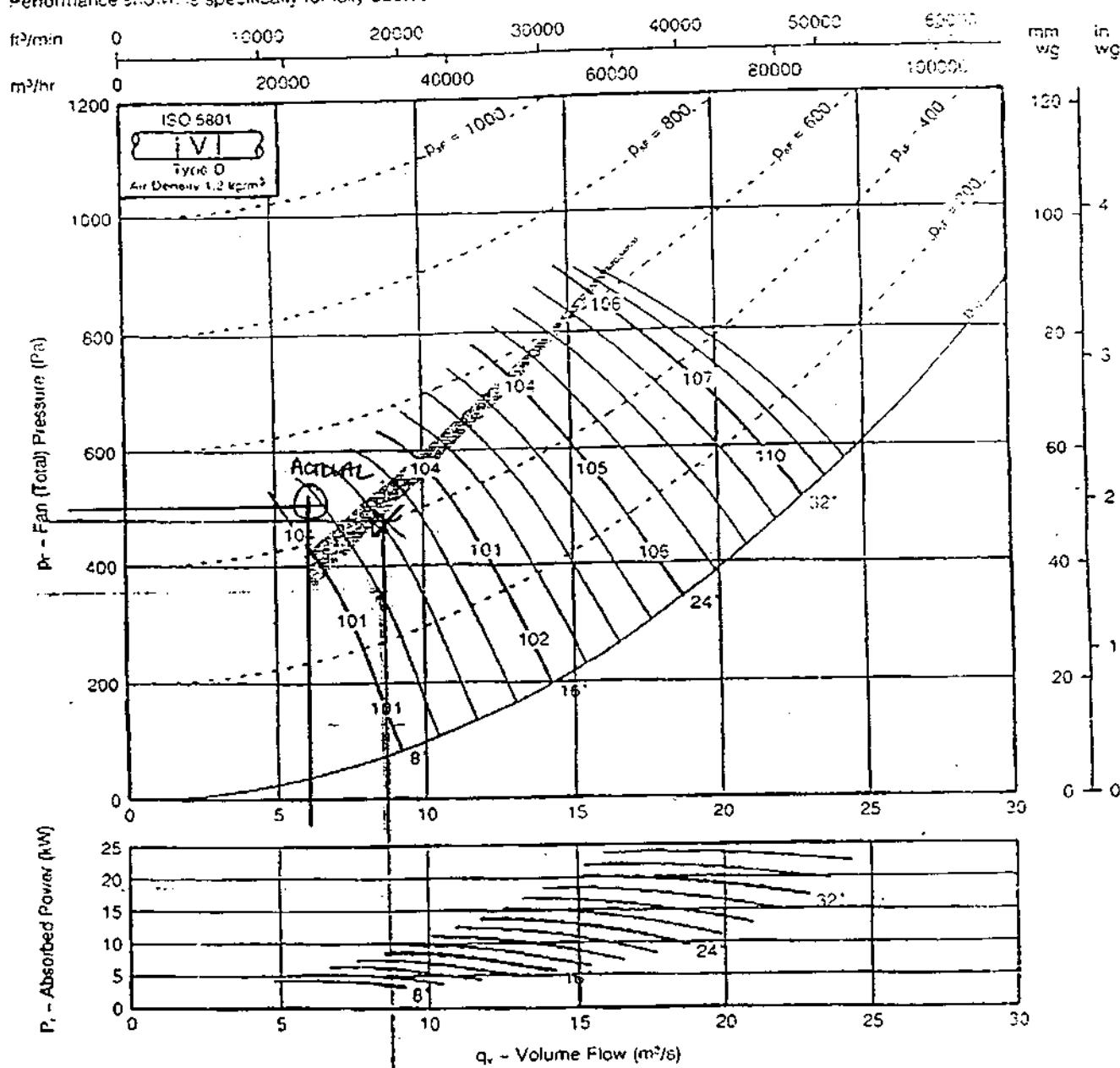
Fan Code: 100JM/25/4/9/...



1000 mm 1470 rev/min 9 Blades 50 Hz

Performance Data ISO 5801:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Pitch Angle	Inlet Levels								Pitch Angle	Outlet Levels									
	Octave Band Centre Frequency (Hz)										Octave Band Centre Frequency (Hz)								
	c3	125	250	500	1k	2k	4k	8k		c3	125	250	500	1k	2k	4k	8k		
6	-21	-21	-14	-9	-4	-1	-12	-19	6	-20	-20	-13	-10	-5	-11	-16	-13		
	-17	-18	-10	-10	-2	-5	-7	-15		-17	-16	-10	-7	-3	-13	-15	-13		
15	-12	-15	-12	-7	-4	-7	-12	-19	12	-14	-15	-12	-7	-5	-11	-17	-15		
	-10	-14	-8	-8	-7	-6	-10	-17		-13	-14	-10	-7	-4	-10	-16	-14		
24 + 36	-5	-6	-8	-8	-5	-6	-13	-16	24 + 36	-7	-9	-6	-4	-4	-6	-12	-10		
	-6	-8	-7	-7	-10	-10	-14	-16		-4	-7	-5	-3	-3	-5	-11	-9		

16-JUL-98 10:22

EXH C1

01703376661

Fan No |

WOODS
AIR MOVEMENTES 750 P1
EN 290/1
ISO 8231

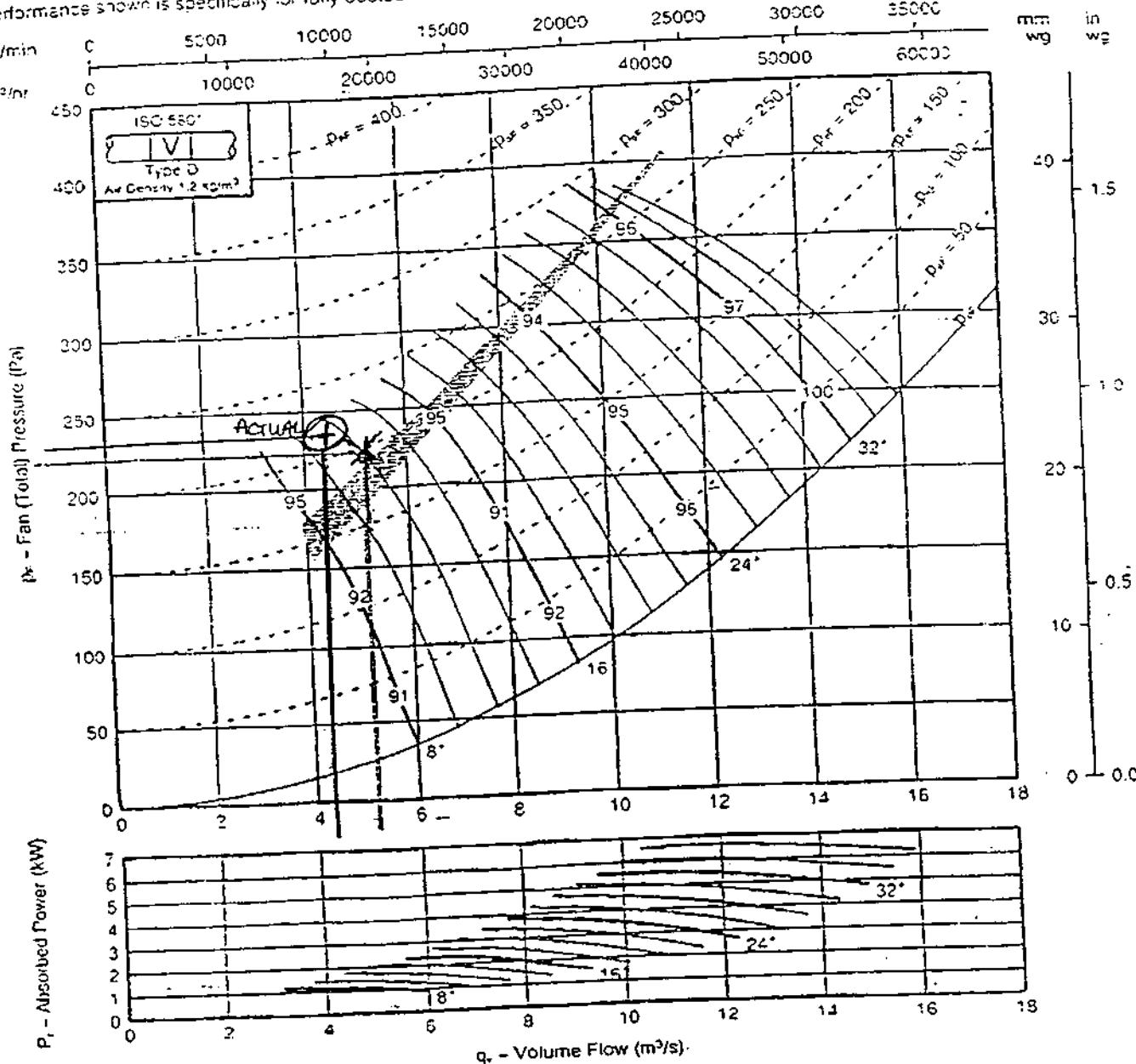
Fan Code: 100JM/25/6/9/...

1000 mm 960 rev/min 9 Blades 50 Hz

LOW SPEED

Performance Data ISO 5601:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Pitch Angle	Inlet Levels								Pitch Angle	Outlet Levels							
	Octave Band Centre Frequency (Hz)										Octave Band Centre Frequency (Hz)						
	63	125	250	500	1K	2K	4K	8K		63	125	250	500	1K	2K	4K	8K
8	-21	-4	-11	-4	-4	-9	-17	-23	8	-20	-12	-17	-2	-4	5	-16	-21
	-12	-10	-10	-8	-4	-8	-13	-16		-18	-6	-13	-6	-1	-5	-12	-17
16	-16	-2	-10	-4	-5	-10	-17	-24	15	-14	-12	-10	-4	-6	-3	-16	-22
	-16	-1	-2	-6	-7	-17	-15	-20		-10	-7	-6	-5	-7	-10	-14	-19
32 + 64	-2	-1	-5	-7	-7	-11	-15	-16	24 - 32	-7	-7	-8	-7	-7	-11	-12	-18
	-2	-1	-2	-9	-9	-12	-16	-20		-5	-5	-6	-5	-7	-12	-15	-18

C3-02-94

SF 5645

6 OF 20



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING.	
PROJECT	5-7 CARLTON GARDENS	
SYSTEM	CAR PARK EXTRACT EXHOL FAN 2.	

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	100JM/25/4-6/9/14H
FAN TYPE	AXIAL	PITCH ANGLE	14°
	1000MM		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	8702 / 5.232	480	/ 225
DESIGN SYSTEM VOLUME	8.702 / 5.232		
TESTED SYSTEM VOLUME & PRESSURE	6.402 / 4.216 @ 74% / 81%	Dis.H ⁹⁴ / 200 Suct. ¹²⁹ / 328 Total	H. 5284p L.223Ap

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	513923 / 22H (2)
VOLTAGE	415 / 50 / 3	POWER	10.0 KW
FULL LOAD CURRENT	H. 19.3A L. 7.6A	RUNNING CURRENT	H. 13.3, 13.4, 13.0. L. 5.6 5.8 5.8
DESIGN SPEED			

DRIVE

M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE
	MOTOR		FAN.
LELY DIA.	" "		" "
SHAFT DIA	" "		" "
BUSH REF.	" "		" "
MEAS. RPM	NO ACCESS		No ACCESS

STARTER

M'FACTURER	TELE MECANIQUE	TYPE	D.O.L.
O/L RANGE	H. 9.0A. TO 13.0A L. 3.0A. TO 10.0A	O/L SETTING	13.0A + 6A
TIMER	1 SEC	FUSE RATING	32.0A

COMMENTS

HIGH OVERLOAD RANGE TOO LOW. MOTOR F.L.C. 19.3AMP.

Jan N. Z.

HIGH SPEED.

JIM AFROFOIL

EXH 9



Fan Code: 100JM/25/4/9/...

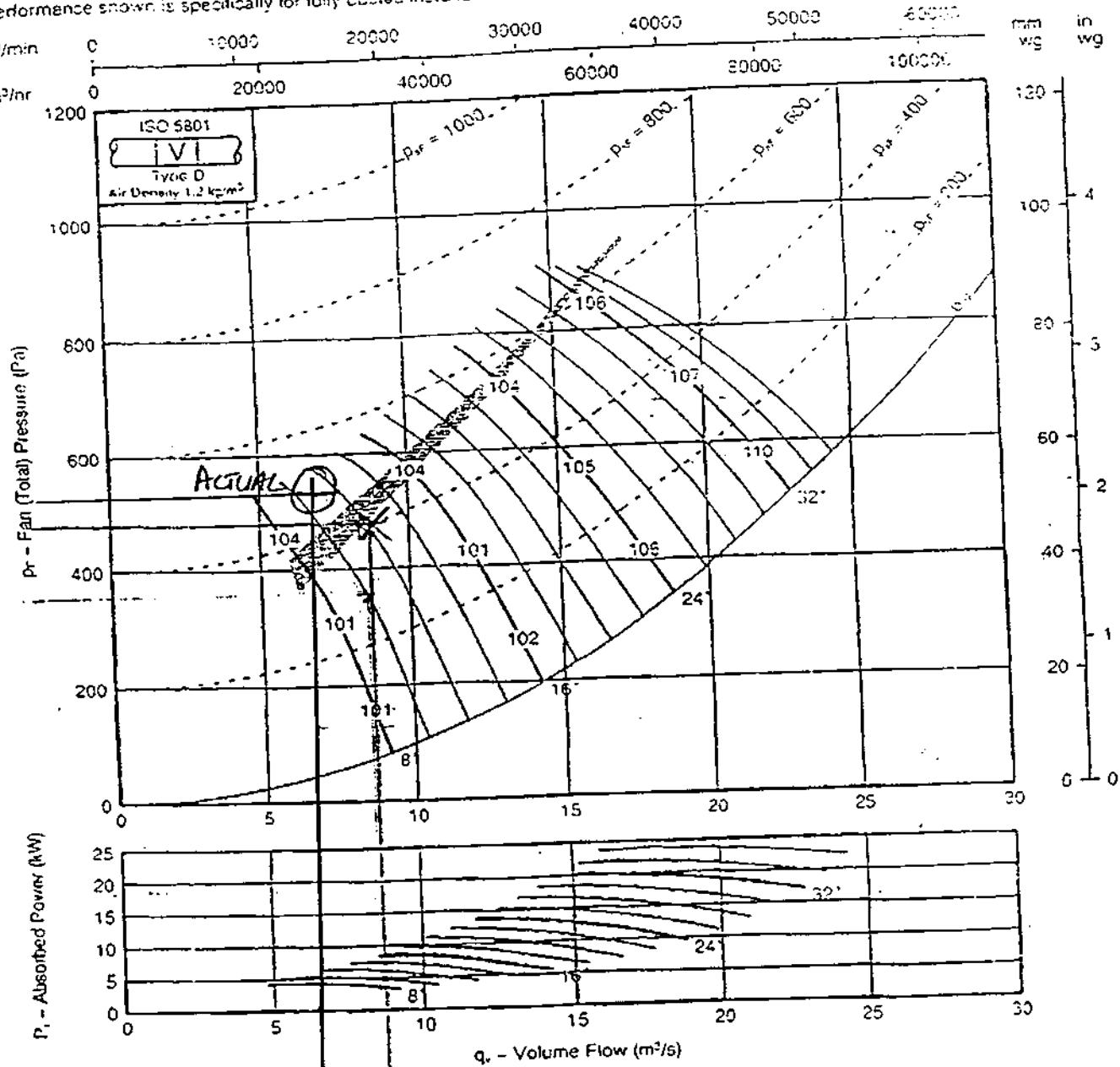
Fan Code: 1000mm
1000 mm 1470 rev/min 9 Blades 50 Hz



BS 5750 Pt
EN 20001
150 9001

Performance Data ISO 5801:

Performance Data Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

SOUND DATA BS5648 Part 2 1985.
Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
6	-21 -17	-19 -18	-14 -10	-9 -10	-4 -5	-6 -5	-12 -10	-19 -15	6	-22 -17	-30 -28	-10 -10	-10 -10	-15 -15	-15 -15	-15 -15	-15 -15
10	-15 -10	-14 -9	-12 -8	-7 -7	-4 -4	-7 -6	-12 -12	-19 -17	10	-14 -10	-6 -5	-12 -10	-10 -10	-15 -15	-15 -15	-15 -15	-15 -15
24 - 36	-6 -6	-6 -7	-8 -7	-8 -10	-5 -10	-6 -10	-10 -14	-16 -16	24 - 36	-7 -6	-9 -8	-10 -10	-10 -10	-14 -14	-14 -14	-14 -14	-14 -14

16-JUL-98 19:00

EXH C1

01702370601

FAN N°C

WOODS
AIR MOVEMENTES 27001 P1
EN 25001
ISO 2001

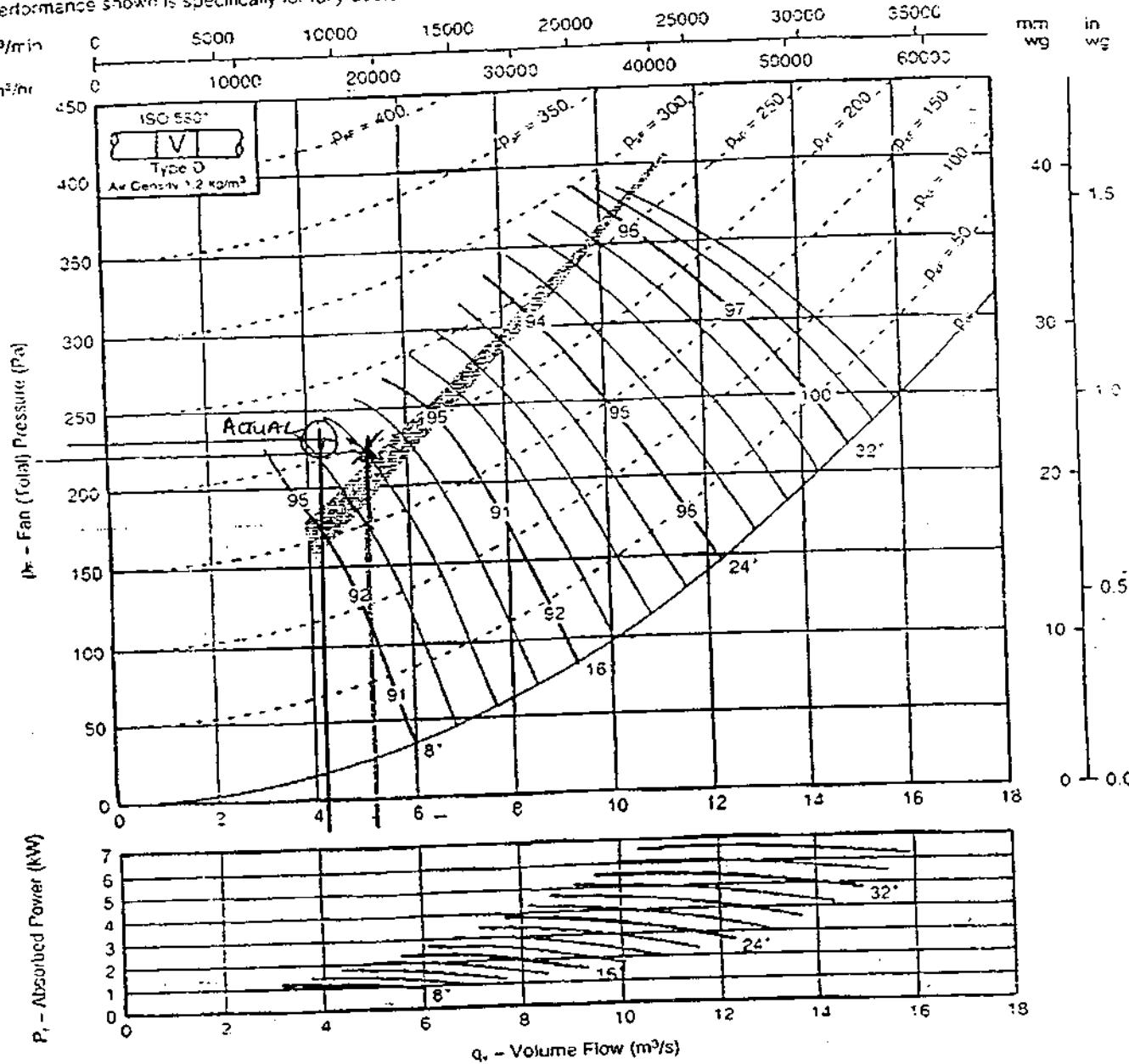
Fan Code: 100JM/25/6/9/...

1000 mm 960 rev/min 9 Blades 50 Hz

LOW SPEED

Performance Data ISO 5601:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Pitch Angle	Inlet Levels								Pitch Angle	Outlet Levels							
	Octave Band Centre Frequency (Hz)										Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
8°	-21	-4	-11	-4	-4	-9	-12	-13	8	-25	-12	-11	-4	-4	5	-16	-21
	19	-10	-10	-8	-1	-8	-13	-16		-18	-6	-10	-6	-4	6	-13	-17
16°	-15	-2	-6	-1	-6	-10	-17	-24	16	-14	-2	-12	-4	-6	-3	-18	-22
	14	-1	-8	-6	-7	-11	-15	-20		-10	-	-8	-6	-7	-5	-14	-19
34 - 36°	-1	-2	-8	-7	-7	-11	-15	-16	24 - 26	-7	-	-6	-7	-7	-11	-14	-18
	13	-1	-7	-9	-6	-12	-17	-23		-5	-5	-5	-5	-7	-1	-5	-19

09-02-04

09-02-04

9 OF 20



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT EXT101 / FAN01		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TP. A.	4.312	1200 x 500	0.60	7.19

HIGH SPEED
VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.4	5.4	5.5	5.1	4.6	4.4		
2	5.6	5.9	5.8	5.7	5.4	5.0		
3	5.4	5.6	5.4	4.9	5.3	4.4		
4								
5								
6								
7								
8								
9								
10	16.4	16.9	16.7	15.7	15.3	13.8		
							TOTAL	94.8

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
5.27	3.160	73	268.

COMMENTS/ TP. LOCATION

INSTRUMENT PAGE

REF ID: 10000000000000000000000000000000

M. Eason

13/7/99

Sheet 10 of 20



DUCT TRAVERSE

CLIENT	DRAKE & SCULL		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT EXHOL / FAN OI.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
T.P.B.	3.10	1000 x 600	0.6	5.17

HIGH SPEED
VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	4.5	4.6	4.5	4.4	4.1			
2	4.3	4.2	4.2	4.2	4.2			
3	3.8	3.8	3.8	3.9	3.5			
4								
5								
6								
7								
8								
9								
10	12.6	12.6	12.5	12.5	11.8			
						TOTAL	62.0	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.13	2.480	80	108.

COMMENTS/ TP. LOCATION

INSTRUMENT REF.

TEST ENGINEER M. Goswell DATE 3/7/99 TIME 11:20



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT EXT101	FAN 1.	

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
T.P. A.	2.982	1200 x 500	0.6	4.93

LOW SPEED

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	3.8	3.6	3.8	3.7	3.2	3.2		
2	3.8	4.1	4.0	3.7	3.6	3.5		
3	3.5	3.7	3.4	3.3	3.3	2.7		
4								
5								
6								
7								
8								
9								
10	11.1	11.4	11.2	10.7	10.1	10.4		
							TOTAL	64.9

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.61	2.166	73	124

COMMENTS/ TP. LOCATION

INSTRUMENT REF:

TEST ENGINEER M. Boswell DATE 13/7/99 TIME 12.00.20



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT Ext 101 / FAN 1		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
T.P. B.	2.250	1000 x 600	0.6	3.75

LOW SPEED.

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.9	3.1	3.0	3.0	2.8			
2	2.8	2.9	2.9	2.9	2.8			
3	2.5	2.5	2.8	2.6	2.5			
4								
5								
6								
7								
8								
9								
10	8.2	8.5	8.7	8.5	8.1			
						TOTAL	42.0	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.8	1.680	75.	52

COMMENTS/ TP. LOCATION

INSTRUMENT REF.:

TEST ENGINEER

2.800

DATE

13/7/99

SHT 13 OF 20



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EXH01 / FAN02

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
T.P. A.	4.812	1200 x 500	0.60	8.3

HIGH SPEED

VELOCITY PROFILE(m/s)

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
5.07	3.042.	71%	249

COMMENTS/TP. LOCATION

INSTRUMENT REF

TEST ENGINEER

Z. Leon

3/7/99

20



DUCT TRAVERSE

CLIENT	DRAKE & SCULL		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT EXH01 / FAN 2		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
T.P. B.	3.10	1000 x 600	0.6	6.2

HIGH SPEED
VELOCITY PROFILE(m/s)

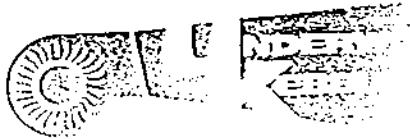
	A	E	C	D	E	F	G	H
1	3.6	3.5	3.6	3.7	3.7			
2	4.1	4.0	4.1	4.2	4.1			
3	4.0	4.2	4.5	4.5	4.3			
4								
5								
6								
7								
8								
9								
10	11.7	11.7	12.2	12.4	12.1			
						TOTAL	60.1	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.01	2.406	78%	103

COMMENTS/ TP. LOCATION

INSTRUMENT REF.:

TEST ENGINEER R. Boon DATE 13/7/99 TIME 15:00



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	CAR PARK EXTRACT	Exthol	Fan 2.

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TP. A	2.982	1200 x 500	0.6	4.97

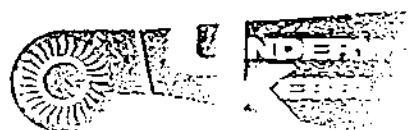
Low Speed

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	3.4	3.6	3.4	3.1	3.2	2.8		
2	3.7	3.7	3.8	3.6	3.4	3.2		
3	3.6	3.5	3.6	3.5	3.1	3.0		
4								
5								
6								
7								
8								
9								
10	10.7	10.8	10.8	10.2	9.7	9.0		
							TOTAL	61.2

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.4	2.04	68%	113

COMMENTS/ TP. LOCATION



DUCT TRAVERSE

CLIENT	DRAKE & SULL ENGINEERING			
PROJECT	S-7 CIVILTON GARDENS			
SYSTEM	CAR PARK EXTRACT Ext 101 Fan 2.			

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TP B	2.250	1000x600	0.6	3.75

LOW SPEED
VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.5	2.6	2.5	2.4	2.5			
2	2.8	2.8	2.6	2.7	2.7			
3	2.6	3.0	2.9	2.8	2.7			
4								
5								
6								
7								
8								
9								
10	7.9	8.4	8.0	7.9	7.9			
						TOTAL	40.1	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.67	1.604	71%	45

COMMENTS/ TP. LOCATION

INSTRUMENT REF:

TEST ENGINEER R. Boon

Date 13/7/99

17 20

GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EXH 01/01 & 02

F	LOCATION	AREA(m ²)	DES DATA		INI	TEST DATA			
			VOL(m ³ /s)	VEL(m/s)		VEL(m/s)	FACT	VOL(m ³ /s)	% DES
G 3/01	CAR PARK	0.089	0.31	3.48	3.1	3.4	0.80	0.242	78
G 3/02	CAR PARK		0.31		4.0	3.3		0.235	76
G 3/03	CAR PARK		0.31		8.0	3.5		0.249	80
G 3/04	CAR PARK		0.31		5.0	3.6		0.256	83
G 3/05	CAR PARK		0.31		6.5	3.5		0.249	80
G 3/06	CAR PARK		0.31		2.6	3.5		0.249	80
G 3/07	CAR PARK		0.31		7.0	3.6		0.256	83
G 3/08	CAR PARK		0.31		3.6	3.4		0.242	78
G 3/09	CAR PARK		0.31		7.0	3.4		0.242	78
G 3/10	CAR PARK		0.31		3.5	3.5		0.249	80
G 3/11	CAR PARK		0.31		8.0	3.4		0.242	78
G 3/12	CAR PARK		0.31		4.0	3.4		0.242	78
G 3/13	CAR PARK		0.31		7.0	3.3		0.235	76
G 3/14	CAR PARK		0.31		5.0	3.3		0.235	76
G 3/15	CAR PARK		0.31		10.0	3.1		0.221	71
G 3/16	CAR PARK		0.31		5.0	3.1		0.221	71
G 3/17	CAR PARK		0.31		8.0	3.2		0.228	74
G 3/18	CAR PARK		0.31		4.0	3.3		0.235	76
G 3/19	CAR PARK		0.31		7.5	3.3		0.235	76
G 3/20	CAR PARK		0.31		3.5	3.2		0.228	74
G 3/21	CAR PARK		0.31		4.0	3.1		0.221	71
G 3/22	CAR PARK		0.31		2.6	3.1		0.221	71
G 3/23	CAR PARK		0.31		3.8	3.4		0.242	78
G 3/24	CAR PARK		0.31		1.7	3.6		0.256	83
G 3/25	CAR PARK		0.31		3.3	3.0		0.214	69
G 3/26	CAR PARK		0.31		1.7	3.0		0.214	69

INSTRUMENT REFS:-

TEST ENGINEER

L. Boon

DATE

9/7/99

SHT. 18 OF 20

GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EXH 01/01 &02

INSTRUMENT REFS:-

TEST ENGINEER

R. 600 N

DATE

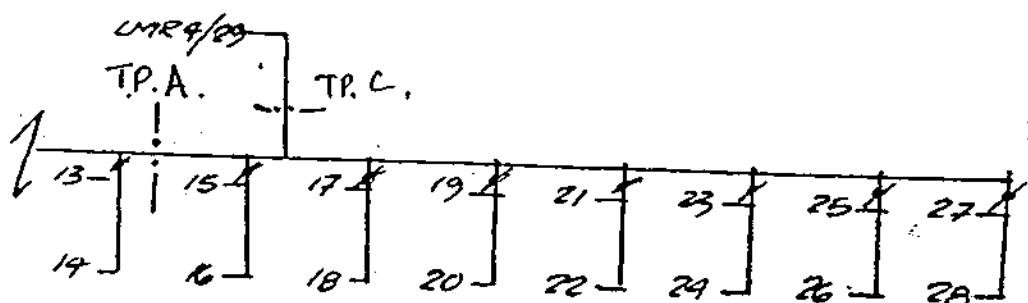
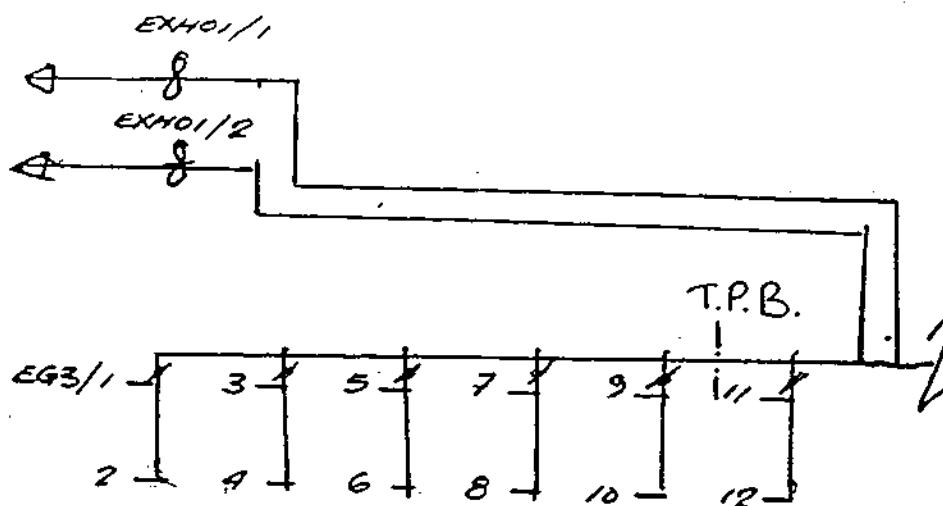
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SHT. 19 OF 20



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	CAR PARK EXTRACT EXH 01/182



REF. KF26082



CONNECT



S 705831 260825 >

MWP LTD. 30 JUN 1999

Drake & Scull Engineering (UK) Ltd
 Home Counties Area Office
 One Shenley Pavilions Chalkdell Drive
 Shenley Wood Milton Keynes MK5 6LB
 Telephone: 01908 506 005
 Estimating Facsimile: 01908 504 669
 Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site
 Telephone No: 0171 930 3365
 Fax No: 0171 9303364

TO:	Name: CARIS TUFFIN
	Company: CML
FAX NO:	MEMO.
FROM:	MARK LAMBARNE
NO: OF PAGES (Including this page)	13
DATE:	17 JUNE 99

RE. CALTON GARDENS

CARIS

PLEASE FIND ATTACHED COMMISSIONING CERTS FOR EXH02 PLANTROOM EXTRACT AS YOU ARE AWARE THE FANS ARE SITUATED DIRECTLY ABOVE EAST AHN AND ARE CONFIGURED AS PER PREVIOUS DSE LTD RFI WITH REGARD TO COORDINATION, THE CURRENT UVENT BEING THE MOST FEASABLE AT INSTALLATION STAGE.

REGARDS.

VOLUMES ASSTABLE.

Mark

14 IN ACCORDANCE WITH OFF STANDARD STAMP

28/6/99



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS LONDON.
SYSTEM	BASEMENT EXTRACT WEST EXH02

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

Dated

14.6.99



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EXH02

PRE-RUNNING CHECKS

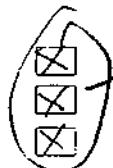
FANS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ANTI-VIB MOUNTINGS FITTED
7. TRANSIT BOLTS REMOVED
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) FREE FROM OBSTRUCTION
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED
10. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

COMMENTS



Is this correct?

CS

SATISFACTORY X NOT APPLICABLE O ACTION REQUIRED

TEST ENGINEER R. PEGAN

DATE 08-06-99 SHT. 2 OF 12



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS.
SYSTEM	BASEMENT EXTRACT WEST EXH02.

STATIC PRESSURES WERE TAKEN ON BOTH FANS IN HIGH AND LOW SPEEDS, IT WAS NOT POSSIBLE TO TAKE A SYSTEM VOLUME DUE TO THE DUCTWORK LAYOUT.

DUE TO THE LOCATION OF GRILLES IN RELATION TO THE FANS IT WAS NOT POSSIBLE TO BALANCE THE SYSTEM, ALL GRILLES (OBD's) WERE LEFT FULLY OPEN.

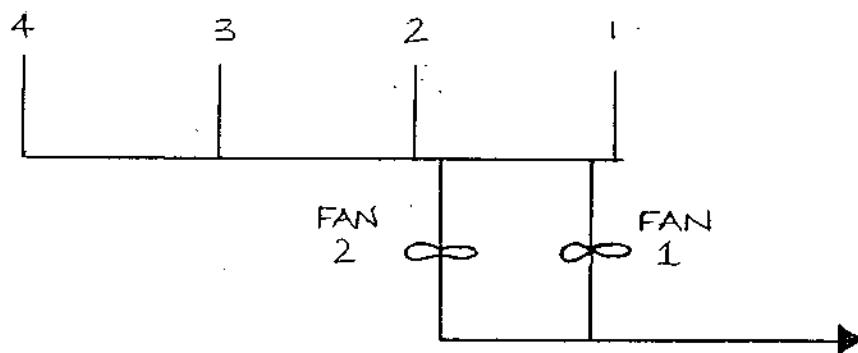
GRILLES 1 & 2 ARE DIRECTLY IN LINE WITH FANS 2 & 1 RESPECTIVELY AND ONLY 600mm FROM THE MOUTH OF FANS, THEREFORE FAN 1 WILL PULL MORE AIR THROUGH GRILLE 2 WHEN RUNNING, WHEREAS FAN 2 WILL PULL MORE AIR THROUGH GRILLE 1.

WHEN GRILLE DAMPERS ARE LEFT FULLY OPEN THEY OFFER LITTLE RESISTANCE, WHEN BALANCING IS ATTEMPTED MORE RESISTANCE IS CREATED AND THE DAMPER BLADES ARE PULLED TO CLOSED POSITION BY AIR VOLUME CREATED BY FANS, THEREFORE IT WAS DECIDED TO LEAVE GRILLES FULLY OPEN.



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EXH02.



CJ



FAN TEST SHEET

CLIENT	DRAKE & SCHL ENGINEERING		
PROJECT	5-7 CADLTON GARDENS.		
SYSTEM	BASEMENT EXT WEST EXH02/1		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573923/02A-1
FAN TYPE	AXIAL Aerofoil	PITCH ANGLE	8°
SIZE	90/JM/25/4-6/6/08 L	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	4.5 / 2.7		350
DESIGN SYSTEM VOLUME	4.48 / 2.24	LOW HIGH	LOW HIGH
TESTED SYSTEM VOLUME & PRESSURE	SEE COMMENTS	Dis.12 / 38 Suct.91 / 230	
		Total L=103 / H=268	

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	NO ACCESS
VOLTAGE	415 / 3 / 50	POWER	3.70 KW
FULL LOAD CURRENT	8.70 / 4.50	RUNNING CURRENT	Low R4.36 / B4.4 / Y4.0
DESIGN SPEED	1440 / 960		High R7.1 / B7.5 / Y7.1

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	0"	QUANTITY	1"
	MOTOR		FAN
BELT DIA.	"		"
SHAFT DIA.	"		"
BUSH REF.	"		"
MEAS. RPM	NO ACCESS.		"

STARTER

M'FACTURER	TELEMECHANIQUE	TYPE	D.O.L
O/L RANGE	9.0 - 13.0 / 2.5 - 4.0	O/L SETTING	9.0 / 4.0
TIMER		FUSE RATING	10.0 AMP.

COMMENTS

OVERLOAD SETTINGS/RANGES INCORRECT.

- * DUE TO DUCTWORK LAYOUT, A PITOT TRAVESE (VOLUME) WAS NOT POSSIBLE. TOTAL SURVEYING OF CIRCUITS C1-J3S A. VOLUME at HIGH. 5.03m³/s = 112% Low 3.285m³/s = 147%.

INSTRUMENT REFS:- Amp Probes=UK AC 4.

TEST ENGINEER R. FOON

DATE 07-06-99 SHT. 4 OF 12



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING,		
PROJECT	5-7 CARLTON GARDENS.		
SYSTEM	BASEMENT EXT WEST	EXH02/2	

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573923/02A-2
FAN TYPE	AXIAL Aerofoil.	PITCH ANGLE	8°
	90JM/25/4-6/6/08 L		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		4.5 / 2.7	350
DESIGN SYSTEM VOLUME		4.48 / 2.24	LOW HIGH LOW HIGH
TESTED SYSTEM VOLUME & PRESSURE		*SEE COMMENTS	Dis.35/77 Suct. 91/191
VOLUME MEASURED AT GRILL FACES HIGH 5.03 m³/s LOW 3.33 m³/s Total		1.126	1.1268

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	NO ACCESS
VOLTAGE	415/3/50	POWER	3.70 KW
FULL LOAD CURRENT	8.70	RUNNING CURRENT	8.46/8.426/Y3.98
DESIGN SPEED	1440	960	HIGH R 6.9/B7.4/Y 6.9

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	"	QUANTITY	"
	MOTOR		FAN
LEY DIA.	"		"
S. FT DIA.	"		"
BUSH REF.	"		"
MEAS. RPM	NO ACCESS		"

STARTER

M'FACTURER	TELEMECHANIQUE	TYPE	D.O.L
O/L RANGE	9.0 - 13.0 / 2.5 - 4.0	O/L SETTING	9.0 / 4.0
TIMER		FUSE RATING	10.0 AMP.

COMMENTS

* DUE TO DUCTWORK LAYOUT, A PITOT TRAVERSE (VOLUME) WAS NOT POSSIBLE. TOTAL SUMMATION OF GRILLS GIVES A VOLUME OF HIGH 5.03 m³/s = 1.1270, LOW 3.335 m³/s = 1.1491. OVERLOAD SETTINGS/RANGES INCORRECT.

INSTRUMENT REFS:- AMP PROBE = UK AC4.

CT

TEST ENGINEER R. BOON

DATE 07-06-99 SHT. 5 OF 12

JM AEROFOIL

HIGH SPEEDS



BS 5750 Pt 1
EN 29001
ISO 9001

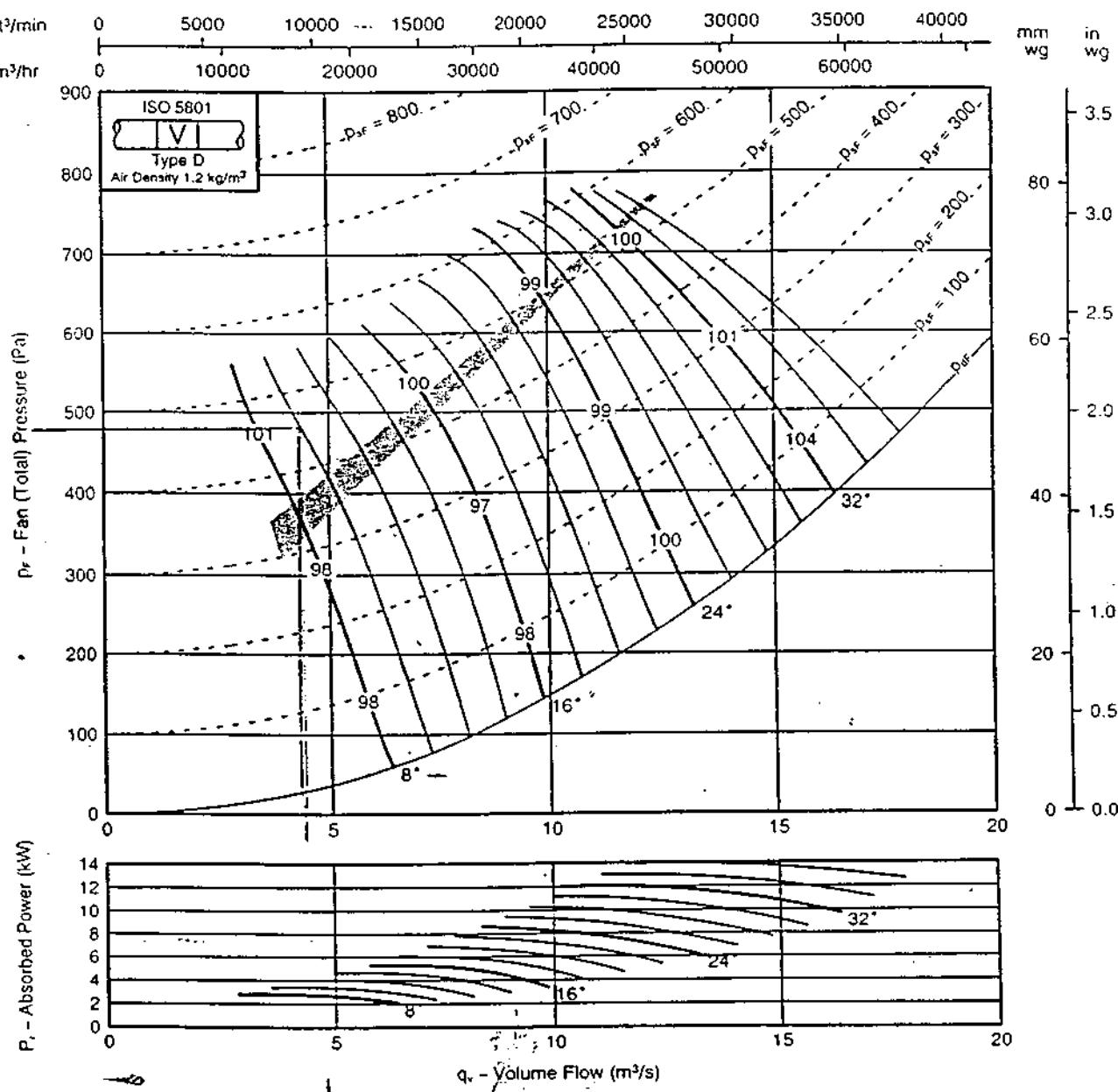
Fan Code: 90JM/25/4/9/...



900 mm 1440 rev/min 9 Blades 50 Hz

Performance Data ISO 5801:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
8	-16	-16	-11	-8	-4	-8	-15	-23	8	-14	-15	-9	-7	-4	-2	-13	-20
	-14	-15	-8	-9	-7	-7	-10	-18		-14	-14	-7	-8	-6	-5	-9	-16
16	-12	-14	-9	-7	-6	-10	-15	-21	16	-10	-13	-8	-6	-5	-9	-13	-19
	-9	-12	-7	-7	-8	-10	-14	-19		-6	-11	-6	-7	-7	-9	-12	-17
24 - 36	-7	-11	-9	-8	-5	-10	-14	-17	24 - 36	-5	-10	-8	-6	-2	-10	-13	-16
	-5	-7	-8	-9	-9	-12	-15	-19		-5	-9	-7	-7	-9	-11	-14	-17

JM AEROFOIL

HIGH SPEEDS



BS 5750 Pt 1
EN 29001
ISO 9001

Fan Code: 90JM/25/4/9/...

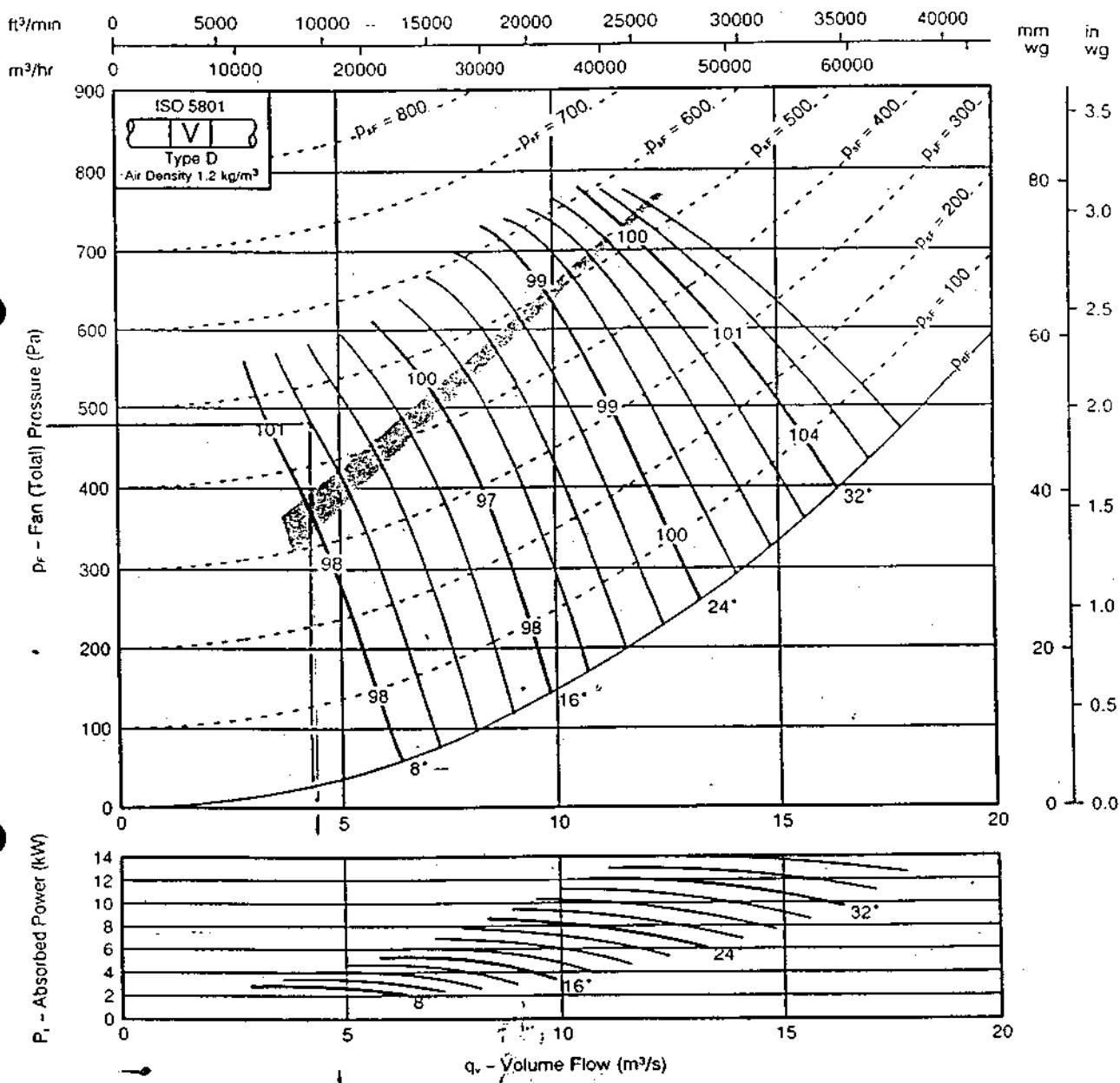
EXH 02 + EXH 03

WOODS
AIR MOVEMENT

900 mm 1440 rev/min 9 Blades 50 Hz

Performance Data ISO 5801:

Performance shown is specifically for fully ducted installations.



Sound Data BS848 Part 2 1985:

Single figures on performance curves are overall inlet sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
8	-16	-16	-11	-8	-4	-8	-15	-23	8	-14	-15	-9	-7	-4	-7	-13	-20
	-14	-15	-8	-9	-7	-7	-10	-18		-14	-14	-7	-8	-6	-5	-9	-16
16	-12	-14	-9	-7	-6	-10	-15	-21	16	-10	-13	-8	-6	-5	-9	-13	-19
	-9	-12	-7	-7	-8	-10	-14	-19		-8	-11	-6	-7	-7	-9	-12	-17
24 - 36	-7	-11	-6	-8	-6	-10	-14	-17	24 - 36	-5	-10	-8	-5	-7	-10	-13	-16
	-6	-9	-6	-8	-9	-12	-15	-19		-6	-9	-7	-7	-9	-11	-14	-17



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EXH02/1 LOW SPEED

SUMMARY - ANI = UKA 09

1ST ENGINEER R. BOON

DATE ०७-०६-९९

SHT. B OF 12



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EX H02/1 HIGH SPEED

MENT REFS - AN 1 = UKA 09

ST ENGINEER R. BOON

DATE 07 - 06 - 99

SHT. 9 OF 12



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EXH02 /2 1000 CFM

INSTRUMENT REFS:- ANI = UKA 09

TEST ENGINEER R. Peon

DATE 07-06-99 SHT.10 OF 12



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT WEST EXH02/2 (HIGH SPEED)

MENT REFS:-ANI = UKA 09

ST ENGINEER R.B.CCN

DATE 07-06-99

SHT 11 OF 12



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING LTD
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT EAST EXH03/2

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative _____
for & on behalf of _____

Dated _____



SCHEMATIC/NOTE SHEET

CLIENT	DAKES & SCOTT
PROJECT	CALTON GARDENS
SYSTEM	BASEMENT EXTRACT EAST EXHOB 1/2

AN INITIAL VOLUME WAS TAKEN AND WE WERE ACHIEVING 3.915 M³/SECOND (90%). BUT DUE TO HAVING TO OVER REGULATE THE SYSTEM TO ACHIEVE VOLUME AT THE INDEX, WE HAVE PUT TOO MUCH RESISTANCE ON THE FAN WE ARE NOW ACHIEVING 3.102 M³/SEC (71%)



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SWELL ENGINEERING LTD
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT EAST EXH03/2

PRE-RUNNING CHECKS

FANS/PUMPS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
7. ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
2. TEST POINTS INSTALLED
3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

MOTORS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY NOT APPLICABLE ACTION REQUIRED

TEST ENGINEER T. DRE

DATE 19/99

SHT. 3 OF 6



FAN TEST SHEET

CLIENT	DPAKE & SCULL ENGINEERING	
PROJECT	CAPITON GARDENS	
SYSTEM	BASEMENT EXTRACT FAN EXH03/2	

FAN		N02	
M'FACTURER	WOODS	IDENT/SERIAL No	90JM/250/4-L 97.0K
FAN TYPE	AXIAL	PITCH ANGLE	10°
SIZE	900A	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	4.50	350	
DESIGN SYSTEM VOLUME	4.35		
TESTED SYSTEM VOLUME & PRESSURE	3.102	Dis. 178 Suct. 335	
	Total	5.3	

MOTOR			
M'FACTURER	WOODS	IDENT/SERIAL No	N/A
VOLTAGE	415 - 50HZ - 3 PHASE	POWER KW	5.0
FULL LOAD CURRENT	10.4	RUNNING CURRENT	3.8 3.8 3.9
DESIGN SPEED	1440		

DRIVE			
M'FACTURER	N/A	TYPE	N/A
BELT SIZE	N/A	QUANTITY	N/A
	MOTOR		FAN
PULLEY DIA.	DIRECT DRIVE		
SHAFT DIA.			DIRECT DRIVE
BUSH REF.			
MEAS. RPM			

STARTER			
M'FACTURER	TEIF MECANIQUE	TYPE	N/A
O/L RANGE	7-10	O/L SETTING	8.4
TIMER	1 SECOND	FUSE RATING	25 AMPS

COMMENTS			

INSTRUMENT REFS:-

TEST ENGINEER

DATE 1/1/79

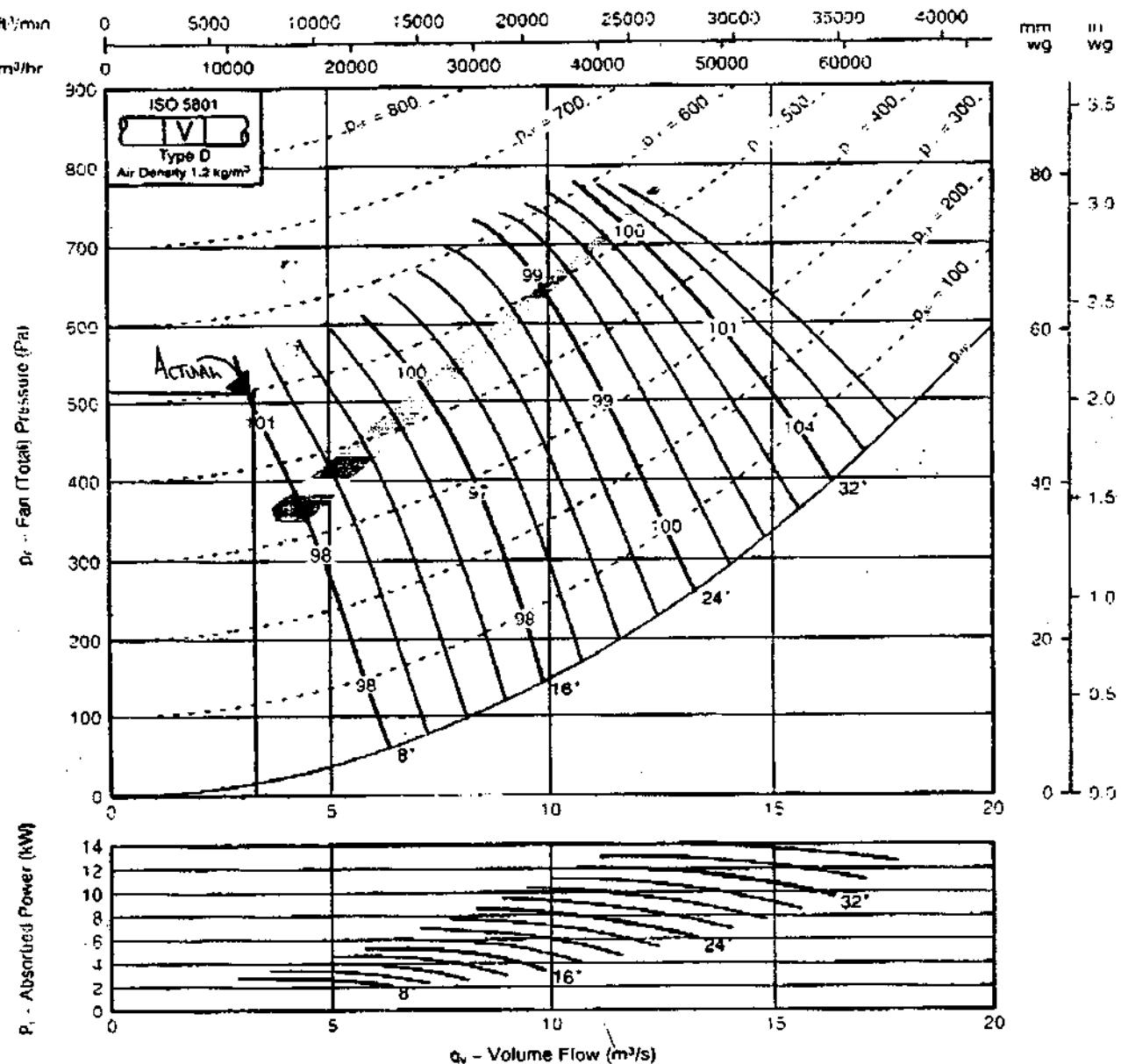
SHT. 4 OF 8

JM AEROFOIL**Fan Code: 90JM/25/4/9/...****900 mm 1440 rev/min 9 Blades 50 Hz****Performance Data ISO 5801:**

Performance shown is specifically for fully ducted installations.

FAO: MARK - DRAKE + SCULL

FAX : 0171 839 3081.

**Sound Data BS848 Part 2 1985:**

Single figures on performance curves are overall inter sound power levels, derived from measurements taken in Woods laboratory specifically under ducted conditions. For sound power levels in eight octave bands, apply the following corrections to the overall level. Use upper corrections when operating point is above shaded area, or lower corrections when operating point is below shaded area.

Inlet Levels									Outlet Levels								
Pitch Angle	Octave Band Centre Frequency (Hz)								Pitch Angle	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k
8	-16	-16	-11	-8	-4	-6	-15	-23	8	-14	-15	-9	-7	-4	-7	-13	-20
	-14	-15	-8	-9	-7	-7	-10	-18		-14	-14	-7	-8	-6	-5	-9	-18
16	-12	-14	-9	-7	-6	-10	-15	-21	16	-10	-13	-8	-6	-5	-6	-13	-19
	-8	-12	-7	-7	-8	-10	-14	-18		-8	-11	-6	-7	-7	-6	-13	-17
24 ~ 36	-7	-11	-9	-8	-8	-10	-14	-17	24 ~ 36	-5	-10	-8	-8	-7	-10	-13	-16
	-6	-9	-6	-8	-9	-12	-15	-19		-6	-9	-7	-7	-9	-11	-14	-17

SK9842

02/02/94

518

TOTAL P.01



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING LTD
PROJECT	CARLTON GARDENS LTD
SYSTEM	BASEMENT EXTRACT EAST EXHOB 1/2

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
TP1	4.35	600 x 800	0.48	9.06

VELOCITY PROFILE(m/s)

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
6.46	3.102	71%	273 _{pa}

COMMENTS/TP. LOCATION

INSTRUMENT REF:-

TEST ENGINEER T. DOLF

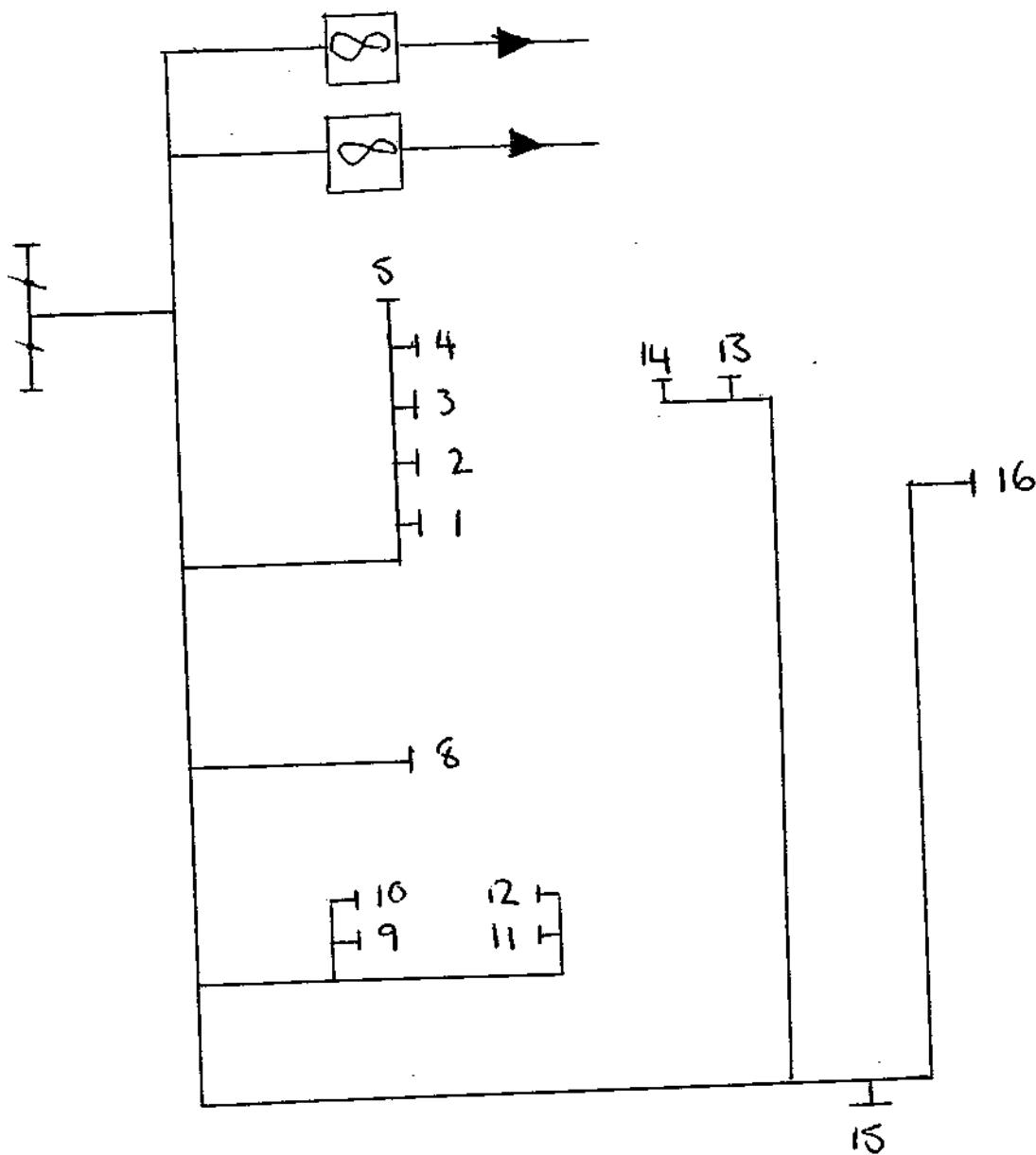
DATE 11/9/99

SHT. 6 OF 8



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SULL ENGINEERING
PROJECT	CAPITOL GARDENS Ltd.
SYSTEM	BASEMENT EXTRACT EAST EXH03/2



TEST ENGINEER T. DOLE

DATE 1/9/99

SHT. 7 OF 8



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCOTT ENGINEERING LTD
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT FAN EXH03/2

INSTRUMENT REFS:-

TEST ENGINEER T. DOLE

DATE 119/99

SHT. 4 OF 8

B

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	CHRIS TURNER.
	Company:	CML LTD.
FAX NO:		MEMO ON SITE.
FROM:		M. LAMBORLINE.
NO: OF PAGES (Including this page)		23
DATE:		26th MARCH 1999.

RE. CARLTON GARDENS.

REF. EXH04. PRESSURE RELIEF.

CHRS.

FURTHER TO WTG WITH S) MAKE /AH QAP PLEASE
FIND COMMISSIONING RESULTS TO FOLLOW WITH
REGARD TO ABOVE FAN, AS YOU ARE AWARE
THE RELIEF VCD WITHIN BASEMENT PLANT ROOM
IS SET TO THE INDEX OF SYSTEM THIS THE
REMAINING RESULTS ARE READ AND RECORDED ONLY

REMARKS.

(M. L. A.)



UNDERWOOD KEBBLE
ENGINEERING LTD

UNIT B4, THE SEEDBED CENTRE
DAVIDSON WAY, ROMFORD
ESSEX RM7 0AZ
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS LONDON.
SYSTEM	West Pressure Relief Ext 104

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

26.7.99.

Dated



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENGINEERING.
PROJECT	5-7 CARLTON GARDENS LONDON
SYSTEM	WEST PRESSURE RELIEF EX H04.

PRE-RUNNING CHECKS

FANS/PUMPS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
7. ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
2. TEST POINTS INSTALLED
3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

MOTORS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY	<input type="radio"/>	NOT APPLICABLE	<input checked="" type="radio"/>	ACTION REQUIRED
TEST ENGINEER	M P	TF		DATE 05/06/99 SHT. 2 OF 22



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	WEST PRESSURE RELIEF EXH04.

AFTER RECORDING INITIAL VOLUMES WITH ALL FLOORS FULLY OPEN WE WERE INSTRUCTED TO TEST FANS USING A PRESSURE RELIEF DAMPER (LOCATED WITHIN THE BASEMENT PLANTROOM) IN ORDER TO ACHIEVE A VOLUME OF 2.0m³/S. WITH FLOORS OPENED INDIVIDUALLY. THE FOLLOWING RESULTS WERE RECORDED.

NOTE

NO STAIRCASE PRESSURISATION FANS WERE RUN WHILST ABOVE SYSTEM WAS TESTED.

CALIBRATED INSTRUMENTS USED.

MICROMANOMETER U.K. N° 7526

ANEMOMETER U.K. A.004.

AMP PROBE. U.K. AP004.



FAN TEST SHEET

CLIENT	DRAVE & SULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS LONDON.		
SYSTEM	PRESSURE RELIEF WEST EXHAUST FAN 2		

FAN

M'FACTURER	MATTEN & YATES	IDENT/SERIAL No	WT 18673202
FAN TYPE	AXIAL IN LINE	PITCH ANGLE	24°
SIZE	24E - 2P - S1	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	5.5	10.80	
DESIGN SYSTEM VOLUME	2.0		
TESTED SYSTEM VOLUME & PRESSURE	2.5309 126%	Dis. 74 Pa Suct. 1087 Pa Total 1161 AP	()

MOTOR

M'FACTURER	MATTEN & YATES	IDENT/SERIAL No	WT 18673202
VOLTAGE	415 150 13	POWER	12.0.
FULL LOAD CURRENT	22.0	RUNNING CURRENT	8.2, 8.4, 8.3
DESIGN SPEED	2880		

DRIVE

M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE
	MOTOR		FAN
PULLEY DIA.	" "	" "	" "
SHAFT DIA.	" "	" "	" "
BUSH REF.	" "		" "
MEAS. RPM	No Access		No Access

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	STAR/DELTA
O/L RANGE	12.0 TO 18.0	O/L SETTING	12.7.
TIMER	5 SEC'S	FUSE RATING	32.0 AMP

COMMENTS

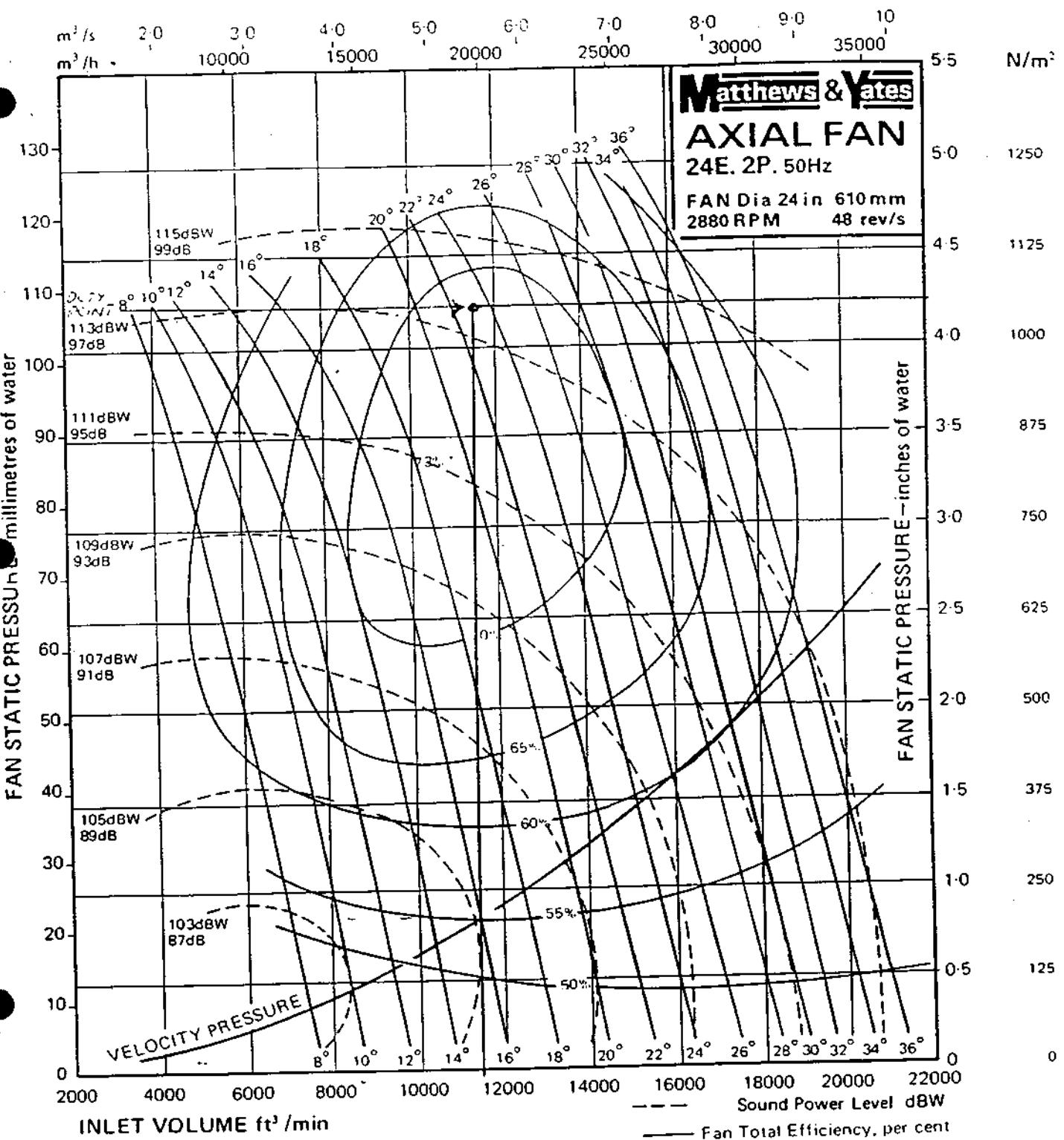
ABOVE TESTED WITH 5TH FLOOR ONLY OPEN &
PLANTROOM RELIEF DAMPER 5% OPEN.

INSTRUMENT REFS:-

TEST ENGINEER

M.P. IF DATE 2.17.99 SHT. 4 OF 22

INLET VOLUME



THREE PHASE 415v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
kW Peak absorbed Per Stage	3.47	4.00	4.55	5.37	6.19	7.42	8.65	9.54	10.44	11.63	12.75	13.80	14.76	16.33	17.90
hp Peak absorbed Per Stage	4.65	5.37	6.10	7.20	8.30	9.95	11.6	12.8	14.0	15.6	17.1	18.5	19.8	21.9	24.0

ACOUSTIC ANALYSIS

IN DUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	7	9	6	9	10	15

To obtain Spectrum subtract above constants from Sound Power level of the fan selected

FOR MOTOR DETAILS SEE MOTOR DATA SHEET.

4A. OF 22



FAN TEST SHEET

CLIENT	DRAKE & SKULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS LONDON.		
SYSTEM	PRESSURE RELIEF WEST EXT 104 FAN N°1		

FAN			
M'FACTURER	MATTHEWS & YATES	IDENT/SERIAL NO	WT/8673201
FAN TYPE	AXIAL (IN LINE).	PITCH ANGLE	24°
SIZE	24E -2P - S1	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		5.50	
DESIGN SYSTEM VOLUME		2.0m³/s	
TESTED SYSTEM VOLUME & PRESSURE		2.098 Pa 105%	Dis. 46 Pa Suct. 986 Pa Total 1034 Pa

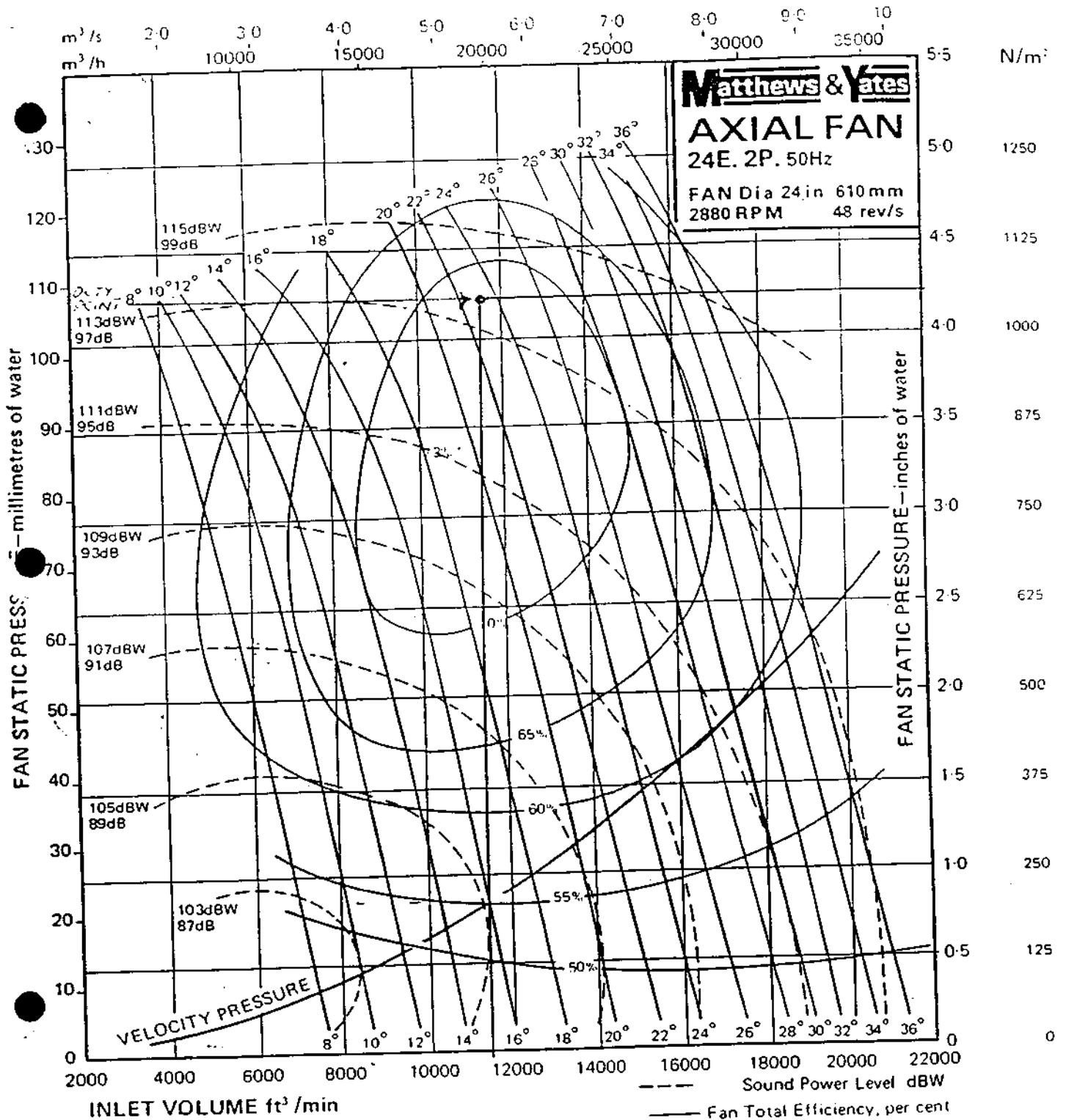
MOTOR			
M'FACTURER	MATTHEWS & YATES	IDENT/SERIAL NO	WT 8673202
VOLTAGE	415 / 3 / 50	POWER	12.0 .
FULL LOAD CURRENT	22.0 .	RUNNING CURRENT	81.84.8.0 .
DESIGN SPEED	2880		

DRIVE			
M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE,
	MOTOR		FAN.
PULLEY DIA.	— " —	— " —	— " —
SHAFT DIA	— " —	— " —	— " —
BUSH REF.	— " —	— " —	— " —
MEAS. RPM	No ACCESS		No ACCESS.

STARTER			
M'FACTURER	TELEMECANIQUE	TYPE	STAR / DELTA .
OIL RANGE	12.0 TO 18.0 .	OIL SETTING	12.7A .
TIMER	5 SEC'S .	FUSE RATING	32.0 AMP .

COMMENTS

ABOVE TESTED WITH 5TH FLOOR ONLY OPEN &
PLANTROOM RELIEF DAMPER 5% OPEN.



THREE PHASE 415v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
kW Peak absorbed Per Stage	3.47	4.00	4.55	5.37	6.19	7.42	8.65	9.54	10.44	11.63	12.75	13.80	14.76	16.33	17.90
hp Peak absorbed Per Stage	4.65	5.37	6.10	7.20	8.30	9.95	11.6	12.8	14.0	15.6	17.1	18.5	19.8	21.9	24.0

ACOUSTIC ANALYSIS

IN DUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	7	9	6	9	10	15

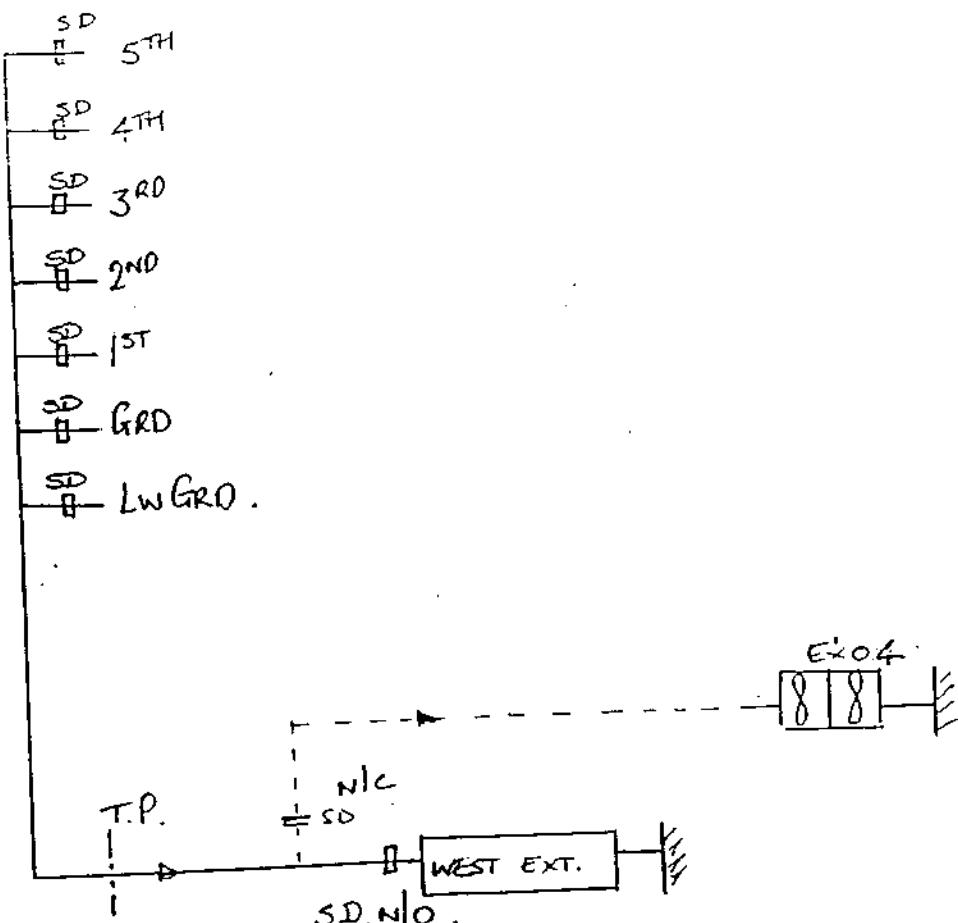
To obtain Spectrum subtract above constants from Sound Power level of the fan selected

FOR MOTOR DETAILS SEE MOTOR DATA SHEET.



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	CHARLTON GARDENS.
SYSTEM	PRESSURE RELIEF WEST EX04





DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	Pressure Relief West EXHO4(FAN)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000 x 800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.3	5.6	6.6	7.1	7.2			
2	5.0	6.5	7.1	7.6	7.4			
3	4.9	6.0	7.3	7.8	7.0			
4	5.4	5.7	7.2	7.6	7.2			
5	5.0	6.4	7.3	7.7	7.5			
6	5.8	6.8	7.1	7.6	7.7			
7								
8								
9								
10	31.4	37.0	42.6	45.4	44.0			
	TOTAL 200.4							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.68	5.344	97	171

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURES, SUCTION = 1140 pa.
DISCHARGE = 26 pa
TOTAL = 1166 pa

INSTRUMENT REF:-

TEST ENGINEER R. BROWN

DATE 10-06-99

SHT. 7 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	PRESSURE RELIEF WEST EXH04(FAN2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000x800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.0	5.8	6.0	7.0	7.0			
2	5.4	6.2	7.0	7.5	7.2			
3	5.0	5.6	7.0	7.6	7.0			
4	5.1	5.4	6.6	7.4	6.9			
5	5.8	6.0	7.0	7.5	7.4			
6	5.4	6.8	7.1	7.6	7.3			
7								
8								
9								
10	31.7	35.8	40.7	44.6	42.8			
	TOTAL 195.6.							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.52	5.216	95	167.

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURE'S, SUCTION = 1087 pa
DISCHARGE 105 pa
TOTAL 1192 Pa.

INSTRUMENT REF:

TEST ENGINEER K. P. OMRI

DATE 10.06.99 SHT. 8 OF 22



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOL WEST (FAW)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000x800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.0	2.3	2.3	3.0	3.1			
2	1.8	2.2	2.1	3.0	3.3			
3	1.6	1.9	2.2	2.9	3.4			
4	2.0	2.1	2.4	3.0	3.4			
5	2.5	2.7	2.7	3.1	3.4			
6	2.5	2.6	2.5	3.2	3.5			
7								
8								
9								
10								
						TOTAL		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.62	2.098	105	581

COMMENTS/ TP. LOCATION

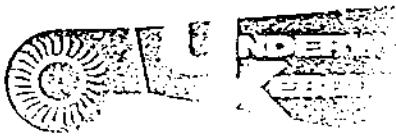
VCD in plant room 95% shut.
5TH FLOOR ONLY OPEN.

RECORD REF:

ENGINEER M.A.P

DATE 16.7.99

SH. 9 OF 22



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS London		
SYSTEM	PRESSURE RELIEF EXH04 WEST (FAN2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000x800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.4	2.8	3.0	3.4	3.4			
2	2.2	2.7	2.9	3.4	4.0			
3	2.3	2.5	3.0	3.5	3.9			
4	2.7	2.7	3.1	3.6	3.8			
5	3.0	3.2	3.2	3.6	4.0			
6	3.0	2.8	3.2	3.8	3.8			
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.16	2.53	126	674

COMMENTS/ TP. LOCATION

VCD in plant room 95% shut
5TH FLOOR ONLY OPEN.

INSTRUMENT REC

TEST ENGINEER M.A.P

DATE 16.7.99

SHR. 1001 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ex H04		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.3	2.7	3.1	3.5	3.1			
2	1.9	2.4	2.8	3.6	3.6			
3	1.9	2.7	3.0	3.7	3.3			
4	2.0	2.6	3.0	3.8	3.5			
5	2.8	2.9	3.2	3.8	3.4			
6	3.3	2.9	3.3	3.6	3.5			
7								
8								
9								
10								
						TOTAL	91.2	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.04	2.432	122	603

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 4TH FLOOR ONLY OPEN AND
FAN N° 1 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 11 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7 CARLTON GARDENS
SYSTEM	WEST PRESSURE RELIEF Ext 104

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	2.9	3.0	3.4	3.1			
2	2.3	2.7	3.2	3.7	3.7			
3	2.1	2.6	3.3	3.8	3.8			
4	2.4	2.7	3.4	3.9	3.7			
5	2.8	2.9	3.4	3.9	3.7			
6	3.0	3.3	3.6	3.7	3.5			
7								
8								
9								
10								
						TOTAL	95.7	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.19	2.552	128	672

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 4TH FLOOR ONLY OPEN AND
FAN N° 2 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 12 OF 22

TEST PLAN

CLIENT Drake And Scull
 PROJECT 5-7 CARLTON GDNS
 SYSTEM EXH04

MEAN VEL DES VOL	DUCT SIZE	TEST VOL	% OF DES.	ST. PRESS (Pa)
A 2.0	1000-800	0.8	2.5	

2.2	2.6	3.0	3.4	3.0		
1.8	2.3	2.8	3.5	3.5		
1.8	2.6	3.0	3.6	3.3		
1.0	2.5	3.0	3.7	3.4		
2.7	2.8	3.2	3.7	3.2		
3.2	2.8	2.9	3.5	3.4		
TOTAL					883	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.943	2.355	118	591

COMMENTS/ TP. LOCATION

Readiness For 3rd Floor Only With Fan 1

Tom Fisher

21/7/99

13 22

BUCH 14/11/2014

CLIENT DRAKE AND SCOTT
PROJECT S-7 CARLTON GONS
SYSTEM EXH04

REF ID: A640146A VOLUME & DUCT SIZING AREA: 100' X 100' X 10'

A	2.0	1000 x 300	0.8	2.5
---	-----	------------	-----	-----

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.09	2.472	124	681

COMMENTS/TP. LOCATION

READINGS TAKEN WITH 3rd FLOOR ONLY OPEN AND FAN 2 RUNNING

Tom Fisher

21/7/99

14 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ext 164		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	1.8	2.6	3.0	3.2	3.1			
2	1.6	2.4	3.1	3.1	3.5			
3	1.9	2.6	3.1	3.3	3.5			
4	2.0	2.5	3.0	3.4	3.6			
5	2.4	2.9	3.2	3.5	3.9			
6	2.1	2.9	2.9	3.1	3.9			
7								
8								
9								
10								
						TOTAL	87.1	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.90	2.323	116	610

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 2ND FLOOR ONLY OPEN AND
FAN N° 1 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 16 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ext H04.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	2.6	3.0	3.4	3.2			
2	2.0	2.5	3.0	3.5	3.5			
3	2.9	2.4	3.1	3.6	3.5			
4	2.0	2.5	3.1	3.7	3.4			
5	2.5	2.8	3.3	3.6	3.5			
6	2.8	3.2	3.1	3.5	3.4			
7								
8								
9								
10								
						TOTAL	89.8	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.99	2.395	120	692

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 2ND FLOOR ONLY OPEN AND
FAN N° 2. RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 16 OF 22

SECRET TRAVELS.

CLIENT DRAKE AND SCOTT
PROJECT S-7 CARLTON GARD.
SYSTEM EXH-4

A 2.0 1000-800 0.8 2.5

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.00	2.40	120	589

COMMENTS/TP. LOCATION

READINGS ARE TAKEN WITH ONLY 1ST FLOOR OPEN AND FAN 1
RUNNING.

Tom Fisher

21/7/99

1

22

DUCT TRAVERSING

CLIENT	Drake And Scott
PROJECT	15-7 Carlton Goods
SYSTEM	EXH04

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.0	1000x800	0.8	2.5

MEAN VEL(m/s) = 2.475

1	2.3	2.7	3.2	3.5	3.3		
2	2.1	2.6	3.1	3.6	3.6		
3	2.0	2.5	3.2	3.7	3.6		
4	2.1	2.6	3.2	3.8	3.5		
5	2.6	2.9	3.4	3.7	3.6		
6	2.9	3.2	3.2	3.6	3.5		
7							
8							
9							
10							
						TOTAL	92.8

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.093	2.475	124	681

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH ONLY 1ST FLOOR OPEN AND FAN 2 RUNNING.

Tom Fisher

21/7/99

13 22

CLIENT

PROJECT

SYSTEM

Drake And Swift

5-7 (age: 60yrs)

SIXTH

THE USE OF DYES IN THE TREATMENT OF DISEASES

4

20

1000 * 800

6.3

2-5

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.8	3.104	1.55	382

COMMENTS/TP. LOCATION

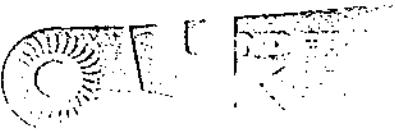
READINGS ARE FOR GRAND FLOOR ONLY OPEN AND FAN 1 RUNNING.

Tom Fischer

2479

9

22



DUCT TRAVERSE

CLIENT	DRAKE AND SCOTT
PROJECT	S-7 CARLTON Gdns
SYSTEM	EXH04

TP REF.	DES VEL(m/s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.0	1000 x 800	0.8	2.5

1	2.7	3.3	4.0	4.5	4.7		
2	2.7	3.6	4.2	4.8	4.7		
3	2.9	3.6	4.4	4.9	4.9		
4	3.0	3.7	4.5	5.1	4.7		
5	3.5	3.8	4.5	5.0	4.5		
6	4.1	4.0	4.4	4.8	4.6		
7							
8							
9							
10							
						TOTAL	124.1

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
4.14	3.31	165	423

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH ONLY GROUND FLOOR OPEN AND FAN 2 RUNNING

Tom Fisher

21/7/99

20 22



BUDGET TRAVELING

CLIENT	Drake And Scull
PROJECT	S-7 Carlton Gdns.
SYSTEM	Exhibit

REF.	DESIGN NO.	DUCT SIZE(mm)	AREA(m ²)	CFM
A	2.0	1000 x 800	0.8	2.5

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.9	2.32	116	591

COMMENTS/TP. LOCATION

READINGS ARE WITH ONLY LOWER GRAND OPEN AND FAN 1 RUNNING



DUCT TRAVERSE

CLIENT	Drake And Scott
PROJECT	S-7 CARLTON Gdns
SYSTEM	EXH04

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.0	1500 x 800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	
1	2.3	2.7	3.1	3.4	2.9	
2	2.1	2.4	3.2	3.4	3.6	
3	2.0	2.6	3.3	3.7	3.7	
4	2.1	2.8	3.3	3.8	3.6	
5	2.4	2.9	3.5	3.7	3.6	
6	3.0	3.1	3.4	3.7	3.5	
7						
8						
9						
10						
						TOTAL 92.8

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.093	2.47	124	683

COMMENTS/ TP. LOCATION

Readings taken with only lower ground floor open and fan 2 running.

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: liz@drake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	GARY TUFFIN
	Company:	CML
FAX NO:		MEMO ON SITE
FROM:		M. LAMBOURNE
NO. OF PAGES (Including this page)		3
DATE:		9 AUGUST 1999

RE: CAPTION GARDENS

REF. EXHOS

GARYS

FURTHER TO PREVIOUS DISCUSSIONS

CML/OAP/MACE PLEASE FIND ATTACHED
MATTERS AND YATES COMMENTS, WITH
REGARDS TO ABOVE FANS, OBVIOUSLY
A. HAYMAN WILL NEED TO COMMENT ON
THESE

REGARDS

RATAN

W. MACE - S. JEFFERY - R. HALE

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Facsimile Cover Sheet

To: Mr Mark Lambourne
Company: Drake & Scull c/o MACE
Phone:
Fax: 0171 839 3081

From: Robert A Nicholson
Company: Matthews & Yates
Phone: 01206 543311
Fax: 01206 760 497
Home phone/fax: 01908 662758 pager 01893 294514

Date: 4th August 1999
Pages including this cover page: Two

Comments: Re: Fan Refs EXH05/01 & 02, 5 to 7 Carleton Gnds

Dear Mark

Following my meeting with Gerry Starkin I understand you wish to have my initial comments regarding the Fan Test Sheets for the above ref. fans.

1. The fans are 48G.4P at 16 degree blade angle with a corresponding Peak Absorbed Power of 29.46 KW giving rise to a 32 KW installed motor motor with a nominal 56 amp FLC.
2. The measured running current is shown as anything from 28.3 to 28.8 amp over the 3 phases for either fan motor. This corresponds to an approx absorbed power of 16 KW.
The achieved duty of 8.618 cuM/s (EXH05/01) x 1078 pa falls on the 8 degree blade angle and this has a Peak Absorbed Power of 17.52 KW
3. I have a concern that the measured pressure duty of 1078 pa at 8.618 cuM/s would rise up the system line (according to the fan laws) to a pressure of around 3051 pa at the design volume of 14.5 cuM/s.
(This duty falls well outside the performance of the Fan).

Conclusions:

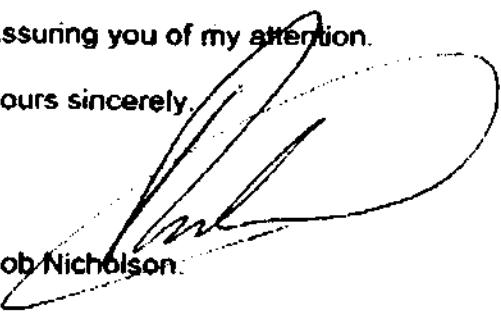
- a) 2., above leads to the conclusion that the Blade Angle may not be set at 16 degree but at 8 degrees.
- b) 3., above leads to the conclusion that the system as measured/installed is different to the calculated system resistance.

- c) If the blade angle is incorrect, you should proceed with caution if you increase the blade angle to 16 degree as the apparent required performance of 3051 pa (x 14.5 cuM/s) falls outside the performance envelope of the fan.

I am sending a copy this transmission to my Technical Director - Mr Ray Sexton at Colchester.

Assuring you of my attention.

Yours sincerely,



Rob Nicholson

cc Ray Sexton.

ARUP

Ove Arup & Partners
Consulting Engineers

Facsimile

cc : MACE

13 Fitzroy Street
London W1P 6BQ
Telephone +44 (0)171 636 1531

Direct Dialling
Telephone +44 (0)171 465 2103
Facsimile +44 (0)171 465 3667

Fax to MACE-

Date 27/7/99

Fax no

Job number/Reference

Attention Roger Hale

S4075

cc L. Bain MRP

5.27

From Andrew Hayman

Total number of pages
(including this page)

Subject Stirling Sq.

5

If you have not received all the pages listed please phone the sender

RFI 6300/166 & 6300/167 attached.

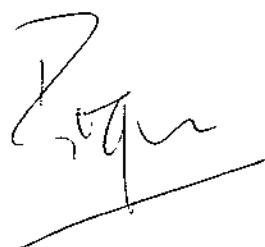
Please call if you need to discuss.

Regards



Mace / do we need to send the

two other RFI & say what do you want
us to do?



Trade Contractor Starter Pack

● Request for Information

Package	Trade Contractor	Date Raised
HVAC	D&E LTD	27/7/99
Package No	Submitted By	Date Received by Mace
6300	M.LAMSONING	
Trade Contractor RFI No	Mace Log No	Date Forwarded by Mace
166	6300/166	27/7/99

We require information for the following:

AH AH 34095

Description:

- RE. EXHOS
- SEE APPENDIX A ATTACHED.
- + PREVIOUS COMMISSIONING RESULTS.


Signed: 

Date Information Required by:

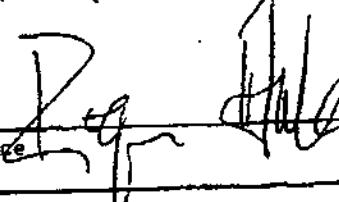
URGENT
ASAP

To: Andrew Hayman

Please provide the information as requested.
We have the following comments:-

Copies to:-			
MWPL	OAP	ECH	BM
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Please can we have your equipment drawings /
instructions by request

Signed: 
Mace

Date: 27.7.99

To: Mace

SEE ENCLOSED PAGES WITH OAP

COMMENTS.

WE NEED TO ENSURE THAT THE DS UNDERSTANDS THE SYSTEM AS COMMISSION
THIS MAY REQUIRE A SMOKE TEST - PLEASE ENSURE SMOKE "BOMBS" ARE

Designer Response No:

Date:

Copies to:-			
MWPL	OAP	ECH	BM

99. TO AVAILABLE FOR DS WITNESSING
From: SHOULD THEY BE REQUIRED.

- ONLY FLOOR OF INCIDENT SMOKE
DOORS CAN OPEN.

RE. GARDEN GARDENS

28/7/99

REF. EXHOS

FURTHER TO PREVIOUS CORRESPONDANCE
AND M/TG WITH MAKE/LOSS WITH REGARD
TO ABOVE SYSTEM WE CONFIRM THE
FOLLOWING.

- 1) ABOVE SYSTEM HAS NO BLOCKAGES
AND ACHIEVES DESIGN IN AM EXTRACT.
- 2) MATHEWS AND YATES RESPONSE TO FOLLOW
SHORTLY, RE FAN PERFORMANCE
- 3) FURTHER TO ABOVE PREVIOUS M/TG
WE CONFIRM WE WILL COMMISSION EXHOS
WITH STAIRCASE TWO / STAIRCASE ONE
FANS RUNNING AND ALL DOORS
SHUT, APART FROM INDEX FLOOR IE,
(B) TO TRY TO ENHANCE EXHOS PERFORMANCE
ABOVE WORKS WILL BE UNDERTAKEN 28/7/99
UPON STAIRCASE ONE COMPLETION, IE.
SERVED PLENUM,
HOWEVER IT SEEMS UNLIKELY THAT THE
PERFORMANCE WILL INCREASE ANY MORE
THAN 3% STILL LEAVING VERY HIGH
DUCT RESISTANCE.
PLEASE ADVISE.

OAP COMMENT:

28/7/99

- NEED MY RESPONSE
- THE STRATEGY WILL BE TO ENSURE
SMALL PRESSURISATION OPERATES IN ACCORDANCE
WITH DS REQUIREMENTS. - IF EXHOS DOES NOT
ACHIEVE DESIGN BUT MAKES SMOKE MOVE
TOWARDS OFFICE THEN INTENT IS SATISFIED.
 - Duct pressures NOT TO EXCEED RECOMMEND'S

Request for Information

Package -HVAC	Trade Contractor DEE O'D	Date Raised 27/7/99
Package No 6300	Submitted By M MAMBOLINE	Date Received by Mace
Trade Contractor RFI No 167	Mace Log No 6300/167	Date Forwarded by Mace 27/7/99

We require information for the following:-

Description: RE- STAIRCASE'S 1,2 & 3.

- ALL ABOVE STAIRCASES HAVE A DOOR AT GROUND LEVEL SPLITTING STAIRCASES INTO 2NO PLENUMS SHOULD THESE NOT HAVE TRANSFER GRilles AND INTUMESCENT BLOCKS NTPIN TO CREATE ONE PLENUM, PLEASE ADVISE,

Signed: M. Tan

Trade Contractor

Date Information Required by:

28/7/99

To: Andrew Hayman,

Please provide the information as requested.
We have the following comments:-

Copies to:-			
MWPL	OAP	ECH	BM
✓	✓	✓	

Please could we have your
very most urgent response for immediate
site action.

Signed:

Mace

Roger Hall

Date: 27.7.99

To: Mace

EACH STAIRWELL HAS A BASEMENT
SPCOT FROM STAIR PRESSURISATIONSYSTEM THUS ENSURING AIR INPUT. IF PRESSURE FIGURES CANNOT BE
ACHIEVED AT ALL FLOORS (DUE TO AIR RELOCATES THROUGH DOORS) THEN THE
TRANSFER WILL BE REQUIRED. PLEASE CONFIRM ACTION TAKEN

Designer Response No:

From:

Date:

REH 27/7/99

m a c e



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON.		
SYSTEM	PRESSURE RELIEF EAST EXH05/01		

FAN			
MANUFACTURER	MATTHEW & YATES	IDENT/SERIAL No	N/I/86732/1
FAN TYPE	AXIAL	PITCH ANGLE	16°
SIZE	48G4P	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	14.5	1.040	
DESIGN SYSTEM VOLUME	14.5		
TESTED SYSTEM VOLUME & PRESSURE	8.618 ± 5%	Dis. 250 Suct. 828	Total 1078

MOTOR			
MANUFACTURER	MATTHEW & YATES	IDENT/SERIAL No	N/D
VOLTAGE	415V / 3ph 50Hz	POWER	32.0 kW.
FULL LOAD CURRENT	56.0	RUNNING CURRENT	28.4, 28.3, 28.8
DESIGN SPEED	1440		

DRIVE			
MANUFACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	—	QUANTITY	—
	MOTOR		FAN
PULLEY DIA.	"		"
SHAFT DIA.	"		"
BUSH REF.	"		"
MEAS. RPM	"		NO ACCESS

STARTER			
MANUFACTURER	TELEMECANIQUE	TYPE	STAR / DELTA.
O/L RANGE	30.0 TO 40.0	O/L SETTING	32.5
TIMER	7 SEC'S	FUSE RATING	80A.

COMMENTS	
@ 100% OF DESIGN SYSTEM PRESSURE	3097Pa. Ap.

TOO HIGH FOR
BLOWWORK

INSTRUMENT REFS:-

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

Please reply to site:

Telephone No: 0171 930 3369

Fax No: 0171 9303364

If there is a problem with this fax, please call 01908 506005.

TO:	Name:	CHRIS TURPIN.
	Company:	CML LTD.
FAX NO:		MEMO ON SITE.
FROM:		M. LAMBORLINE.
NO: OF PAGES (Including this page)		23.
DATE:		26th MARCH 1999.

RE. CARLTON GARDENS.

REF. EXH04. PRESSURE RELIEF.

GML.

FURTHER TO WTG WITH S)MALE /AH CAP PLEASE
SEND COMMISSIONING RESULTS TO FOLLOW WITH
REGARD TO ABOVE FAN, AS YOU ARE AWARE
THE RELIEF VCD WITHIN BASEMENT PLANT ROOM
IS SET TO THE INDEX OF SYSTEM THATS THE
REMAINING RESULTS ARE READ AND RECORDED ONLY

REMARKS.

(M.L.A.)



UNDERWOOD KEBBLE
ENGINEERING LTD

UNIT B4, THE SEEDBED CENTRE
DAVIDSON WAY, ROMFORD
ESSEX RM7 0AZ
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS LONDON
SYSTEM	WEST PRESSURE RELIEF Ext 104

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative _____
for & on behalf of _____

Dated _____



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS LONDON
SYSTEM	WEST PRESSURE RELIEF EX H04

PRE-RUNNING CHECKS

FANS/PUMPS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
7. ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
 2. TEST POINTS INSTALLED
 3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN
- MOTORS (VISUAL CHECKS)
1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

MOTORS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY

O

NOT APPLICABLE

X

ACTION REQUIRED

TEST ENGINEER

MP TF

DATE

05/06/99 SHT. 2 OF 22



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	WEST PRESSURE RELIEF EXH04.

AFTER RECORDING INITIAL VOLUMES WITH ALL FLOORS FULLY OPEN WE WERE INSTRUCTED TO TEST FANS USING A PRESSURE RELIEF DAMPER (LOCATED WITHIN THE BASEMENT PLANTROOM) IN ORDER TO ACHIEVE A VOLUME OF 2.0m³/S. WITH FLOORS OPENED INDIVIDUALLY. THE FOLLOWING RESULTS WERE RECORDED.

NOTE

NO STAIRCASE PRESSURISATION FANS WERE RUN WHILST ABOVE SYSTEM WAS TESTED.

CALIBRATED INSTRUMENTS USED.

Micromanometer U.K. N° 7526

ANEMOMETER U.K. A.004.

AMP PROBE. U.K. AP004.



FAN TEST SHEET

CLIENT	DRAKE & SULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS LONDON.		
SYSTEM	PRESSURE RELIEF WEST EXHAUST FAN 2		

FAN

M'FACTURER	MATTEN & YATES	IDENT/SERIAL No	WT 18673202
FAN TYPE	AXIAL IN LINE	PITCH ANGLE	24°
SIZE	24E - 2P - S1	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	5.5	10.80	
DESIGN SYSTEM VOLUME	2.0		
TESTED SYSTEM VOLUME & PRESSURE	2.530 @ 126%	Dis. 74 Pa Suct. 1087 Pa	
	Total	1161 ΔP	

MOTOR

M'FACTURER	MATTEN & YATES	IDENT/SERIAL No	WT 18673202
VOLTAGE	415 150 13	POWER	12.0
FULL LOAD CURRENT	22.0	RUNNING CURRENT	8.2, 8.4, 8.3
DESIGN SPEED	2880		

DRIVE

M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE
	MOTOR		FAN
PULLEY DIA.	" "	" "	" "
SHAFT DIA	" "	" "	" "
BUSH REF.	" "		
MEAS. RPM	No Access		No Access

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	STAR/DELTA
O/L RANGE	12.0 TO 18.0	O/L SETTING	12.7
TIMER	5 SEC'S	FUSE RATING	32.0 AMP

COMMENTS

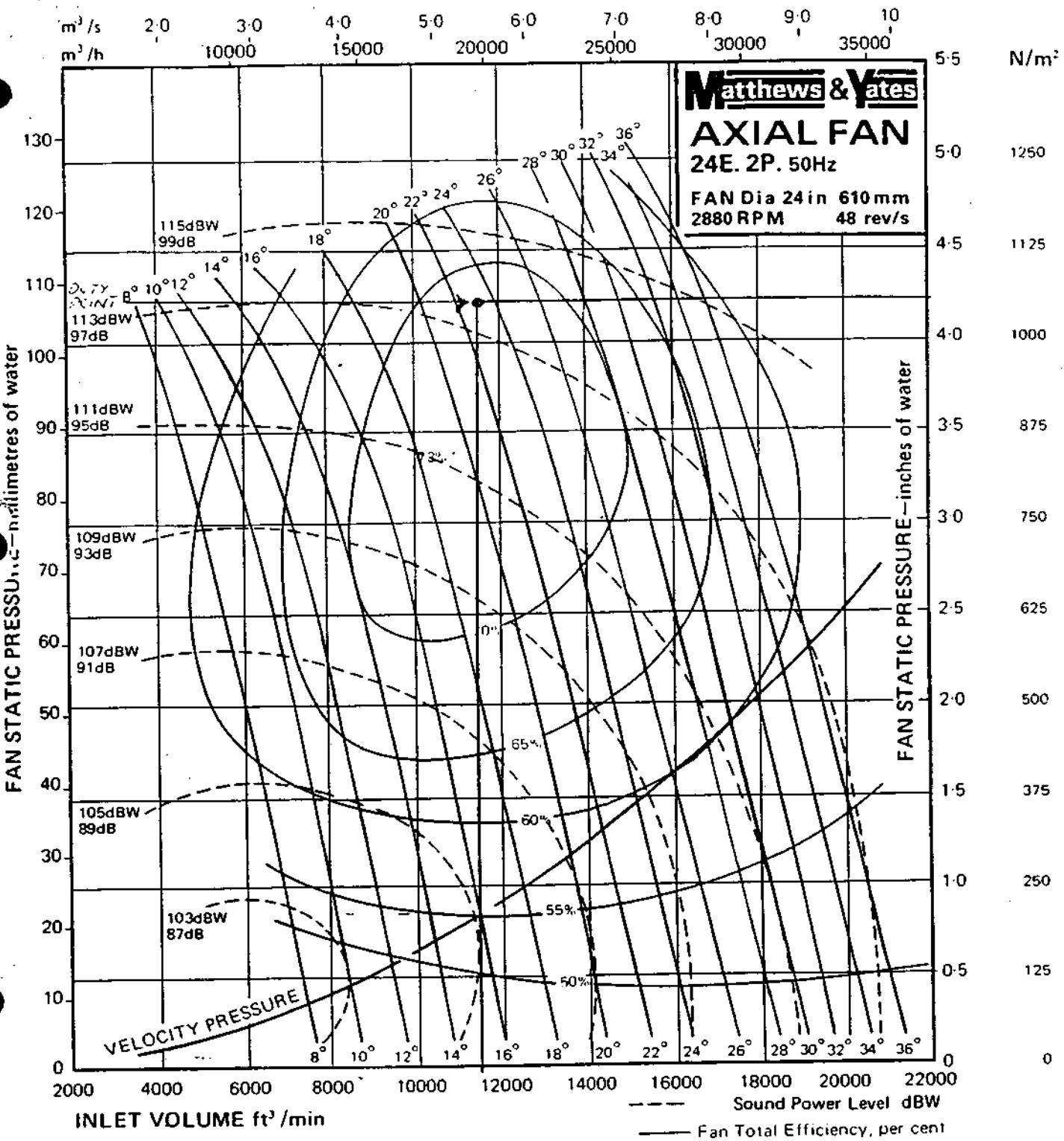
ABOVE TESTED WITH 5TH FLOOR ONLY OPEN &
PLANTROOM RELIEF DAMPER 5% OPEN.

INSTRUMENT REFS:-

TEST ENGINEER

M.P. TF DATE 21/7/99 SHT. 4 OF 22

INLET VOLUME



THREE PHASE 415v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
kW Peak absorbed Per Stage	3.47	4.00	4.55	5.37	6.19	7.42	8.65	9.54	10.44	11.63	12.75	13.80	14.76	16.33	17.90
hp Peak absorbed Per Stage	4.65	5.37	6.10	7.20	8.30	9.95	11.6	12.8	14.0	15.6	17.1	18.5	19.8	21.9	24.0

ACOUSTIC ANALYSIS

IN DUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	7	9	6	9	10	15

To obtain Spectrum subtract above constants from Sound Power level of the fan selected

FOR MOTOR DETAILS SEE MOTOR DATA SHEET.

4A. OF 22



FAN TEST SHEET

CLIENT	DRAKE & SKULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS LONDON.		
SYSTEM	PRESSURE RELIEF WEST Ext H04 FAN N°1		

FAN

M'FACTURER	MATTHEWS & YATES	IDENT/SERIAL No	WT/8673201
FAN TYPE	AXIAL (IN LINE).	PITCH ANGLE	24°
SIZE	24E -2P - S1	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		5.50	
DESIGN SYSTEM VOLUME		2.0m³/s	
TESTED SYSTEM VOLUME & PRESSURE		2.098 P 105% Dis. 46Pa Suct. 980Pa	Total 1034 Pa

MOTOR

M'FACTURER	MATTHEWS & YATES	IDENT/SERIAL No	WT 8673202
VOLTAGE	415 / 3 / 50	POWER	12.0.
FULL LOAD CURRENT	22.0.	RUNNING CURRENT	8.1, 8.4, 8.0.
DESIGN SPEED	2880		

DRIVE

M'FACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE.
	MOTOR		FAN.
PULLEY DIA.	— " —	— " —	— " —
SHAFT DIA	— " —	— " —	— " —
BUSH REF.	— " —	— " —	— " —
MEAS. RPM	No ACCESS		No ACCESS.

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	STAR/DELTA.
O/L RANGE	12.0 TO 18.0.	O/L SETTING	12.7A.
TIMER	5 SEC'S.	FUSE RATING	32.0 AMP.

COMMENTS

ABOVE TESTED WITH 5TH FLOOR ONLY OPEN &
PLANTROOM RELIEF DAMPER 5% OPEN.

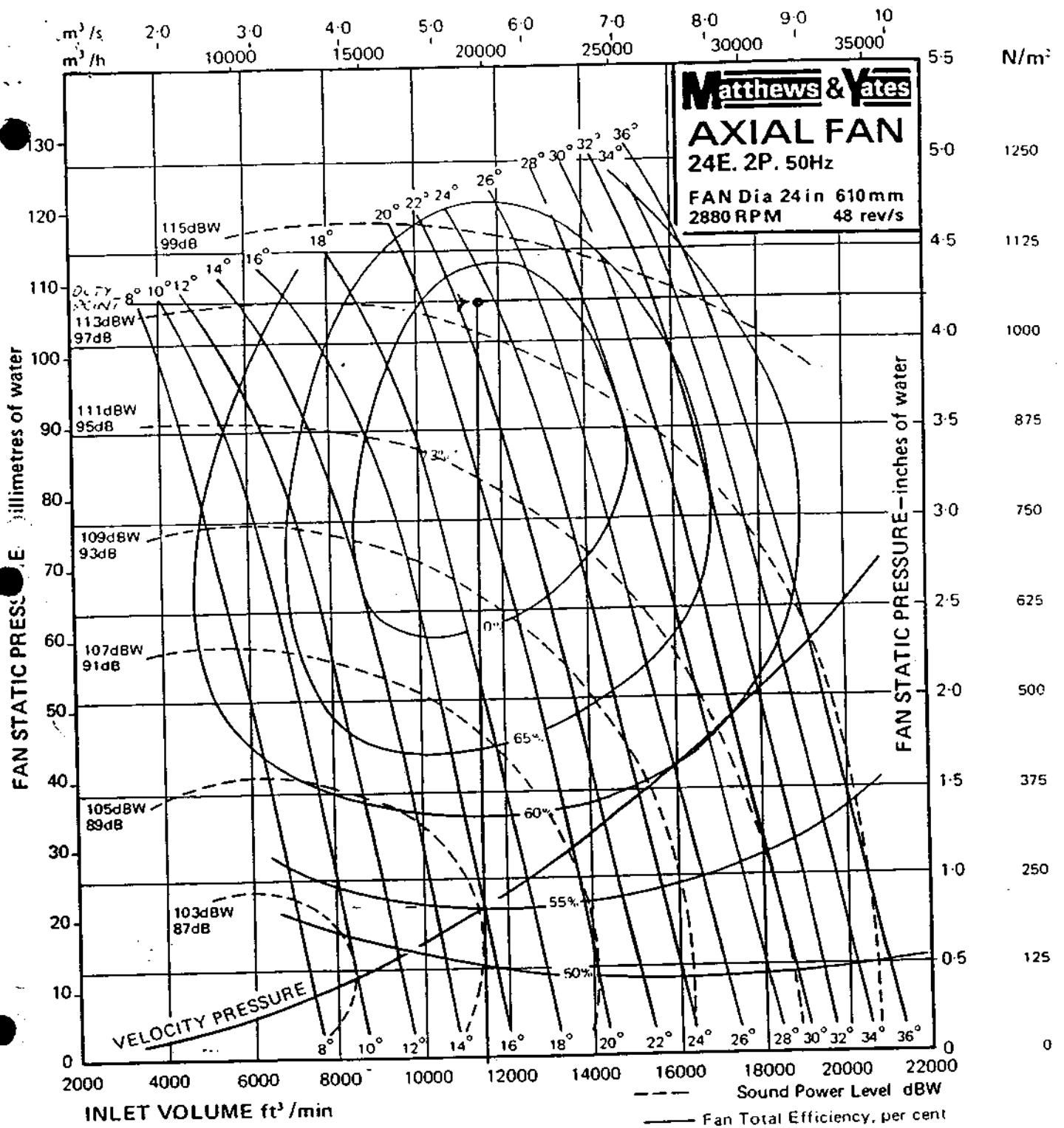
INSTRUMENT REFS:-

TEST ENGINEER

M.P. T.F.

DATE

21/7/99 SHT. 5 OF 22



THREE PHASE 415v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
kW	Peak absorbed Per Stage	3.47	4.00	4.55	5.37	6.19	7.42	8.65	9.54	10.44	11.63	12.75	13.80	14.76	16.33	17.90
hp	Peak absorbed Per Stage	4.65	5.37	6.10	7.20	8.30	9.95	11.6	12.8	14.0	15.6	17.1	18.5	19.8	21.9	24.0

ACOUSTIC ANALYSIS

INDUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	7	9	6	9	10	15

To obtain Spectrum subtract above constants from Sound Power level of the fan selected

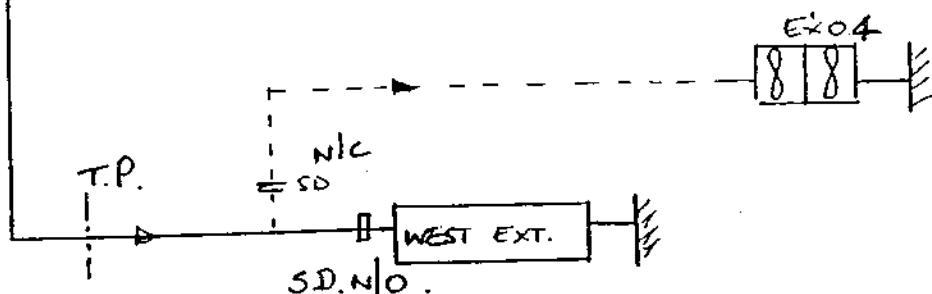
FOR MOTOR DETAILS SEE MOTOR DATA SHEET.



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	CURLTON GARDENS.
SYSTEM	Pressure Relief WEST EX04

SD
5TH
SD
4TH
SD
3RD
SD
2ND
SD
1ST
SD
GRD
SD
Lw GRD.





DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	Pressure Relief WEST EXHO4(FANI)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000 x 800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.3	5.6	6.6	7.1	7.2			
2	5.0	6.5	7.1	7.6	7.4			
3	4.9	6.0	7.3	7.8	7.0			
4	5.4	5.7	7.2	7.6	7.2			
5	5.0	6.4	7.3	7.7	7.5			
6	5.8	6.8	7.1	7.6	7.7			
7								
8								
9								
10	31.4	37.0	42.6	45.4	44.0			
	TOTAL 200.4							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.68	5.344	97	171

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.

NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURES, SUCTION = 1140 pa.

DISCHARGE = 26 PaTOTAL = 1166 Pa

INSTRUMENT REF:-

TEST ENGINEER R. BSCON

DATE 10-06-99

SHT. 7 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	PRESSURE RELIEF WEST EXH04(FAN 2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000 X 800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.0	5.8	6.0	7.0	7.0			
2	5.4	6.2	7.0	7.5	7.2			
3	5.0	5.6	7.0	7.6	7.0			
4	5.1	5.4	6.6	7.4	6.9			
5	5.8	6.0	7.0	7.5	7.4			
6	5.4	6.8	7.1	7.6	7.3			
7								
8								
9								
10	31.7	35.8	40.7	44.6	42.8			
	TOTAL 195.6.							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.52	5.216	95	167.

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURE'S, SUCTION = 1087 Pa
DISCHARGE 105 Pa
TOTAL 1192 Pa

INSTRUMENT REF:-

TEST ENGINEER R. BOON

DATE 10-06-991 SHT. 8 OF 22



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOL WEST (FAN)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A.	2.00	1000X800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.0	2.3	2.3	3.0	3.1			
2	1.8	2.2	2.1	3.0	3.3			
3	1.6	1.9	2.2	2.9	3.4			
4	2.0	2.1	2.4	3.0	3.4			
5	2.5	2.7	2.7	3.1	3.4			
6	2.5	2.6	2.5	3.2	3.5			
7								
8								
9								
10								
						TOTAL		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.62	2.098	105	581

COMMENTS/ TP. LOCATION

VCD in plant room 95% shut.
5th Floor ONLY open.

INSTRUMENT REF:

TEST ENGINEER M.W.P

DATE 16.7.99

SHT. 9 OF 22



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF ERH04 WEST (FAN 2)		

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.00	1000x800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.4	2.8	3.0	3.4	3.4			
2	2.2	2.7	2.9	3.4	4.0			
3	2.3	2.5	3.0	3.5	3.9			
4	2.7	2.7	3.1	3.6	3.8			
5	3.0	3.2	3.2	3.6	4.0			
6	3.0	2.8	3.2	3.8	3.8			
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.16	2.53	126	674

COMMENTS/ TP. LOCATION

VCD in plant room 95% sheet
5TH FLOOR ONLY OPEN.

INSTRUMENT REF

TEST ENGINEER M.A.P

DATE 16.7.99

SHT. 10 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SKELL ENGINEERING.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	WEST PRESSURE RELIEF Ex H104.

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8.	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.3	2.7	3.1	3.5	3.1			
2	1.9	2.4	2.8	3.6	3.6			
3	1.9	2.7	3.0	3.7	3.3			
4	2.0	2.6	3.0	3.8	3.5			
5	2.8	2.9	3.2	3.8	3.4			
6	3.3	2.9	3.3	3.6	3.5			
7								
8								
9								
10								
						TOTAL	91.2	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.04	2.432	122	603

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 4TH FLOOR ONLY OPEN AND
FAN N° 1 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. II OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ext 104.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	2.9	3.0	3.4	3.1			
2	2.3	2.7	3.2	3.7	3.7			
3	2.1	2.6	3.3	3.8	3.8			
4	2.4	2.7	3.4	3.9	3.7			
5	2.8	2.9	3.4	3.9	3.7			
6	3.0	3.3	3.6	3.7	3.5			
7								
8								
9								
10								
						TOTAL	95.7	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.19	2.552	128	672

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 4TH FLOOR ONLY OPEN AND
FAN N° 2 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 12 OF 22

VENTILATION

CLIENT Drake And Scull
 PROJECT 5-7 CARLTON Gdns.
 SYSTEM EXH04

REF.	% DES VOL	DUCT SIZE	% OF DES VOL	DES VOL
A	2.0	1000-800	0.8	2.5

1	2.2	2.6	3.0	3.4	3.0			
2	1.8	2.3	2.8	3.5	3.5			
3	1.8	2.6	3.0	3.6	3.3			
4	1.9	2.5	3.0	3.7	3.4			
5	2.7	2.8	3.2	3.7	3.2			
6	3.1	2.8	2.9	3.5	3.4			
7								
8								
9								
10								
						TOTAL	883	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.943	2.355	118	591

COMMENTS/TP. LOCATION

Readings For 3rd Floor One With Fan 1

Tom Fisher

21/7/99

13 22

DUCT TRAVERS

CLIENT	DRAKE AND SCOTT
PROJECT	S-7 CARLTON GONS
SYSTEM	EX H04

REF.	PIPE SIZE	DUCT SIZING	AREA(m ²)	DES. VEL(m/s)
A.	2.0	1000 x 800	0.8	2.5

1	2.1	2.8	2.9	3.3	3.0		
2	2.2	2.6	3.1	3.6	3.6		
3	2.0	2.5	3.2	3.7	3.7		
4	2.3	2.6	3.3	3.8	3.6		
5	2.7	2.9	3.3	3.8	3.6		
6	2.9	3.1	3.5	3.6	3.4		
7							
8							
9							
10							
						TOTAL	92.7

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.09	2.472	124	681

COMMENTS/TP. LOCATION

READINGS TAKEN WITH 3rd FLOOR ONLY OPEN AND FAN 2 RUNNING

Tom Fisher

21/7/99

14 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ex H104.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	1.8	2.6	3.0	3.2	3.1			
2	1.6	2.4	3.1	3.1	3.5			
3	1.9	2.6	3.1	3.3	3.5			
4	2.0	2.5	3.0	3.4	3.6			
5	2.4	2.9	3.2	3.5	3.9			
6	2.1	2.9	2.9	3.1	3.9			
7								
8								
9								
10								
						TOTAL	87.1	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.90	2.323	116	610

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 2ND FLOOR ONLY OPEN AND
FAN N° 1 RUNNING

INSTRUMENT REF:-

TEST ENGINEER M.P. T.F. DATE 21/7/99 SHT. 16 OF 22



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING.		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	WEST PRESSURE RELIEF Ex H64.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.00	1000 x 800	0.8	2.50

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	2.6	3.0	3.4	3.2			
2	2.0	2.5	3.0	3.5	3.5			
3	1.9	2.4	3.1	3.6	3.5			
4	2.0	2.5	3.1	3.7	3.4			
5	2.5	2.8	3.3	3.6	3.5			
6	2.8	3.2	3.1	3.5	3.4			
7								
8								
9								
10								
						TOTAL	89.8	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.99	2.395	120	692

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH 2ND FLOOR ONLY OPEN AND
FAN N° 2. RUNNING

INSTRUMENT REF:-

TEST ENGINEER MP. TF DATE 21/7/99 SHT. 16 OF 22

DUCT TRAVELS

CLIENT	Deake And Scull
PROJECT	S-7 Carlton Gdns
SYSTEM	EXH04

REF. NO. DESIGNATION DUCT SIZE/mm² AREA/m² BPS/mm²

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.00	2.40	120	589

COMMENTS/TP. LOCATION

READINGS ARE TAKEN WITH ONLY 1ST FLOOR OPEN AND FAN 1
RUNNING.

Tom Fishes

21/7/99

四 22



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL
PROJECT	5-7 Carlton Gdns
SYSTEM	Exch4

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.0	11000 - 800	0.8	2.5

VELOCITY PROFILE READINGS

1	2.3	2.7	3.2	3.3	3.3		
2	2.1	2.6	3.1	3.6	3.6		
3	2.0	2.5	3.2	3.7	3.6		
4	2.1	2.6	3.2	3.8	3.5		
5	2.6	2.9	3.4	3.7	3.6		
6	2.9	3.2	3.2	3.6	3.5		
7							
8							
9							
10							
						TOTAL	92.8

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.093	2.475	124	681

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH ONLY 1ST FLOOR OPEN AND FAN 2 RUNNING.

Tom Fisher

21/7/99

18..22

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FACT THREE

CLIENT	Deake And Scuse
PROJECT	S-7 CARLTON Gdns
SYSTEM	EXHO4

TE REF. NO. 1 DES VOLANTS DUCT SIZE (in.) 75% REF. 1 DES VOLANTS
A 2.0 1000 ± 300 0.8 2.5

A 2.0 1000 ± 300 0.8 2.5

• 1960-1961 •

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.8	3.104	1.55	382

COMMENTS/TP. LOCATION

READINGS ARE FOR GROUND FLOOR ONLY OPEN AND FAN 1 RUNNING.

Tom Fisher

24/3/99

19 22



DUCT TRAVERSE

CLIENT	Drake And Scull
PROJECT	5-7 Carlton Gdns
SYSTEM	EXH04

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	2.0	1500 x 800	0.8	2.5

VELOCITY PROFILE DATA

1	2.7	3.3	4.0	4.5	4.7		
2	2.7	3.6	4.2	4.8	4.7		
3	2.9	3.6	4.4	4.9	4.9		
4	3.0	3.7	4.5	5.1	4.7		
5	3.5	3.8	4.5	5.0	4.5		
6	4.1	4.0	4.4	4.8	4.6		
7							
8							
9							
10							
						TOTAL	124.1

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.14	3.31	165	423

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH ONLY GROUND FLOOR OPEN AND FAN 2 RUNNING

Tom Fisher

21/7/99

20/7/99



DUCT TRAVERSES

CLIENT	Drake And Scull			
PROJECT	S-7 Carlton Gdns.			
SYSTEM	EXHAUST			

REF.	ST. PRESS. (Pa)	DUCT SIZE(mm)	AREA(m ²)	TYPE
A	2.0	1000 x 800	0.8	2.5

At 100% FAN

1	2.1	2.3	2.9	3.1	3.0		
2	1.9	2.4	2.9	3.4	3.4		
3	2.0	2.4	3.0	3.5	3.5		
4	2.2	2.4	3.1	3.5	3.6		
5	2.5	2.8	3.2	3.6	3.5		
6	2.3	2.8	3.3	3.2	3.2		
7							
8							
9							
10							
						TOTAL	87.0

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.9	2.32	116	591

COMMENTS/ TP. LOCATION

READINGS ARE WITH ONLY LOWER GRAND OPEN AND FAN 1 RUNNING

Tom Fisher

21/7/99

21 22



DUCT TRAVERSE

CLIENT	Drake And Scull
PROJECT	S-7 Carlton Goods
SYSTEM	EXHO4

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	2.0	1500 x 800	0.8	2.5

VELOCITY PROFILE(m/s)

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.093	2.47	124	683

COMMENTS/ TP. LOCATION

READINGS TAKEN WITH ONLY LOWER GROUND FLOOR OPEN AND FAN 2
RUNNING.

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005.

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	CAIRIS TUFFIN / R. HALE
	Company:	CML MACE
FAX NO:	MEMO.	
FROM:	M. LAMBOURNE	
NO. OF PAGES (Including this page)	23	
DATE:	27th JULY 1999	

RE: GARSTON GARDENS

REF. EXHIBS

PLEASE FIND ATTACHED RFI NO 166
TO FOLLOW WITH REGARD TO ABOVE
SYSTEM, OBVIOUSLY THIS IS NOW VERY
URGENT AND REQUIRES PLENTY
RESPONSE.

REGARDS

mls

RE. CARRION GARDENS

28/7/99

REF. EXHOS

FURTHER TO PREVIOUS CORRESPONDANCE
AND MTG WITH MALE / OAP WITH REGARD
TO ABOVE SYSTEM WE CONFIRM THE
FOLLOWING.

- 1) ABOVE SYSTEM HAS NO BLOCKAGES
AND ACHIEVES DESIGN IN AMM EXTRACT.
- 2) MATTHEWS AND YATES RESPONSE TO FOLLOW
SHORTLY, RE FAN PERFORMANCE
- 3) FURTHER TO ABOVE PREVIOUS MTG
WE CONFIRM WE WILL COMMISSION EXHOS
WITH STAIRCASE TWO / STAIRCASE ONE
FANS RUNNING AND ALL DOORS
SHUT, APART FROM INDEX FLOOR IE,
(5) TO TRY TO ENHANCE EXHOS PERFORMANCE
ABOVE WORKS WILL BE UNDERTAKEN 28/7/99
UPON STAIRCASE ONE COMPLETION, IE.
SECOND PLENUM,
HOWEVER IT SEEMS UNLIKELY THAT THE
PERFORMANCE WILL INCREASE ANY MORE
THAN 3% . STILL LEAVING VERY HIGH
DUCT RESISTANCE.
PLEASE ADVISE.

Trade Contractor Starter Pack

Request for Information

Package HVAC	Trade Contractor D&E LTD	Date Raised 27/3/2017/19
Package No 6300	Submitted By M. LAMSON LINE	Date Received by Mace
Trade Contractor RFI No 166	Mace Log No	Date Forwarded by Mace

We require information for the following:-

Description:

RE. EXHOS " "
SEE APPENDIX A ATTACHED.
+ PREVIOUS COMMISSIONING RESULTS.

Signed W. J. Da
Trade Contractor

Signed Mike
Trade Contractor

Date Information Required by

WRENT
ASAP.

10

Please provide the information as requested.
We have the following comments:-

Copies to:-			
MWPL	OAP	ECH	BM

Signed: Mace

Date: _____

To: Mace

Copiesto:-			
MWPL	OAP	ECH	BM

Designer Response No:

102

Date:

From:

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: liz@drake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	GARIS TUFFIN
	Company:	CMV
FAX NO:		MEMO ON SITE
FROM:		MARK LAMBOURNE
NO: OF PAGES (Including this page)		19
DATE:		20th JULY 1999,

RE, CAROTON GARDENS,
REF, EXHOS

GARIS,

PLEASE FIND INITIAL PAPERWORK FOR ABOVE
FAN, PLEASE NOTE 2ND FAN TESTS, BUILDING
EXERIC BEING IN DIFFERENT STATUS, FURTHER
TO MAKE DAP MTR 19th JULY 1999, I CONFIRM
I WILL SPEAK TO MATTHEWS, YATES, AND CHECK
DUCT SYSTEM FOR ANY SABOTAGE/BLOCKAGE
REGARDS.

M. Lam.

UK/GEN/01



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS LONDON.
SYSTEM	PRESSURE RELIEF EAST EXHOS.

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative _____
for & on behalf of _____

Dated _____



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	Pressure Relief East Exhos 1 & 2

PRE-RUNNING CHECKS		RUNNING CHECKS	
FANS			
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:		(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input type="checkbox"/>	MOTORS	
4. V BELTS:		1. BEARINGS:	<input checked="" type="checkbox"/>
(i) TENSIONED	<input type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
5. GUARDS:		2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input type="checkbox"/>	SYSTEM CHECKS	
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
9. DRAINS:		4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
(ii) CLEAN	<input type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
10. FILTERS:		MOTORS (VISUAL CHECKS)	
(i) FITTED	<input type="checkbox"/>	1. ELECTRICAL CONNECTIONS:	
(ii) CLEAN	<input type="checkbox"/>	(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>
		(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>
		(iii) COVER FITTED	<input checked="" type="checkbox"/>
COMMENTS			



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING.
PROJECT	S-7 CARLTON GARDENS, LONDON.
SYSTEM	PRESSURE RELIEF EAST EXHOS

WE HAVE COMMISSIONED THE ABOVE SYSTEM
WITH ALL FLOOR SMOKE DAMPERS OPEN, THE
NORMALLY CLOSED SMOKE DAMPER ON EXHOS OPEN
& THE NORMALLY OPEN SMOKE DAMPER ON AHU N°1
EAST CLOSED.

IT SHOULD BE NOTED THAT THE SYSTEM
HAS BEEN TESTED WITHOUT DOORS FITTED TO
STAIRCASES, WINDOWS NOT FITTED DUE TO HOIST,
& NO STAIRCASE PRESSURISATION FANS RUNNING.



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	S-7 CARLTON GARDENS, LONDON.		
SYSTEM	PRESSURE RELIEF EAST EXH05/01		

FAN

M'FACTURER	MATTHEW & YATES	IDENT/SERIAL No	W/I/86732/1
FAN TYPE	AXIAL	PITCH ANGLE	16°
SIZE	48G4P		
SPECIFIED VOLUME & PRESSURE	14.5	m³/sec	Pascals
DESIGN SYSTEM VOLUME	14.5		1040
TESTED SYSTEM VOLUME & PRESSURE	8.618 @ 59%	Dis. 250 Suct. 828	Total 1078

MOTOR

M'FACTURER	MATTHEW & YATES	IDENT/SERIAL No	N/D
VOLTAGE	415V / 3ph 50Hz	POWER	32.0 KW.
FULL LOAD CURRENT	56.0	RUNNING CURRENT	28.4, 28.3, 28.8
DESIGN SPEED	1440		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	— 1 —	QUANTITY	— 1 —
PULLEY DIA.	— 1 —	MOTOR	FAN
SHAFT DIA.	— 1 —		— 1 —
BUSH REF.	— 1 —		— 1 —
MEAS. RPM	— 1 —		NO ACCESS

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	STAR / DELTA.
O/L RANGE	30.0 TO 40.0	O/L SETTING	32.5
TIMER	7 SEC'S	FUSE RATING	80A.

COMMENTS

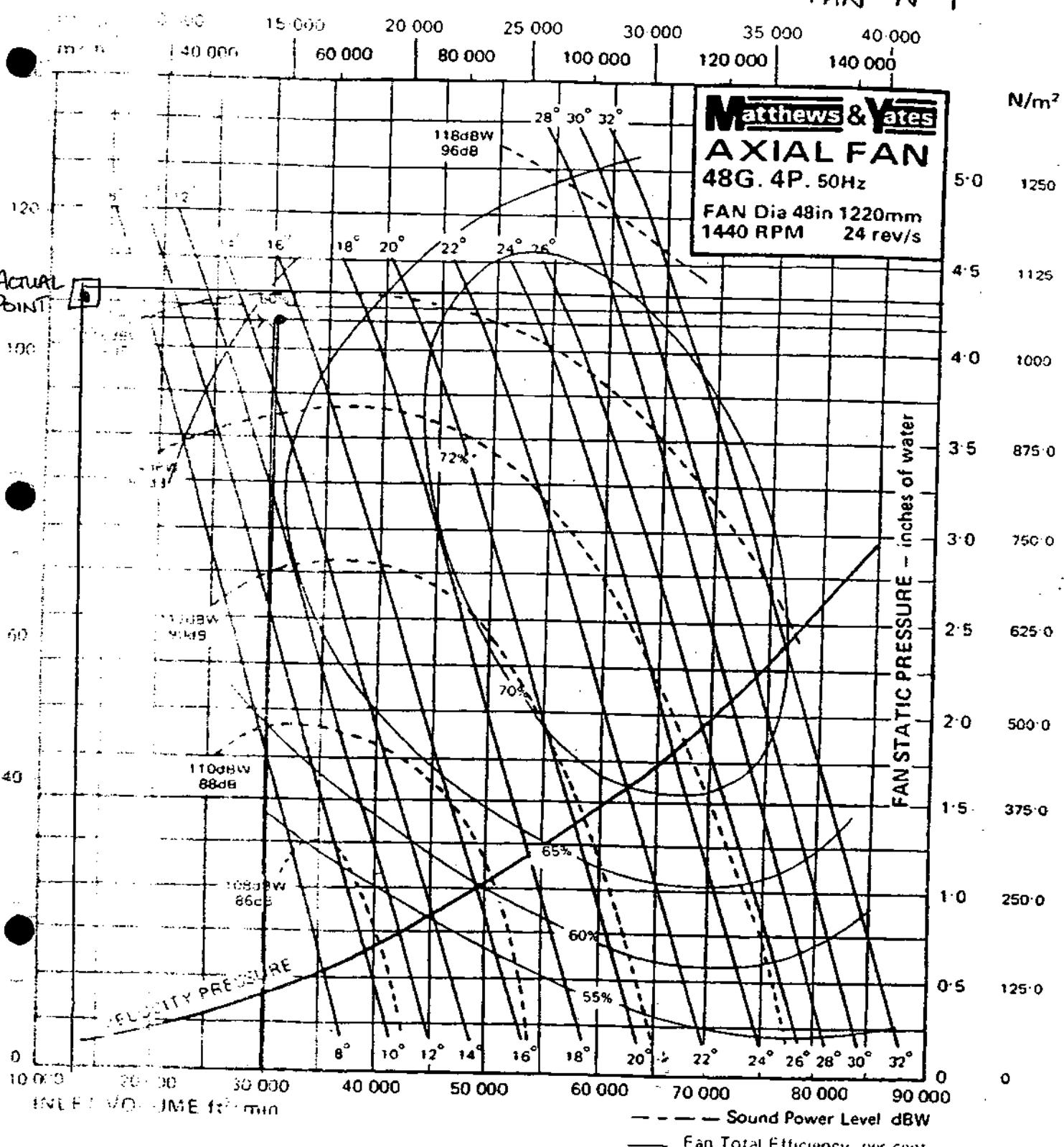
@ 100% OF DESIGN SYSTEM PRESSURE 3097Pa. Ap.

INSTRUMENT REFS.:-

TEST ENGINEER R. BAKER DATE 10-6-99 SHT. 4 OF 10

INLET VOLUME

ExHOS FAN N° 1



THREE PHASE 115v

48G		6°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°
PHASE		3	3	3	3	3	3	3	3	3	3	3	3	3
kW		17.52	19.76	22.97	25.73	29.46	34.68	39.15	43.25	46.98	52.57	57.42		
PSI		23.5	26.5	30.0	34.5	39.5	46.5	52.5	58.0	63.0	70.5	77.0		

ACOUSTIC ANALYSIS

OCTAVE BAND MID-FREQUENCY Hz

	250	500	1000	2000	4000
	7	9	10	12	17

Note: Use above constants from Sound Power level of the fan selected



FAN TEST SHEET

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS, LONDON
SYSTEM	PRESSURE RELIEF EAST EXHOS 102

FAN

MANUFACTURER	MATTHEWS & YATES	IDENT/SERIAL No	WF/86732/02
FAN TYPE	AXIAL	PITCH ANGLE	16°
SIZE	4894P		
SPECIFIED VOLUME & PRESSURE		m³/sec	Pascals
DESIGN SYSTEM VOLUME	14.500	1040	
TESTED SYSTEM VOLUME & PRESSURE	14.500	8.355 (58%)	Dis. 346 Suct. B32
		Total	1178 AP.

MOTOR

MANUFACTURER	MATTHEWS & YATES	IDENT/SERIAL No	N/D
VOLTAGE	415 / 3 / 50	POWER	32 KW.
FULL LOAD CURRENT	56.0	RUNNING CURRENT	284, 28.6, 28.6
DESIGN SPEED	1440 RPM		DELTA LOOP

DRIVE

MANUFACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	" — "	QUANTITY	" — "
PULLEY DIA.	" — "	MOTOR	FAN
SHAFT DIA.	" — "	" — "	" — "
BUSH REF.	" — "	" — "	" — "
MEAS. RPM	NO ACCESS	" — "	" — "

STARTER

MANUFACTURER	TELEMECANIQUE	TYPE	STAR / DELTA
O/L RANGE	30.0 TO 40.0	O/L SETTING	32S
TIMER	7 SEC'S	FUSE RATING	80A

COMMENTS

ALL SMOKE DAMPER ON FLOORS OPEN.
No DOORS FITTED TO STAIRCASES.

INSTRUMENT REFS:-

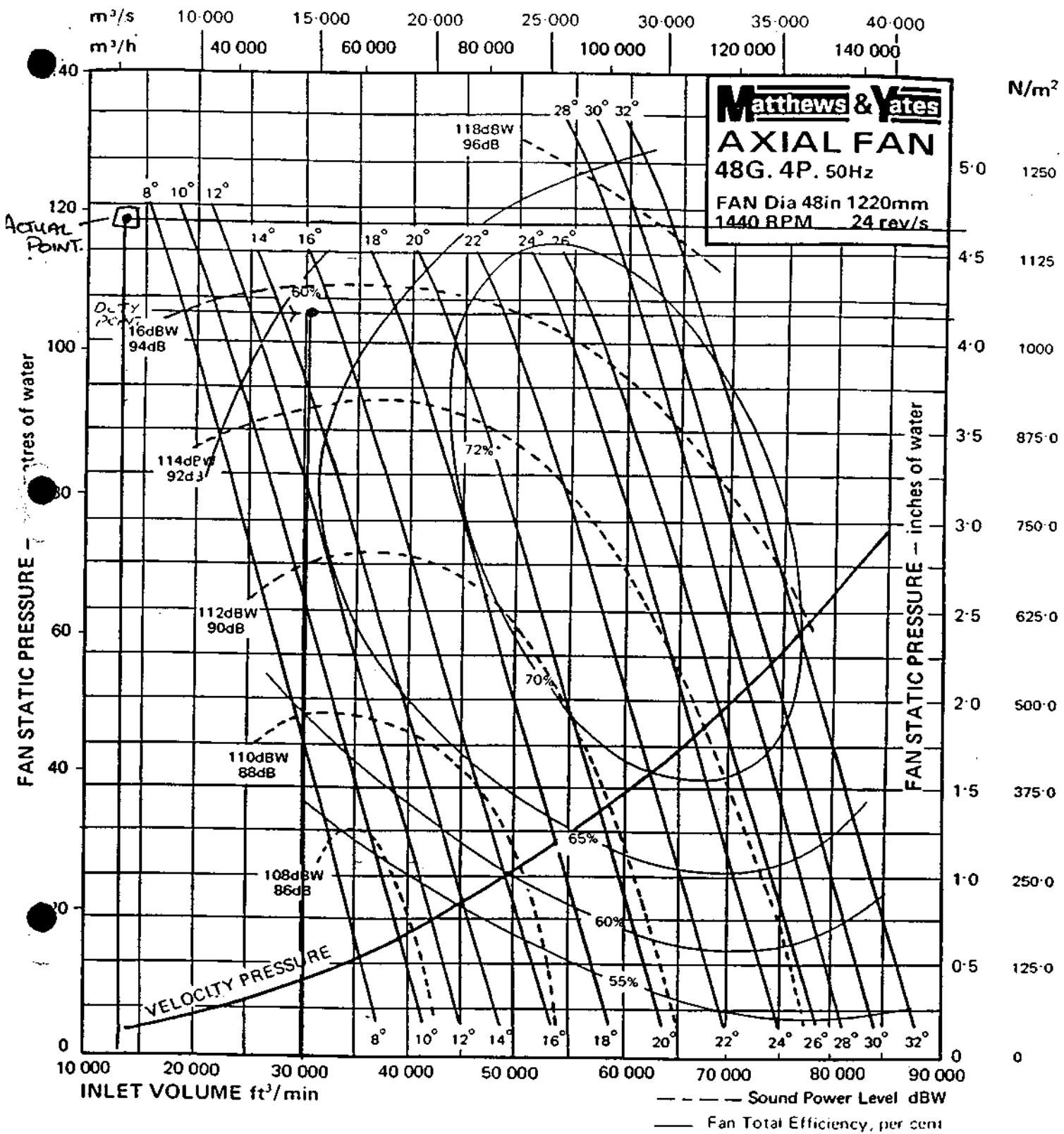
TEST ENGINEER R.BEEN

DATE 10.08.99

SHT. 6 OF 10

INLET VOLUME

Ex HOS / FAN 2.



THREE PHASE 415v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3
KW Peak absorbed Per Stage	17.52	19.76	22.37	25.73	29.46	34.68	39.15	43.25	46.98	52.57	57.42		
hp Peak absorbed Per Stage	23.5	26.5	30.0	34.5	39.5	46.5	52.5	58.0	63.0	70.5	77.0		

ACOUSTIC ANALYSIS

INDUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	14	7	9	10	12	17
To obtain Spectrum subtract above constants from Sound Power level of the fan selected						

FOR MOTOR DETAILS SEE MOTOR DATA SHEET.

SHEET 7 OF 10



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EAST EXHOS (FAN 1)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
1	14.500	1000 X 800	0.800	18.125

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	11.6	10.4	11.0	11.0	10.5	10.7	11.1	11.2
2	9.4	10.2	10.8	11.2	11.4	11.7	11.8	11.4
3	9.5	10.0	11.1	11.4	11.7	11.3	11.2	10.9
4	9.4	10.0	10.5	10.6	10.9	10.5	10.7	9.6
5								
6								
7								
8								
9								
10	39.9	40.6	43.4	44.2	44.5	44.2	44.8	43.1
						TOTAL	344.7	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
10.77	8.618	59	683

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

FAN STATIC PRESSURES:- SUCTION = 828 pa
DISCHARGE = 250 pa.
TOTAL = 1078 pa.

INSTRUMENT REF:-

TEST ENGINEER R. BEEN

DATE 10-06-99

SHT. 8 OF 10



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING			
PROJECT	5-7 Carlton Gardens, London.			
SYSTEM	PRESSURE RELIEF EAST EXH05 (FAN2)			

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
1	14.500	1000 x 800	0.800	18.125

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	10.0	10.3	10.6	10.0	10.1	9.6	9.4	8.7
2	11.3	10.9	11.0	10.3	9.7	10.1	8.6	8.5
3	11.2	12.0	11.9	11.7	11.1	10.6	10.6	9.4
4	12.0	10.3	12.0	12.1	10.1	10.3	9.6	10.2
5								
6								
7								
8								
9								
10	44.5	43.5	45.5	44.1	41.0	40.6	38.2	36.8
	TOTAL 334.2							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
10.44	8.355	58	740

COMMENTS/ TP. LOCATION

ALL DAMPER'S FULLY OPEN.
NO DOORS FITTED ON FLOORS.

FAN STATIC PRESSURE'S = SUCTION = 1032 Pa.
DISCHARGE = 346 Pa.
TOTAL = 1378 Pa.

INSTRUMENT REF:-

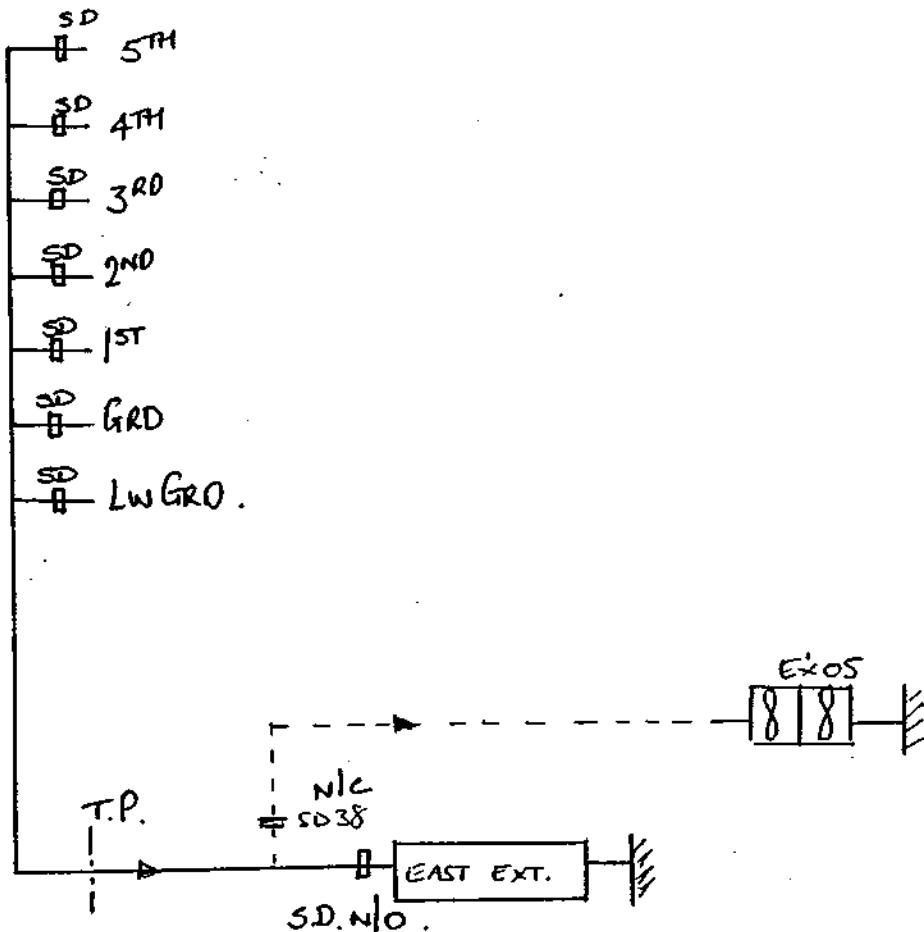
TEST ENGINEER R. BOON

DATE 10-06-99. SHT. 9 OF 10



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	CARLTON GARDENS.
SYSTEM	PRESSURE RELIEF EAST EXOS





DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST (FAN)		

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A.	14.5	1000x800	0.8	18.1

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	7.7	8.1	8.2	8.7	9.1	9.2	8.8	8.7
2	8.0	9.0	9.0	9.1	9.4	9.9	9.8	10.1
3	8.7	9.1	9.3	10.0	10.3	10.7	10.4	9.9
4	7.6	7.5	9.0	11.9	4.8	7.7	7.3	11.0
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
9.52	7.616	53	795

COMMENTS/ TP. LOCATION

The above reading was taken with all the floor's open

MEASUREMENT REF.

TEST ENGINEER M.A.P

DATE 16.7.91

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST (FAN)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	14.5	1000x800	0.8	18.1

VELOCITY PROFILE(m/s)

	A	E	C	D	E	F	G	H
1	8.3	8.5	8.6	9.0	9.4	9.6	9.3	8.7
2	8.3	8.8	9.5	9.7	10.0	10.3	10.1	10.3
3	8.5	9.4	9.7	10.1	10.4	10.8	10.6	10.4
4	9.7	10.4	10.9	10.1	10.9	11.5	11.2	9.9
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
9.78	7.825	54.	838

COMMENTS/ TP. LOCATION

The above reading was taken with all floors open.

INSTRUMENT REF.:

TEST ENGINEER M.A.P

DATE 16.7.99 SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST (FAN 2)		

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	5.0	1000x800	0.8	6.25

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.6	2.8	2.6	2.7	2.6	2.5	2.4	1.9
2	2.2	2.2	2.0	2.1	2.1	2.1	2.1	2.1
3	2.4	2.4	2.1	2.4	2.3	2.3	2.3	2.1
4	2.5	2.2	2.6	1.8	2.4	2.7	1.9	2.4
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.306	1.845	37	1671

COMMENTS/ TP. LOCATION

The above reading was taken with only the 2nd floor open

INSTRUMENT REF.

TEST ENGINEER M.A.P

DATE 16.7.99

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST (FAN)		

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	5.0	1000x800	0.8	6.25

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	4.5	4.1	4.1	4.1	2.4	2.4	2.5	2.2
2	2.3	3.9	3.8	3.7	2.1	2.1	2.0	2.1
3	2.5	3.9	3.9	2.4	2.4	2.3	2.3	2.4
4	2.4	4.0	3.0	2.4	2.3	1.8	0	2.6
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.96	2.37	47	1573

COMMENTS/ TP. LOCATION

The above reading was taken with only the 2nd floor open.

INSTRUMENT REF:

TEST ENGINEER M.W.P

DATE 16.7.99

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST (P&V)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	10.0	1000x800	0.8	12.5

VELOCITY PROFILE(m/s)

	A	E	C	D	E	F	G	H
1	6.5	6.6	6.8	7.2	7.3	6.7	6.6	6.3
2	6.5	7.1	6.9	7.2	7.7	7.3	6.8	7.0
3	7.1	7.4	7.6	7.6	8.1	7.9	7.4	7.5
4	8.0	7.8	7.5	7.3	7.5	8.2	8.1	7.8
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
7.776	6.22	62	1064

COMMENTS/ TP. LOCATION

The above reading was taken with only the 2nd + 3rd floor open.

INSTRUMENT REF:

TEST ENGINEER M.A.P

DATE 16.7.99 SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST FAN ?		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
4	10.0	1000x800	0.8	12.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	6.5	6.7	6.8	7.2	5.1	4.9	4.9	4.7
2	6.6	6.9	7.4	7.5	5.4	5.3	5.2	5.2
3	7.1	7.0	7.3	7.2	5.8	6.0	5.8	5.6
4	7.7	6.8	5.3	6.3	6.2	4.8	6.3	6.0
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
5.316	4.25	43	1339

COMMENTS/ TP. LOCATION

The above reading was taken with only the
2nd + 3rd floor's open



DUCT TRAVERSE

CLIENT	DRAKE + SCULL
PROJECT	CARLTON GARDENS LONDON
SYSTEM	PRESSURE RELIEF EXHOS EAST (FAD)

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.00	1000x800	0.8	6.25

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	2.3	1.4	1.2	1.0	1.9	2.1	1.9
2	1.8	1.8	0	0	0.6	0.7	0.8	0.8
3	1.8	1.7	0	0	0.8	0.6	0.8	1.0
4	0.8	1.9	0	0	1.4	1.3	1.2	1.7
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
1.146	0.917	18	1663

COMMENTS/ TP. LOCATION

The above reading was taken with only the 5th floor open.

INSTRUMENT REF:

TEST ENGINEER *M.A.P*

DATE 16.7.99

SHT. 01



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOS EAST ^(FAC) 2		

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
A	5.00	1000x800	0.8	6.25

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	1.8	2.0	2.0	2.1	1.8	2.0	1.9	1.6
2	0.9	1.1	0.6	0.6	0.9	0.6	1.0	0.9
3	0.9	0.8	0.7	0.6	0.6	0.5	1.0	0.9
4	0.6	0.8	0.8	0.5	0.6	0.4	0.6	1.7
5								
6								
7								
8								
9								
10								
							TOTAL	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
1.056	0.845	17	1764

COMMENTS/ TP. LOCATION

The above reading was taken with only the 5th floor open.

INSTRUMENT REF.:

TEST ENGINEER N.A.P

DATE 16.7.99

SHT. OF

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: liz@drake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:

Telephone No: 0171 930 3369

Fax No: 0171 9303364

TO:	Name: CHRIS TUFFIN.
Company:	CML
FAX NO:	MEMO ON SITE
FROM:	MARK LAMBOURNE
NO: OF PAGES (Including this page)	FIVE
DATE:	20 JULY 1999

RE. CARDINGTON GARDENS,

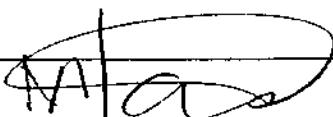
REF. EXH 04,

CHRIS,

FURTHER TO MTG 19/JULY/1999 WITH MALE/QAP

PLEASE FIND PRELIMINARY RESULTS WITH REGARD
TO ABOVE FAN SYSTEM. I CONFIRM WE WILL
VISIT EVERY FLOOR AND READ AND RECORD
FLOOR OF INCIDENT VOLUMES FOR THE RECORD
THIS PAPERWORK WILL FOLLOW SHORTLY,

REGARDS





DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	PRESSURE RELIEF WEST EXH04(FAN2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
1	5.500	1000x800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.0	5.8	6.0	7.0	7.0			
2	5.4	6.2	7.0	7.5	7.2			
3	5.0	5.6	7.0	7.6	7.0			
4	5.1	5.4	6.6	7.4	6.9			
5	5.8	6.0	7.0	7.5	7.4			
6	5.4	6.8	7.1	7.6	7.3			
7								
8								
9								
10	31.7	35.8	40.7	44.6	42.8			
						TOTAL 195.6		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.52	5.216	95	167.

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURES, SUCTION = 1087pa
DISCHARGE 105 pa
TOTAL 1192 Pa

INSTRUMENT REF:-

TEST ENGINEER R. Boon

DATE 10-06-99. SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	Pressure Relief West EXH04(FAN)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
	5.500	1000 x 800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.3	5.6	6.6	7.1	7.2			
2	5.0	6.5	7.1	7.6	7.4			
3	4.9	6.0	7.3	7.8	7.0			
4	5.4	5.7	7.2	7.6	7.2			
5	5.0	6.4	7.3	7.7	7.5			
6	5.8	6.8	7.1	7.6	7.7			
7								
8								
9								
10	31.4	37.0	42.6	45.4	44.0			
						TOTAL 200.4		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.68	5.344	97	171

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURES, SUCTION = 1140 pa.
DISCHARGE = 26 pa
TOTAL = 1166 pa

INSTRUMENT REF:-

TEST ENGINEER R. BOON

DATE 10-06-99

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF EXHOL WEST (Fan 1)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
	2.00	1000x800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.0	2.3	2.3	3.0	3.1			
2	1.8	2.2	2.1	3.0	3.3			
3	1.6	1.9	2.2	2.9	3.4			
4	2.0	2.1	2.4	3.0	3.4			
5	2.5	2.7	2.7	3.1	3.4			
6	2.5	2.6	2.5	3.2	3.5			
7								
8								
9								
10								
						TOTAL		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.62	2.098	105	581

COMMENTS/ TP. LOCATION

VCD in plant room 95% Shut.

INSTRUMENT REF:-

TEST ENGINEER M.A.P

DATE 16.7.99

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE + SCULL		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	PRESSURE RELIEF ERH04 WEST (FAN2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
	2.00	1000x800	0.8	2.5

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.4	2.8	3.0	3.4	3.4			
2	2.2	2.7	2.9	3.4	4.0			
3	2.3	2.5	3.0	3.5	3.9			
4	2.7	2.7	3.1	3.6	3.8			
5	3.0	3.2	3.2	3.6	4.0			
6	3.0	2.8	3.2	3.8	3.8			
7								
8								
9								
10								
						TOTAL		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.16	2.53	126	674

COMMENTS/ TP. LOCATION

VCD in plant room 95% Shut

INSTRUMENT REF:-

TEST ENGINEER M.A.P

DATE 16.7.99

SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	PRESSURE RELIEF WEST EXH04(FAN2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000x800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.0	5.8	6.0	7.0	7.0			
2	5.4	6.2	7.0	7.5	7.2			
3	5.0	5.6	7.0	7.6	7.0			
4	5.1	5.4	6.6	7.4	6.9			
5	5.8	6.0	7.0	7.5	7.4			
6	5.4	6.8	7.1	7.6	7.3			
7								
8								
9								
10	31.7	35.8	40.7	44.6	42.8			
						TOTAL 195.6.		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.52	5.216	95	167.

COMMENTS/ TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURE'S, SUCTION = 1087pa
DISCHARGE 105 pa
TOTAL 1192 Pa

INSTRUMENT REF:-

TEST ENGINEER R. BOON

DATE 10-06-99. SHT. OF



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	CARLTON GARDENS LONDON		
SYSTEM	Pressure Relief West EXH04(FAN)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
A	5.500	1000 x 800	0.800	6.875

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.3	5.6	6.6	7.1	7.2			
2	5.0	6.5	7.1	7.6	7.4			
3	4.9	6.0	7.3	7.8	7.0			
4	5.4	5.7	7.2	7.6	7.2			
5	5.0	6.4	7.3	7.7	7.5			
6	5.8	6.8	7.1	7.6	7.7			
7								
8								
9								
10	31.4	37.0	42.6	45.4	44.0			
						TOTAL 200.4		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
6.68	5.344	97	171

COMMENTS/TP. LOCATION

ALL SMOKE DAMPERS FULLY OPEN.
NO DOORS FITTED ON FLOORS.

INITIAL FAN STATIC PRESSURES, SUCTION = 1140 pa.
DISCHARGE = 26 pa
TOTAL = 1166 Pa

INSTRUMENT REF:-

TEST ENGINEER R. BOON

DATE 10-06-99

SHT. OF

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	S. JEFFREY. R. HALE .
	Company:	MALE .
FAX NO:		071 639 3081 .
FROM:		M. VAMBURNE .
NO: OF PAGES (Including this page)		FOUR .
DATE:		16TH JULY 1999 .

RE: CARLTON GARDENS.

REF: EXH 04.

WITH REFERENCE TO THE ABOVE SYSTEM AND
OAP FAX 13/7/99. WE CONFIRM THE
MODIFICATION OF THE BALCONY WORK WOULD
BE A MAJOR TASK. DUE TO DULIT NOW
BEING INSULATED, METAL CLADDED. IT WOULD
ALSO INVOLVE THE MOVING AND MODIFICATION
OF OTHER SERVICES ADJACENT. I.E. TWS ETC.
WE WOULD STRONGLY SUGGEST A UNK IS
MADE FROM SD36. I HAVE SPOKEN TO
SYNCHRONISED SYSTEMS, WHO CONFIRM THIS
CAN BE UNDERTAKEN

REGARDS.

M. Hale



Ove Arup & Partners
Consulting Engineers

Facsimile

13 Harley Street
London W1P 6BQ
Telephone +44 (0)171 636 1531

Direct Dialling
Telephone +44 (0)171 465 2103
Facsimile +44 (0)171 465 3667

Fax to

Roger Hale Esq MACE

Date

13/7/99

Fax no

Job number/Reference

526015

Attention

File reference

5.27

cc

From

Andrew Hayman.

Total number of pages
(including this page)

Subject

C.C. 6300/163

3

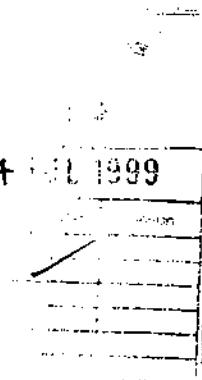
If you have not received all the pages listed please phone the sender

Please see attached

Regards

S.

14/7/1999



Roger

Trade Contractor Starter Pack

Request for Information

AKVAC 16300	DSE LTD. M. LAMBANINE	9/1/99 PPA Date Forwarded to DSE
Trade Contractor Ref ID: 163.	Mobile Login	Date Forwarded to DSE

We require information for the following:-

Description

BGF. FANS EXH04 , EXH05.

- PLEASE SEE APPENDIX "A" ATTACHED.
- INITIAL VOLUMES ETC. FOR ABOVE FANS SYSTEM FULLY OPEN. TO BE READ IN ACCORDANCE WITH RPI.163.

Signed M. L. Mace
Trade Contractor

Date Information Required by:

13 JULY 1999

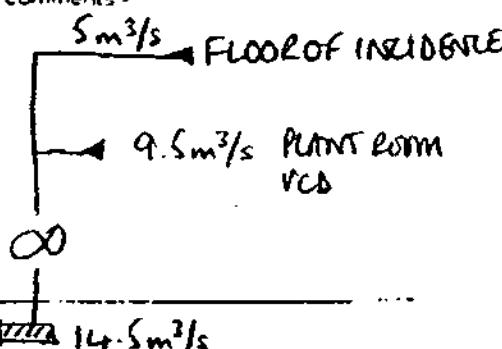
TOTAL NO OF PAGES .

To:

Please provide the information as requested.
We have the following comments:-

Copies to:-			
MWPL	OAP	ECH	BM

● EXH05



Volumes as stated at
meeting 15/6/99.

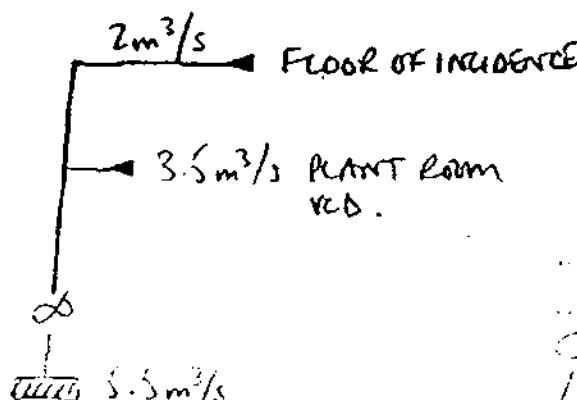
Signed

Mace

Date

To: Mace

EXH04



Copies to:-			
MWPL	OAP	ECH	BM

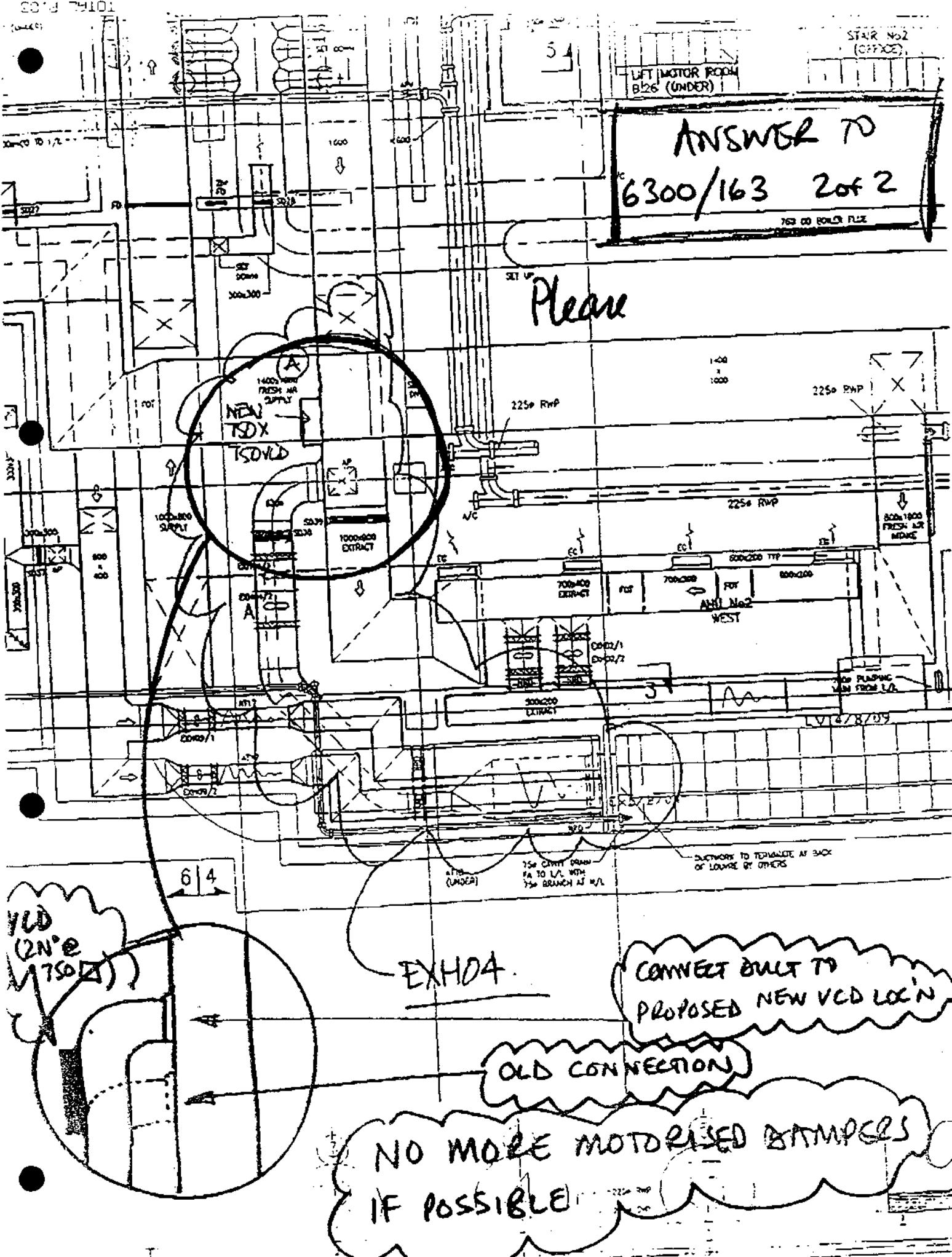
ANSWER PAGE 1 OF 2

EE ATTACHED

EETCH .

● EXH02

JL
TAC



MESSAGE CONFIRMATION

16/07/99 09:10

DATE	S.R-TIME	DISTANT STATION ID	MODE	PAGES	RESULT
16-07	01 ⁰⁶ 20"	MACE - STIRLING	CALLING	04	OK 0000

13 factory Street
London. W1P 6SQ
Telephone +44 (0)171 636 1531

Direct Dialling
Telephone +44 (0)171 465 2103
Facsimile +44 (0)171 465 3667

Pay to Roger Hale Esq M&RE

Date 13/7/89

Fax no.

Attention

66

From Andrew Hayman

Subject CG. 6300/163

Date 13/7/ Job number/Reference

File reference

S-27

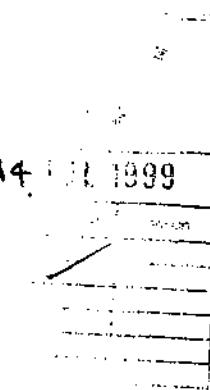
Total number of pages
(including this page)

If you have not received all the pages listed please phone the sender

Pl. see attached

regards
A.

Roger



Request for Information

Mike	DSE ID Contractor ID	911) 517 1999
6300	M. LAMBORLINE	Contractor ID
Trade Contractor Ref ID	Macel Log No	Contractor ID

We require information for the following:-

Cognitio

BET. FANS EXH04, EXH05.

- - PLEASE SEE APPENDIX "A" ATTACHED.
 - INITIAL VOLUMES ETC. FOR ABOVE FANS
SYSTEM FULLY OPEN: TO BE READ IN ACCORDANCE
WITH RPI.163.

Signed M. A.
Trade Contractor

1996-1997

Date information received by:

13 JULY 1999

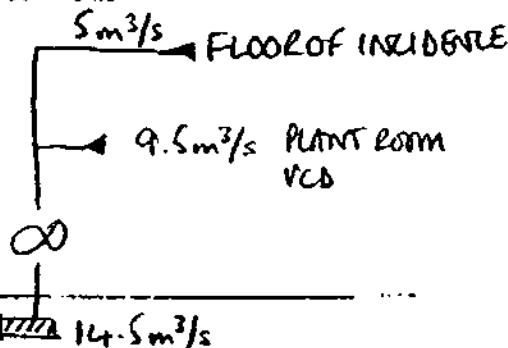
TOTAL NO OF PAGES

To:

Please provide the information as requested
we have the following comments:-

Copies to:			
MWPL	OAP	ECM	BM

EXHOS



Volumes as stated at
meeting 15/6/99.

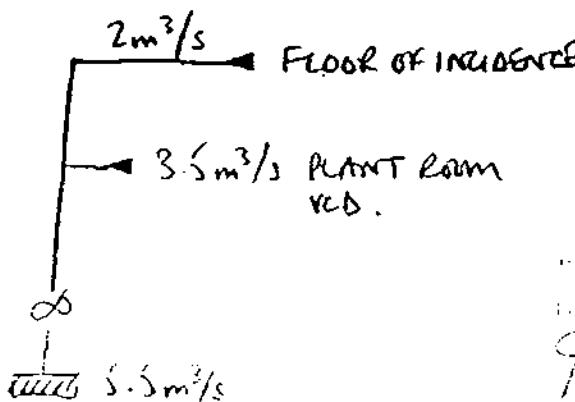
Signed

Macc

Ques

10/2009

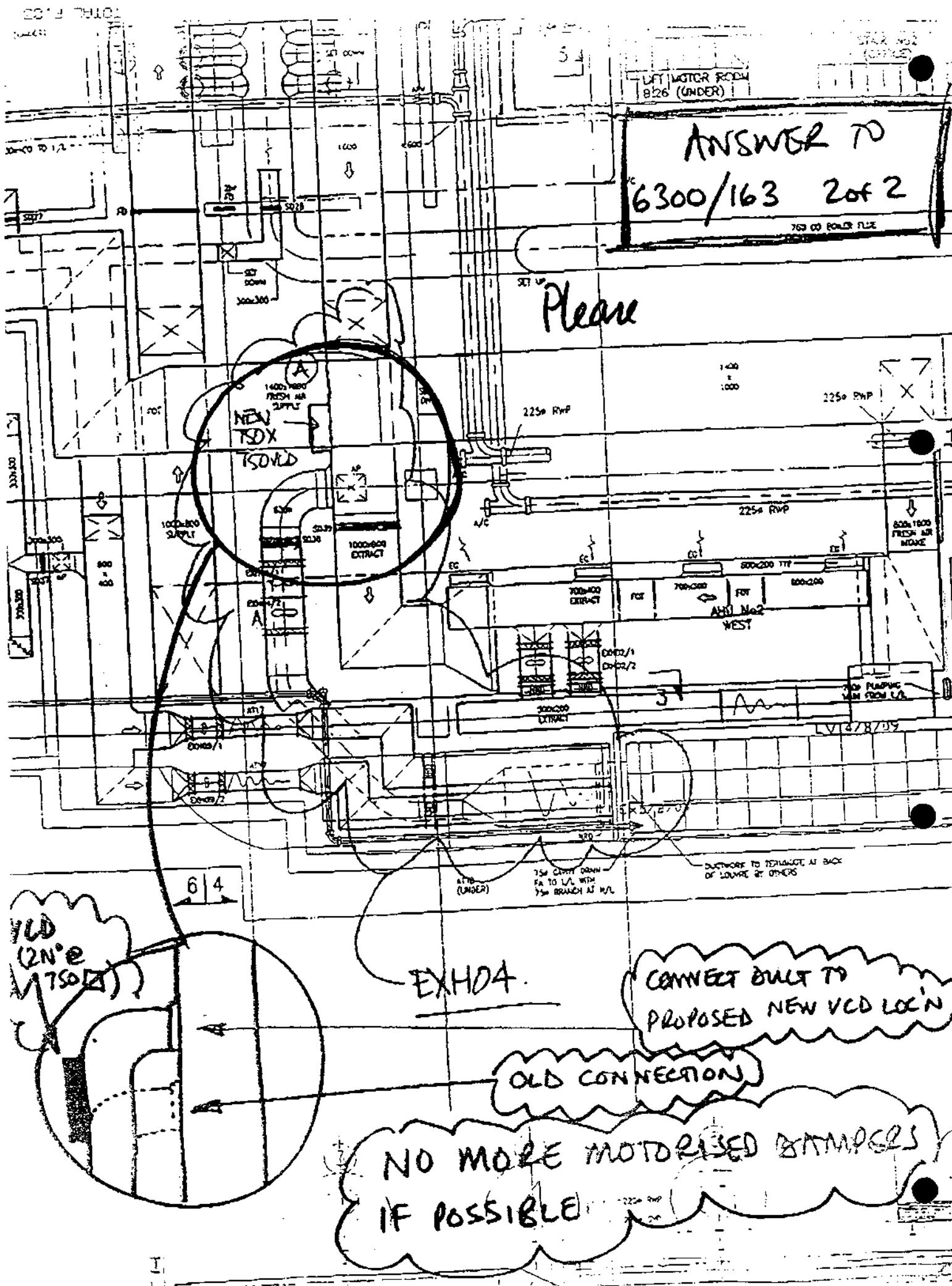
Exhibit 4



Codicis 10.			
MWPL	OAP	ECII	BM

Answer Page 1 of 2

P. E. G. 12th Jan.



Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:
Telephone No: 0171 930 3369
Fax No: 0171 9303364

TO:	Name:	S. JEFFREY, R. HAYE
	Company:	MACE
FAX NO:		0171 839 3081
FROM:		M. LAMBORNE
NO: OF PAGES (Including this page)		
DATE:		9.JULY.1999.

RE. FANS. EXH04 / EXH05 .

STATION

I HAVE MADE ASSUMPTIONS ON PRESSURE
RELIEF VOLUMES ETC. FOR INITIAL COMMISSIONING
BUT A. HATMAN WILL NEED TO CONFIRM
HE MAY HAVE A DIFFERENT VIEW .

REGARDS .

MACE .

COPY. C.TUFFIN.AML LTD.

Trade Contractor Starter Pack

Request for Information

Package	Trade Contractor	Date Raised
HVAC.	DSE LTD.	9th July 1999.
Package No	Submitted By	Date Received by Mace
6300.	M. LAMBORNE	

Trade Contractor RFI No

163.

Mace Log No

Date Forwarded by Mace

We require information for the following:-

Description:

BFT. FANS EXH04, EXH05.

- PLEASE SEE APPENDIX "A" ATTACHED.
- INITIAL VOLUMES ETC. FOR ABOVE FANS SYSTEM FULLY OPEN. TO BE READ IN ACCORDANCE WITH RFI.163.

Signed M. L. A.
Trade Contractor

Date Information Required by:

13 JULY 1999

TOTAL NO OF PAGES . . .

To:

Please provide the information as requested.
We have the following comments:-

Copies to:-			
MWPL	OAP	ECH	BM

Signed: _____
Mace

Date: _____

To: Mace

Copies to:-			
MWPL	OAP	ECH	BM

Designated Person to receive:

Date

To

From

APPENDIX "A" EPI. 163. DATED. 9TH JULY 1999.
PRESSURE RELIEF FANS. EXH 04, 05.

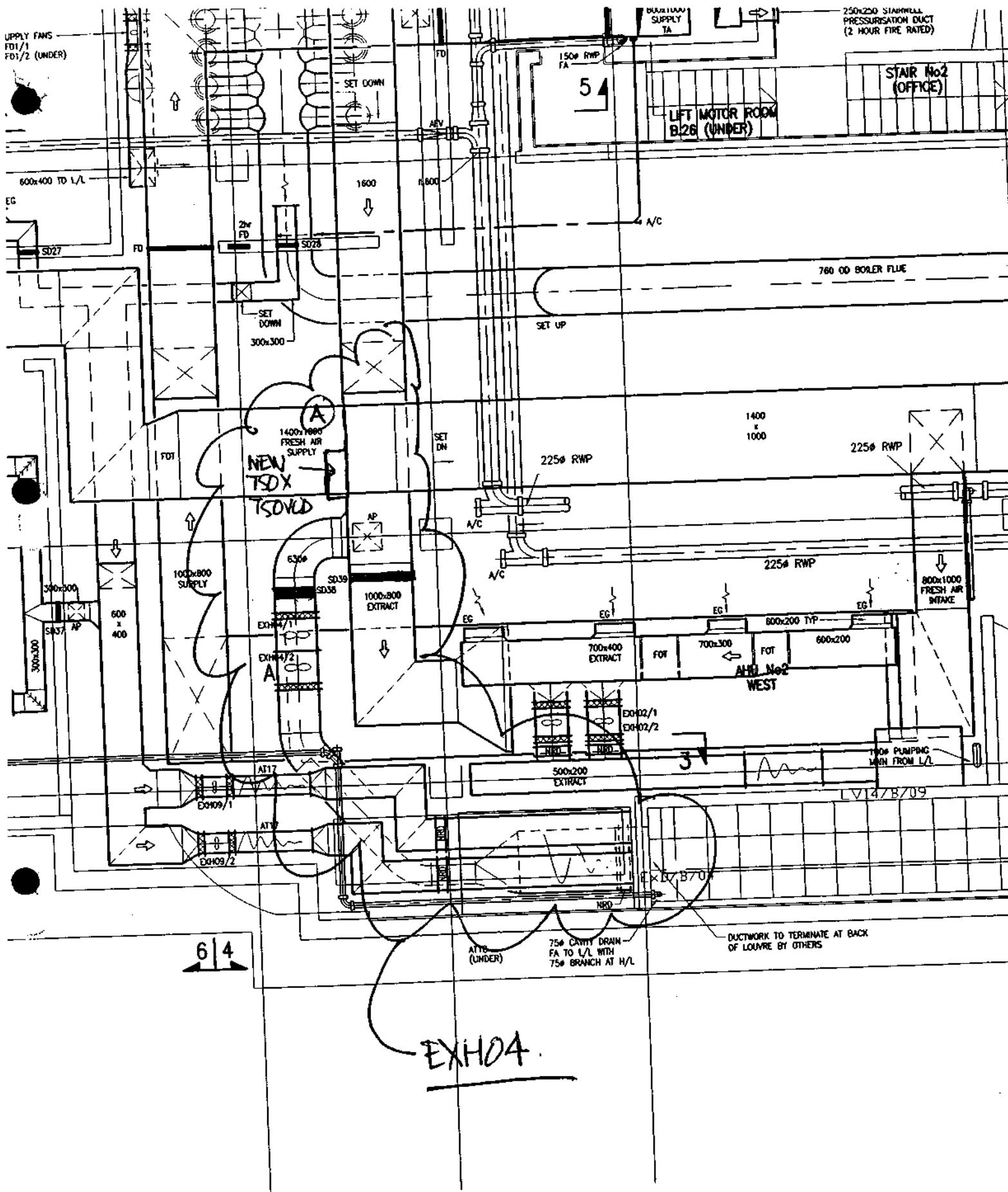
- COMMISSIONING WORKS RELATED TO ABOVE FANS AND CMI REGARDING TSOxTSO RELIEF VDS.

- EXH 04.

- A • SEE SKETCH ATTACHED NEW VCD (A) CANNOT BE LOCATED DOWNSTREAM OF SD38. WITHOUT SERIOUS Duct MODIFICATION. THEREFORE IF VCD IS REGULATED IN PRESSURE RELIEF MODE. UPON SYSTEM BEING PUT BACK INTO STANDARD AHU2 EXTRACT MODE. THE STANDARD EXTRACT WILL NOT BE IN BALANCE DUE TO THIS OPEN RELIEF VCD. SHOULD THIS NOT BE MOTORISED (LINKED) WITH SD38 TO OPEN / CLOSE. PLEASE ADVISE.
- B • PLEASE ADVISE DESIGN VOLUMES FOR EXH 04 IE. VCD RELIEF AND FLOOR/s OF INCIDENT.

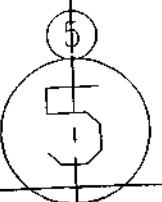
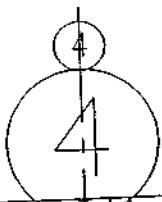
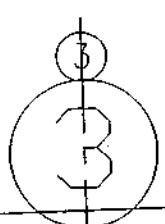
- EXH 05

- A • SEE SKETCH ATTACHED VCD IS LOCATED DOWNSTREAM OF SD38 .THUS ENABLING MANUAL BALANCE .
- B • PLEASE ADVISE DESIGN VOLUMES FOR EXH 05 IE. VCD RELIEF AND FLOOR/s OF INCIDENT . BEARING IN MIND PROPORTIONAL BALANCE OF FLOORS WHEN IN AHU EXTRACT MODE



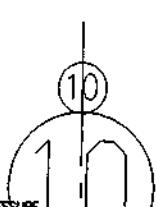
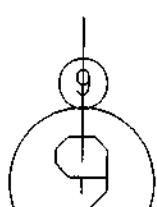
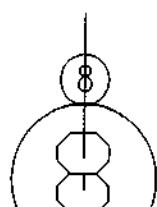
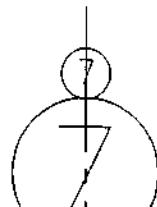
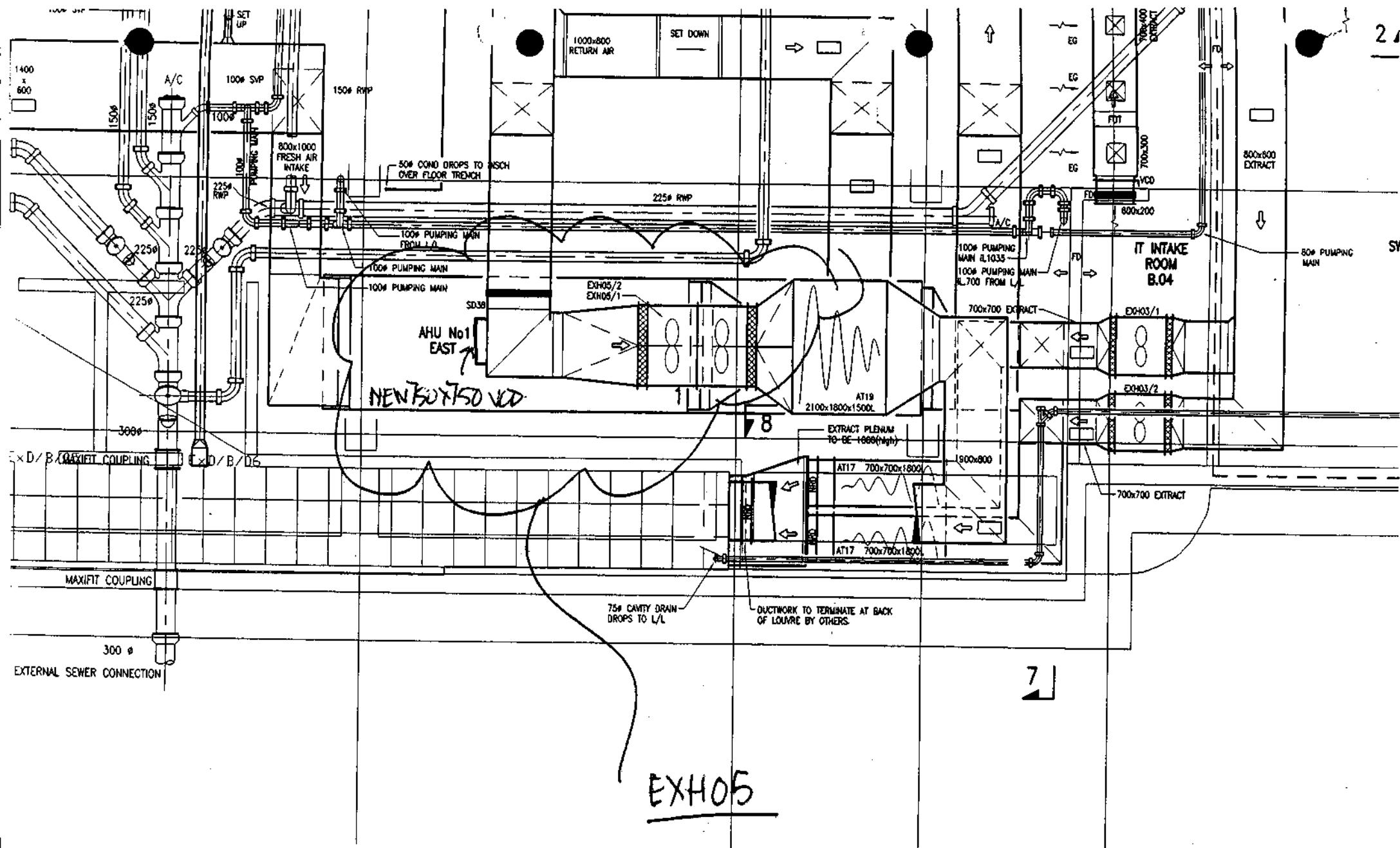
EXH04

DUCTWORK TO TERMINATE AT BACK
OF LOUVRE BY OTHERS



1200x1200 FRESH AIR SUPPLY

1000x1400 ➔





UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EK1-106

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

NACC

Dated

28.6.99



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT EXTRACT STAFF EXHAUST

PRE-RUNNING CHECKS

FANS/PUMPS

- ✓ IMPELLER FREE TO ROTATE
- ✓ BEARINGS FREE TO ROTATE
- PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
- ✓ V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
- ✓ GUARDS:
 - (i) SATISFACTORY
- ✓ ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
- ✓ ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
- ✓ FLEXIBLE CONN'S INSTALLED
- DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

- ✓ 1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
- ✓ 2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

- ✓ 1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
- ✓ 2. TEST POINTS INSTALLED
- ✓ 3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

- ✓ 1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

- ✓ 1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
- ✓ 2. A.V.M'S OPERATING

MOTORS

- ✓ 1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
- ✓ 2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY O NOT APPLICABLE X ACTION REQUIRED

TEST ENGINEER R. SAYRE

DATE 28.01.99

SHT. 2 OF 9



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	S-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXT10

AS NON RETURN DAMPERS ARE NOT INSTALLED TO INDIVIDUAL FANS, THE AIR IS RE-CIRCULATING AROUND BOTH FANS.

WE HAVE THEREFORE BLANKED OFF FAN N°2 & COMMISSIONED FAN N°1, USING AN ANEMOMETER & MICROMANOMETER.

CALIBRATED INSTRUMENTS USED WERE .

ANEMOMETER U.KAO4.

MICROMANOMETER U.K. 7526.

SMOKE MODE

SMOKE DAMPER TO REFUSE OPEN
SMOKE DAMPER TO STAFF AREA CLOSED.

NORMAL MODE

SMOKE DAMPER TO REFUSE CLOSED
SMOKE DAMPER TO STAFF AREA OPEN.



FAN TEST SHEET

CLIENT	DRAKE & SKULL		
PROJECT	CARLTON GARDENS		
SYSTEM	BASEMENT STAFF EXTRACT EXHOLE		

FAN N°1

FAN

M'FACTURER	MATTHEW & VATES	IDENT/SERIAL No	WT86732/031
FAN TYPE	AXIAL	PITCH ANGLE	10
SIZE	305 MM		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.24	290
DESIGN SYSTEM VOLUME		0.241	
TESTED SYSTEM VOLUME & PRESSURE	0.23 @ 93%	Dis. 15 Suct. 182	
		Total	197

MOTOR

M'FACTURER	N/A	IDENT/SERIAL No	N/A
VOLTAGE	415 - 3.50	POWER kW	0.17
FULL LOAD CURRENT	2.15	RUNNING CURRENT	1.7, 1.6, 1.7
DESIGN SPEED	2880		

DRIVE

M'FACTURER	N/A	TYPE	N/A
BELT SIZE	N/A	QUANTITY	N/A
	MOTOR		FAN.
PULLEY DIA.	DIRECT DRIVE		DIRECT DRIVE
GFT DIA	" "	" "	" "
SH REF.	" "	" "	" "
MEAS. RPM	NO ACCESS		NO ACCESS

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	D.O.L.
O/L RANGE	1.6 - 2.5	O/L SETTING	2.15
TIMER	N/A	FUSE RATING	16Amp

COMMENTS

FAN RUNNING IN NORMAL MODE. AS ABOVE.

FAN RUNNING IN SMOKE MODE.

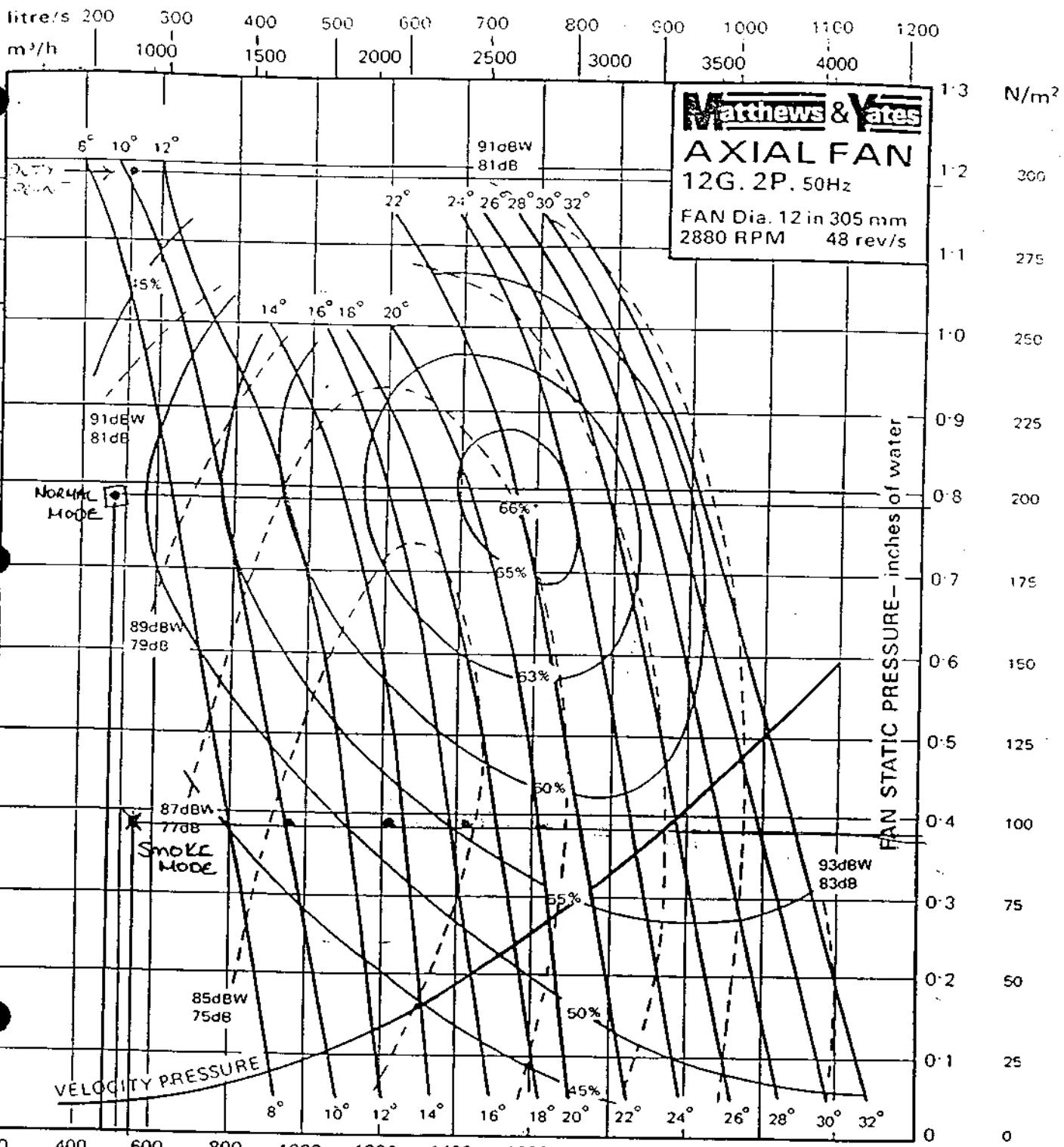
FAN SUCTION 74Pa Ap 94Pa. Running Currents. L:- 1.8A Y:- 1.8A, B1.9A
DISCHARGE 20Pa

INSTRUMENT REFS: UK 907-UK MOT

TEST ENGINEER: C BOYCE

DATE 29/06/99 SHT. 4 OF 9

INLET VOLUME



THREE PHASE 415v

SINGLE PHASE 220v

ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°
PHASE	3	1	3	1	3	1	3	1	3	1	3	1	3
kW Peak absorbed Per Stage	0.14	0.17	0.19	0.21	0.23	0.25	0.27	0.31	0.34	0.37	0.40	0.44	0.48
hp Peak absorbed Per Stage	0.19	0.23	0.25	0.28	0.31	0.34	0.36	0.42	0.46	0.50	0.54	0.59	0.65

ACOUSTIC ANALYSIS

INDUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	8	6	8	10	14	20

To obtain Spectrum subtract above constants from Sound Power level of the fan selected

FOR MOTOR DATA SEE MOTOR DATA SHEET



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SCULL				
PROJECT	CARLTON GARDENS				
SYSTEM	BASEMENT STAFF EXTRACT EX DB				

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
MAIN	0.241	365 Ø	0.99	2.75

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	d6
a	2.0	2.8	2.3	2.5	2.3	2.3
b	2.6	2.7	2.6	2.2	2.2	1.9
c						
d						
TOTAL 27.4						

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST PRESS.(Pa)
2.325	0.230	95	182

COMMENTS/ TP. LOCATION

NORMAL Mode

INSTRUMENT REF - UK M 07

TEST ENGINEER R BAKER

DATE 22-06-99

REV 6

1



DUCT TRAVERSE (CIRC.)

CLIENT	DEAVE & SCULL
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXHOLE

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
SMOKE MODE	0.211	355 Ø	0.099	3.75

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	d6 0.933*dia
a	4.5	4.7	4.6	2.9	2.1	1.5
b	2.7	3.5	3.8	4.1	3.3	3.3
c						
d						
				TOTAL	41.0	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.41	0.337	140	50

COMMENTS/ TP. LOCATION

TP ON SUCTION SIDE OF FAN

INSTRUMENT REF - UK M 07

TEST ENGINEER R DEAVE

DATE 23.06.99 SHT. 7 OF 9



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXH06

INSTRUMENT REFS:- HK 8 07

TEST ENGINEER P R G A V E D

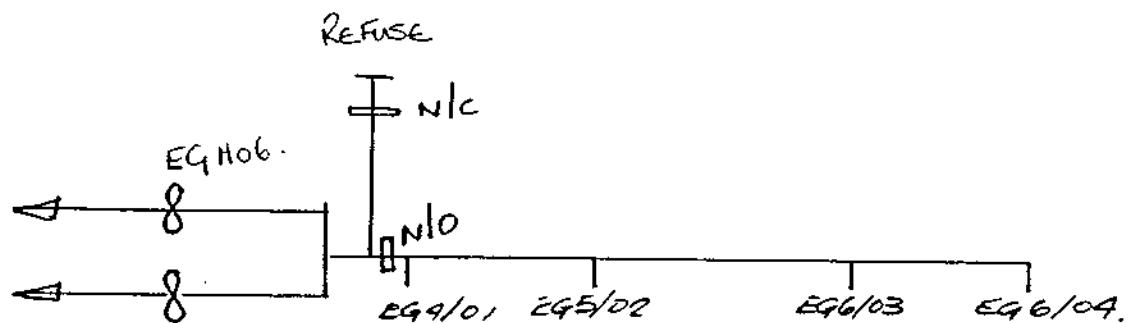
DATE 01-07-99

SHT. 8 OF 9



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXH 06





UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

7.7.99.

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

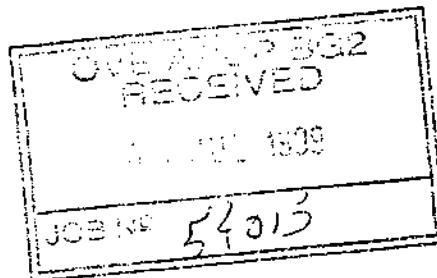
Signature of Clients representative
for & on behalf of

[Signature]
NACS

Dated

28.6.99

FAN NEEDS TO BE PROVIDING
90-110% DESIGN FLOW AT ROOM
CONDITIONS UNDER NORMAL AND SMOKE COND'NS.



[Signature]
'Z' 1/7/99.



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SULL
PROJECT	CARTON GARDENS
SYSTEM	BASEMENT EXTRACT STAFF EXHAUST

PRE-RUNNING CHECKS

FANS/PUMPS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
7. ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
2. TEST POINTS INSTALLED
3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

MOTORS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY

NOT APPLICABLE

ACTION REQUIRED

TEST ENGINEER E BAKER

DATE 28.06.99

SHT. 2 OF 9



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	S-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXT10

AS NON RETURN DAMPERS ARE NOT INSTALLED TO INDIVIDUAL FANS, THE AIR IS RE-CIRCULATING AROUND BOTH FANS.

WE HAVE THEREFORE BLANKED OFF FAN N° 2 & COMMISSIONED FAN N° 1, USING AN ANEMOMETER & MICRONANOMETER.

CALIBRATED INSTRUMENTS USED WERE .

ANEMOMETER U.KAO4.
MICRONANOMETER U.K. 7526. } CALIBRATION
CERTIFIED

SMOKE MODE

SMOKE DAMPER TO REFUSE OPEN
SMOKE DAMPER TO STAFF AREA CLOSED.

NORMAL MODE

SMOKE DAMPER TO REFUSE CLOSED
SMOKE DAMPER TO STAFF AREA OPEN.



FAN TEST SHEET

CLIENT	DEAKE & SKULL		
PROJECT	CARLTON GARDENS		
SYSTEM	BASEMENT STAFF EXTRACT EXHOLE	FAN N°1	

FAN

M'FACTURER	MATTHEW & VATES	IDENT/SERIAL No	WT86732/031
FAN TYPE	AXIAL	PITCH ANGLE	10
SIZE	305 MM	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	0.2 L	290	
DESIGN SYSTEM VOLUME	0.2 L		
TESTED SYSTEM VOLUME & PRESSURE	0.23 @ 93%	Dis. 15 Suct. 182	
	Total	197	

MOTOR

M'FACTURER	N/A	IDENT/SERIAL No	N/A
VOLTAGE	415 - 3.50	POWER kW	0.17
FULL LOAD CURRENT	2.15	RUNNING CURRENT	1.7, 1.6, 1.7
DESIGN SPEED	2880		

DRIVE

M'FACTURER	N/A	TYPE	N/A
BELT SIZE	N/A	QUANTITY	N/A
	MOTOR		FAN.
DULLEY DIA.	DIRECT DRIVE		DIRECT DRIVE
HAFT DIA.	" "		" "
LJSH REF.	" "		" "
MEAS. RPM	NO ACCESS		NO ACCESS

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	D.O.L.
O/L RANGE	1.6 - 2.5	O/L SETTING	2.15
TIMER	N/A	FUSE RATING	16 AMP

COMMENTS

FAN RUNNING IN NORMAL MODE. AS ABOVE.

FAN RUNNING IN SMOKE MODE.

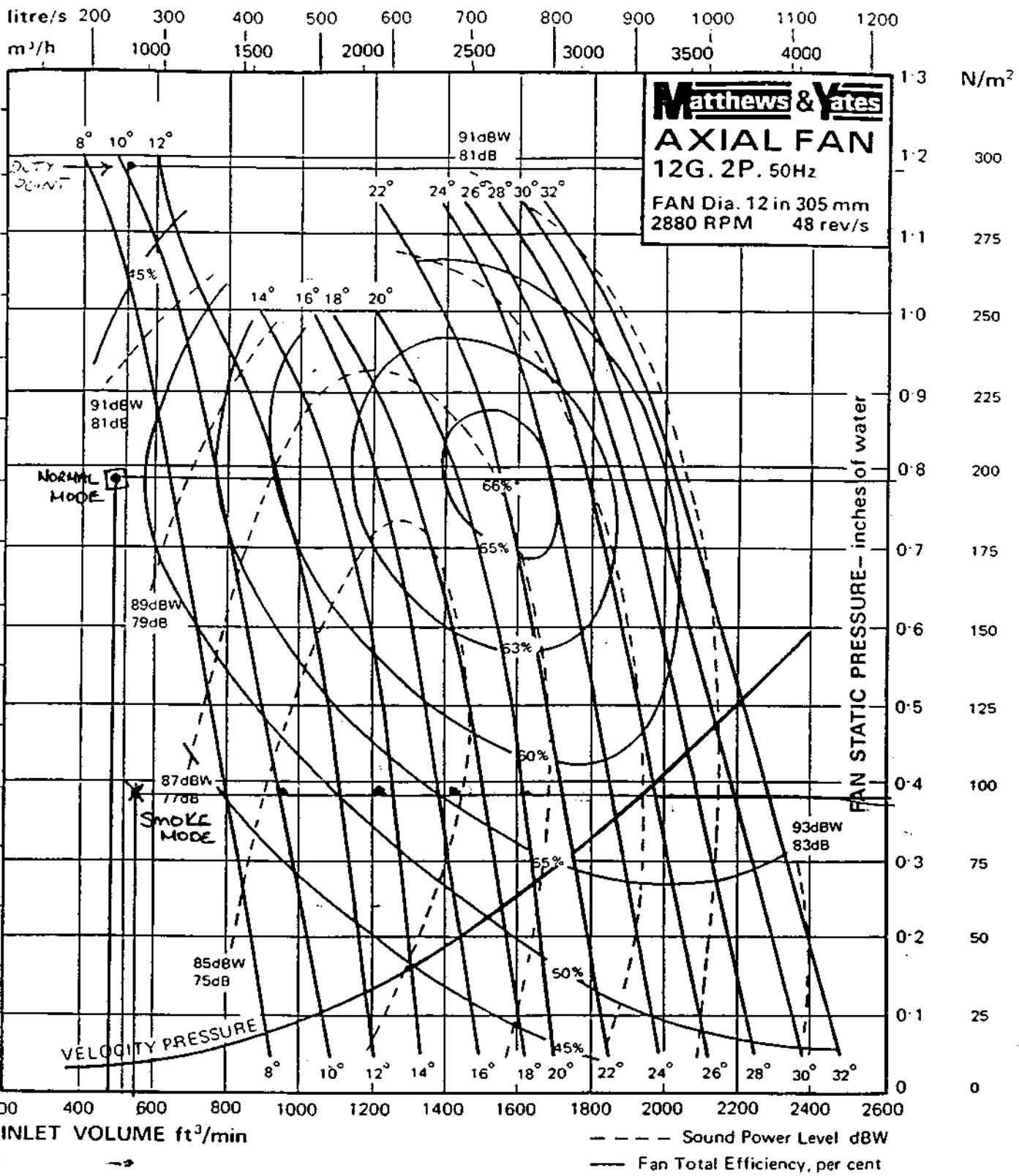
FAN SUCTION 74 Pa Ap 94 Pa Running Currents. R:- 1.8 A Y:- 1.8 A B1.9 A
DISCHARGE 20 Pa

INSTRUMENT REFS:- UK 907 - UK 907

TEST ENGINEER P BAKER

DATE 28.06.99 SHT. 4 OF 9

INLET VOLUME



ANGLE	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°
PHASE	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1	3 1
kW Peak absorbed Per Stage	0.14	0.17	0.19	0.21	0.23	0.25	0.27	0.31	0.34	0.37	0.40	0.44	0.48
hp Peak absorbed Per Stage	0.19	0.23	0.25	0.28	0.31	0.34	0.36	0.42	0.46	0.50	0.54	0.59	0.65

ACOUSTIC ANALYSIS

INDUCT SPECTRUM	OCTAVE BAND MID-FREQUENCY Hz					
	125	250	500	1000	2000	4000
CONSTANTS	8	6	8	10	14	20
To obtain Spectrum subtract above constants from Sound Power level of the fan selected						

FOR MOTOR DETAILS SEE MOTOR DATA SHEET.

5 - 9



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SCULL				
PROJECT	CARLTON GARDENS				
SYSTEM	BASEMENT STAFF EXTRACT EXDL				

TP REF.	DES VOL(m ³ /s)	DUCT DIA.(mm)	AREA(m ²)	DES VEL(m/s)
MAIN	0.241	365 Ø	0.99	2.75

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	Ø 1.061*dia
a	2.0	2.8	2.3	2.5	2.3	2.3
b	2.6	2.7	2.6	2.2	2.2	1.9
c						
d						
TOTAL 27.9						

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.325	0.230	95	182

COMMENTS/ TP. LOCATION

NORMAL MODE

INSTRUMENT REF: UK M 07

TEST ENGINEER R BAKER

DATE 28.06.99

SHT 6

9



DUCT TRAVERSE (CIRC.)

CLIENT	DRAVE & SKULL	
PROJECT	CARLTON GARDENS	
SYSTEM	BASEMENT STAFF EXTRACT EXHOLD	

TP REF.	DES VOL(m ³ /s)	DUCT DIA.(mm)	AREA(m ²)	DES VEL(m/s)
SMOKE MODE	0.241	355 Ø	0.099	3.75

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.579*dia	d5 0.865*dia	d6 0.956*dia
a	4.5	4.7	4.6	2.9	2.1	1.5
b	2.7	3.5	3.8	4.1	3.3	3.3
c						
d						
			TOTAL	41.0		

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.41	0.337	110	50

COMMENTS/ TP. LOCATION

TP ON SUCTION SIDE OF FAN

INSTRUMENT REF: UK M 07

TEST ENGINEER R BAXPE

DATE 28.06.99 SHT. 7 OF 9



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAYE & SULL
PROJECT	CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXHOLE

REF	LOCATION	AREA(m ²)	DES DATA		TEST DATA		
			VOL(m ³ /s)	VEL(m/s)	VEL(m/s)	FACT	VOL(m ³ /s)
EG4/01	MAILROOM	0.0314	0.130	4.14	2.3		0.103
EG4/02	STAFF AREA	0.02	0.085	4.25	3.48		0.0696
EG4/03	L M E B.20	0.0056	0.013	2.32	1.95		0.0109
EG4/04	L M E B.22	0.0028	0.013	4.64	2.7		0.0103
							79 x

NOTE:- EG4/04 DIAMETER 60mm Ø

INSTRUMENT REFS:- UX029

INDEX *

TEST ENGINEER R BAKER

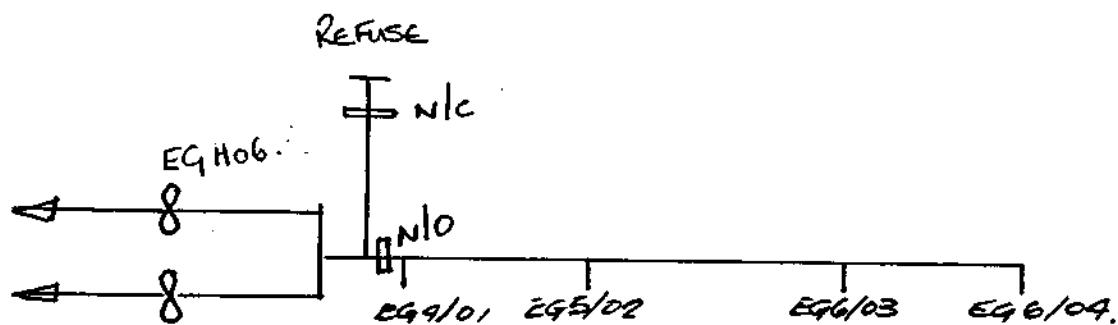
DATE 28.06.99

SHT 8 OF 9



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF EXTRACT EXH 06



15



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT TOILET EXTRACT .Ex H07

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative _____
for & on behalf of _____

Dated _____



PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7 CARLTON GARDENS
SYSTEM	BASEMENT TOILET EXTRACT EX07

PRE-RUNNING CHECKS

FANS/PUMPS

1. IMPELLER FREE TO ROTATE
2. BEARINGS FREE TO ROTATE
3. PULLEYS:
 - (i) TIGHT ON SHAFT
 - (ii) ALIGNED
4. V BELTS:
 - (i) TENSIONED
 - (ii) ALL SIMILAR
5. GUARDS:
 - (i) SATISFACTORY
6. ACCESS DOORS / PANELS:
 - (i) SATISFACTORY
 - (ii) ALL BOLT SEALS IN PLACE
7. ANTIVIBRATION MOUNTINGS:
 - (i) FREE FROM OBSTRUCTION
8. FLEXIBLE CONN'S INSTALLED
9. DRAINS:
 - (i) PLUGS IN PLACE
 - (ii) CLEAN
 - (iii) OVERFLOW TRAPS FITTED

FANS

1. FAN VOLUME CONTROL DEVICE:
 - (i) OPERABLE
 - (ii) CONTROL OPERATIONAL
2. FILTERS:
 - (i) FITTED
 - (ii) CLEAN

PUMPS

1. PUMP GLANDS:
 - (i) PACKED
 - (ii) MECHANICAL SEALS
2. TEST POINTS INSTALLED
3. STRAINERS:
 - (i) SERVICABLE
 - (ii) CLEAN

MOTORS (VISUAL CHECKS)

1. ELECTRICAL CONNECTIONS:
 - (i) O'LOADS CORRECT
 - (ii) TERMINALS SECURE
 - (iii) COVER FITTED

RUNNING CHECKS

FANS / PUMPS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

MOTORS

1. BEARINGS:
 - (i) NOISY
 - (ii) RUNNING HOT
2. A.V.M'S OPERATING

COMMENTS

SATISFACTORY NOT APPLICABLE ACTION REQUIRED
TEST ENGINEER MJ DATE 20/8/99 SHT. 2 OF 12



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	BASEMENT STAFF AREA SUPPLY SF02.

WE HAVE BALANCED THE ABOVE SYSTEM USING A (150^{mm}x150) HOOD & ANEMOMETER. A FACTOR OF 0.825 HAS BEEN CALCULATED AS PER VOLUME TEST SHEET.

AS CAN BE SEEN ON THE GRILLE TEST SHEET GRILLES SG04 & SG03 WITHIN THE FACILITIES MANAGERS OFFICE HAVE BEEN FULLY CLOSED USING THE V.C.D'S. FITTED.

CALIBRATED INSTRUMENTS USED:-

ANEMOMETER UKA004.

MICROMANOMETER N° 7526

AUX PROBE UKA04..

NOTE:- EVEN AT 85% OF DESIGN TOILET LOBBY & MAILROOM DIFFUSER ARE NOISY.



FAN TEST SHEET

CLIENT	DRAKE & SCULL ENGINEERING		
PROJECT	55-57 CARLTON GARDENS		
SYSTEM	BASEMENT GENERAL SUPPLY SF02/1		

FAN

MANUFACTURER	WOODS	IDENT/SERIAL No	573923/11x
FAN TYPE	AXIAL AEROFOIL	PITCH ANGLE	10°
SIZE	35/JM/16/2/5/10	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.335	385
DESIGN SYSTEM VOLUME		0.311	
TESTED SYSTEM VOLUME & PRESSURE		0.273 m³/s @ 88%	Dis. 315 Suct. 53
		Total	368 AP

MOTOR

MANUFACTURER	WOODS	IDENT/SERIAL No	JL381201
VOLTAGE	415/3/50	POWER	0.35 kw.
FULL LOAD CURRENT	0.9	RUNNING CURRENT	0.8070.8
DESIGN SPEED	2840		

DRIVE

MANUFACTURER	DIRECT	TYPE	DIRECT
BELT SIZE	DRIVE	QUANTITY	DRIVE
	MOTOR		FAN
PULLEY DIA.	DIRECT		DIRECT
SHAFT DIA.	DRIVE		DRIVE
BUSH REF.			
MEAS. RPM	No Access		No Access

STARTER

MANUFACTURER	TELEMECANIQUE	TYPE	D.O.L.
O/L RANGE	0.63 TO 1.0	O/L SETTING	0.9
TIMER	N/APP.	FUSE RATING	6Amp.

COMMENTS

INSTRUMENT REFS:-

TEST ENGINEER MB DATE 23/8/99 SHT. 4 OF 8

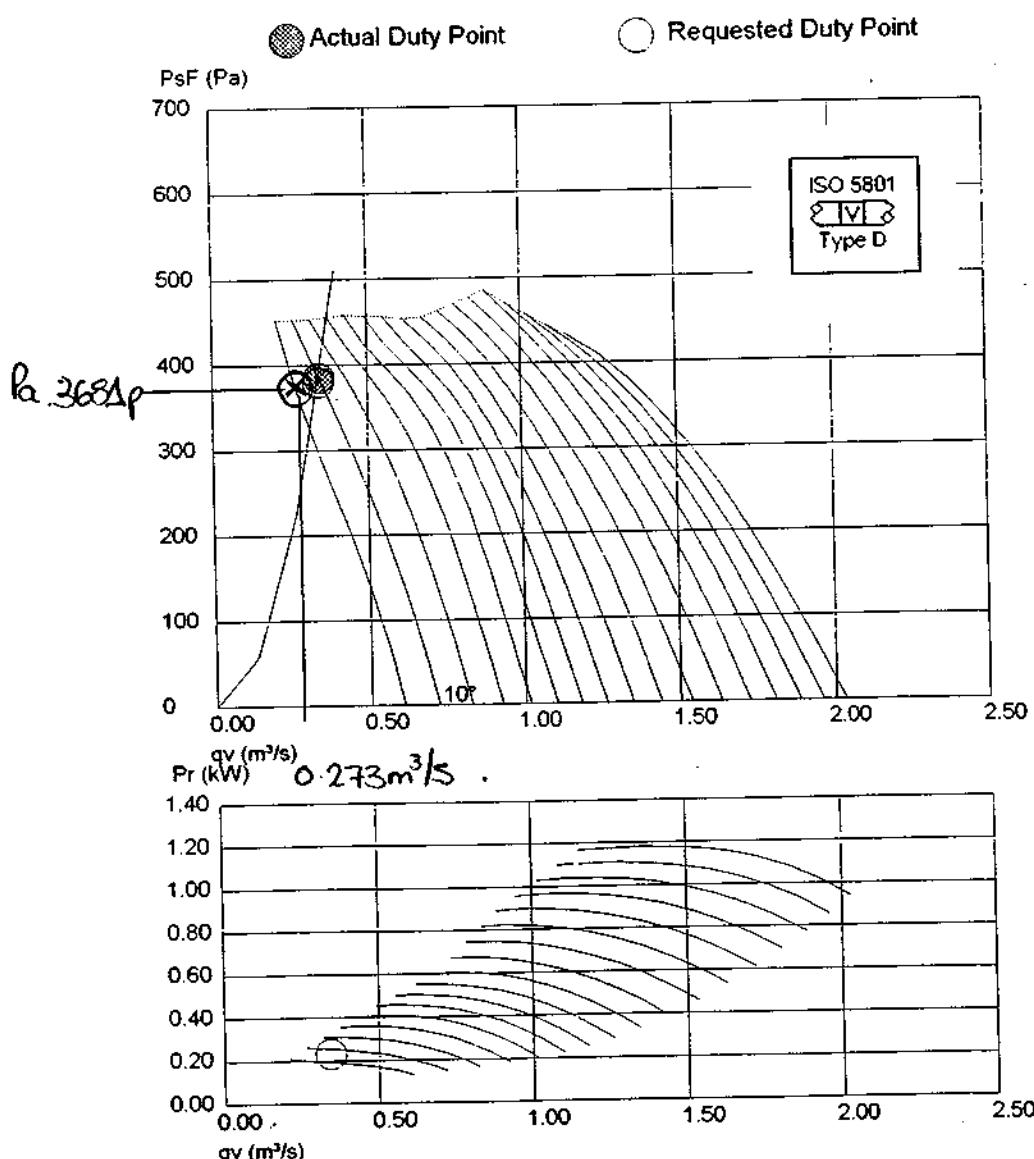
WOODS OF COLCHESTER LTD.



JM AEROFOIL

Quote Number : QOPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 35JM/16/2/5/10

Date: 12/08/98
 Fan Reference : SF02



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 Pf Fan (Total) Pressure, qv Volume Flow Rate

Woods of Colchester Ltd.

Tunhill Way, Colchester, Essex, CO4 5AR, England

Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

a **GBC** group company

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Fan Selector v1.1.05

SHEET 5 OF 8



DUCT TRAVERSE (CIRC.)

CLIENT	DRAKE & SCULL ENGINEERING				
PROJECT	5-7 CARLTON GARDENS.				
SYSTEM	BASEMENT GENERAL SUPPLY SF02				

TP REF.	DES VOL(m³/s)	DUCT DIA.(mm)	AREA(m²)	DES VEL(m/s)
FAN INLET	0.311	350	0.096	3.24

VELOCITY PROFILE(m/s)

	d1 0.032*dia	d2 0.135*dia	d3 0.321*dia	d4 0.679*dia	d5 0.865*dia	d6 0.966*dia
a	2.8	2.9	3.0	2.7	2.9	3.1
b	2.7	2.8	3.1	3.0	2.5	2.6
c						
d	5.5	5.7	6.1	5.7	5.4	5.7
	TOTAL 34.1					

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.84 m/s	0.273	88.	20 Pa

COMMENTS/ TP. LOCATION

FACTOR FOR ANEMOMETER & HOOD

$$\frac{\text{Micro VOL}}{\text{ANNE VOL}} = \frac{0.273 \text{m}^3/\text{s}}{0.331 \text{m}^3/\text{s}} = 0.825$$

INSTRUMENT REF:-

TEST ENGINEER

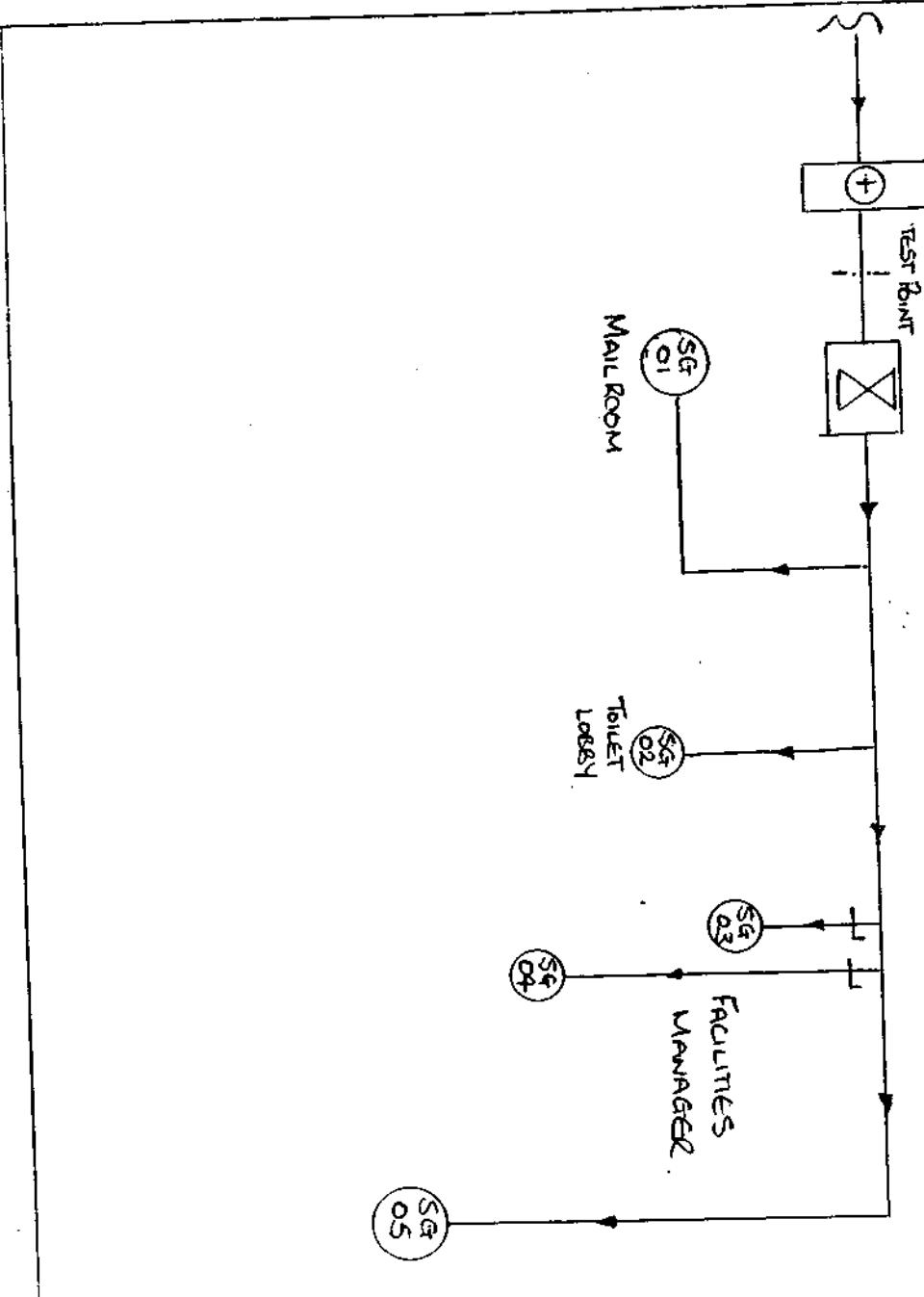
MB

DATE 23/8/99

SHT. 6 OF 8

SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7. CARLTON GARDENS
SYSTEM	BASEMENT STAFF AREA SUPPLY SF02



TEST ENGINEER

MB

DATE 23/8/99

7 8



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS.
SYSTEM	BASEMENT STAFF AREA SUPPLY SF02.

F/clos
F/close

INSTRUMENT REFS:- Auk

TEST ENGINEER MR

DATE 28/8/99 SHT. 8 OF 8.

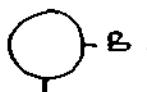


DUCT TRAVERSE

CLIENT	DRAKE & SCULL.		
PROJECT	5-7 CARLTON GARDENS.		
SYSTEM	Basement General Supply SFOZ.		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
Main.	0.311	355d	0.099m²	3.14.

VELOCITY PROFILE(m/s)



	A	B	C	D	E	F	G	H
1	5.4	5.1						
2	5.3	5.7						
3	5.2	5.2						
4	5.4	4.7						
5	5.4	4.1						
6	5.9	3.4						
7								
8								
9								
10	32.6	28.2						
							TOTAL	60.8

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
5.07	0.502	161%	100.

COMMENTS/ TP. LOCATION

INLET DUCTWORK NOT CONNECTED. GRILLES NOT FITTED
 INITIAL FAN TEST WITH ALL V.C.D'S & O.B.D'S
 FULLY OPEN.

INSTRUMENT REF -

TEST ENGINEER M. Boumelj DATE 22/4/99 SHT. 1 OF 1



DUCT TRAVERSE

CLIENT	DRAKE & SCULL.		
PROJECT	S-7 CARLTON GARDENS.		
SYSTEM	BASEMENT GENERAL SUPPLY SFOZ.		

TP REF	DES VOL (m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
Main	0.311	355d	0.099m²	3.14.

VELOCITY PROFILE(m/s)



	A	B	C	D	E	F	G	H
5.4	5.1		6.0	5.8				
5.3	5.7		5.7	5.7				
5.2	5.2		5.7	5.5				
5.4	4.7		5.2	4.2				
5.4	4.1		5.0	3.9				
5.9	3.4		5.3	3.0				
32.6	28.2		32.9	28.1			61.0	
					TOTAL		60.8	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
5.07	0.502	161%	100.

92.

COMMENTS: TP LOCATION

INLET DUCTWORK NOT CONNECTED. GRILLES NOT FITTED

INITIAL FAN TEST WITH ALL V.C.D'S & O.B.D'S
FULLY OPEN.

Sect = A7

Dodge 76
173



UNDERWOOD KEBBLE
ENGINEERING LTD

211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS LONDON
SYSTEM	SECURITY TOILET EXTRACT EXHOF

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

John Baker J.W.
for Ward

Dated

2-7-99



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	SECURITY TOILET EXTRACT ExH08

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>		<u>FANS</u>	
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>		
4. V BELTS:	<input checked="" type="checkbox"/>	<u>MOTORS</u>	
(i) TENSIONED	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>		
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	SYSTEM CHECKS	
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
10. FILTERS:	<input checked="" type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(i) FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>		
<u>MOTORS (VISUAL CHECKS)</u>			
1. ELECTRICAL CONNECTIONS:	<input checked="" type="checkbox"/>		
(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>		
(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>		
(iii) COVER FITTED	<input checked="" type="checkbox"/>		
COMMENTS			

<input checked="" type="checkbox"/>	SATISFACTORY	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input checked="" type="checkbox"/>	ACTION REQUIRED
TEST ENGINEER	R BAKER		DATE 01-07-99	SHT. 2 OF 8	



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING,
PROJECT	5-7 CARLTON GARDENS
SYSTEM	SECURITY TOILET EXTRACT EXH08.

As system was incomplete when tested.
(EG212 FLEX & GRILLE NOT FITTED) both grilles
were balanced using pitot traverse.

Fans have been wired for both fans to
run concurrently, therefore one fan was
disconnected from power supply in order
to test. Fans should be wired as
Run & Standby.

CALIBRATED INSTRUMENT USED TO BALANCE THE
ABOVE:-

Micromanometer. U.K. N° 7526



FAN TEST SHEET

CLIENT	DRAKE & SKULL		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	SECURITY TOILET EXTRACT EXHOB		

FAN			
M'FACTURER	WOODS	IDENT/SERIAL NO	573923/16S
FAN TYPE	PARALLEL TWIN	PITCH ANGLE	- N/A
SIZE	TF1 DT4 AF		
		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		0.09	285
DESIGN SYSTEM VOLUME		0.09	
TESTED SYSTEM VOLUME & PRESSURE		0.025	Dis. 66 Suct. 239 15%
		Total	305
MOTOR			
M'FACTURER	WOODS	IDENT/SERIAL NO	573923/16S
VOLTAGE	240 / 1 / 50	POWER	350
FULL LOAD CURRENT	1.6	RUNNING CURRENT	0.74
DESIGN SPEED	1350		
DRIVE			
M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE		QUANTITY	
	MOTOR		FAN
PULLEY DIA.	DIRECT DRIVE		DIRECT DRIVE
GAIT DIA.	" "		" "
BUSH REF.	" "		" "
MEAS. RPM	NO ACCESS		NO ACCESS
STARTER			
M'FACTURER	TELEMECANIQUE	TYPE	D.O.L.
O/L RANGE	NOT FITTED	O/L SETTING	NOT FITTED
TIMER	—	FUSE RATING	6 AMP
COMMENTS			

INSTRUMENT REFS: UK A 07 UX 07 M

TEST ENGINEER R BAKER

DATE 01-07-99

SHT. 4 OF 8

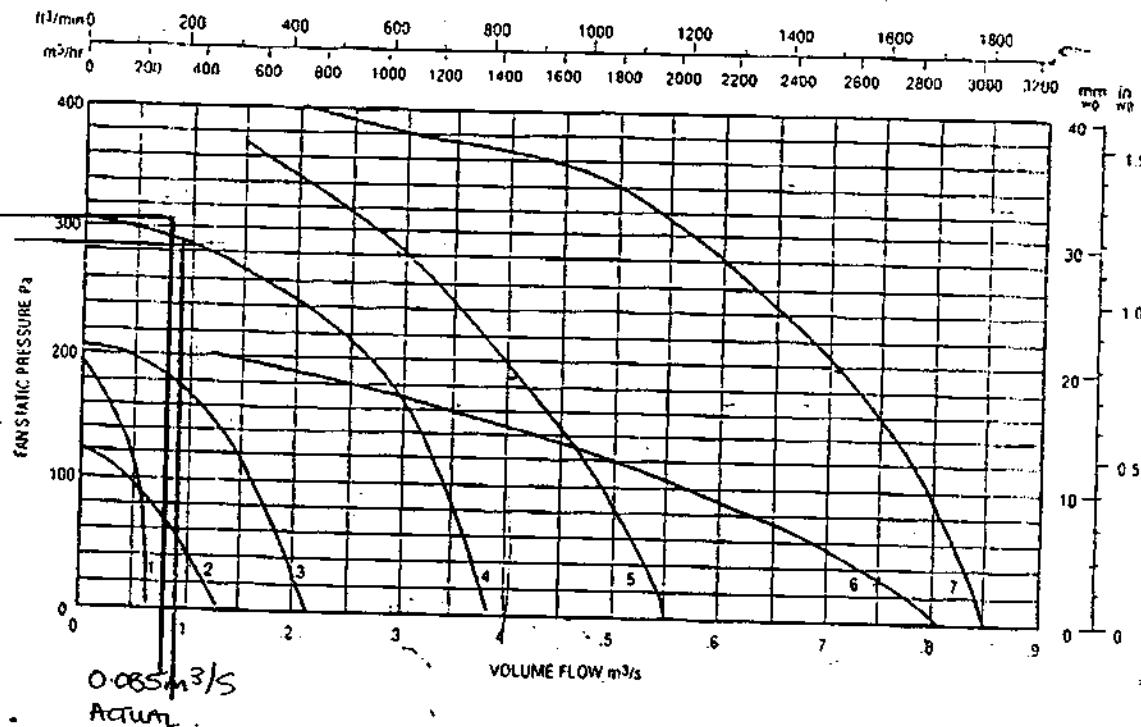
EX 408

PARALLEL FAN UNITS

DIRECT DRIVE UNITS



Fan Performance



Electrical Data (220-240 V / 50Hz / 1φ)

Code	Watts Input	Starting Current* (A)	Running current (A)	Speed rev/min
TF/DTF1	75	0.78x2	0.52	2000
TF/DTF2	170	1.6x2	1.1	1275
TF/DTF3	225	2.3x2	1.5	1275
TF/DTF4	350	3.1x2	1.6	1350
TF/DTF5	700	6.9x2	3.1	1350
TF/DTF6	640	6.9x2	3.1	940
TF/DTF7	1420	13.6x2	6.2	1400

Enquire for other voltages and frequencies.

*Momentarily both fans will start (initial start only).

Sound Power Level Spectra in dB re 1 pW

Code	Octave Band Centre Frequency								Sound Level dBA @ 3 m	Breakout Sound Level dBA @ 3 m
	63	125	250	500	1K	2K	4K	8K		
TF/DTF-1A	67	65	62	59	55	53	50	47	44	39
TF/DTF-1AL	67	65	62	58	52	49	46	44	42	37
TF/DTF-2A	67	65	58	51	53	52	50	47	42	37
TF/DTF-2AL	67	65	58	50	50	48	46	44	39	34
TF/DTF-3A	68	66	59	50	54	53	51	48	43	38
TF/DTF-3AL	68	66	59	50	54	53	51	48	43	38
TF/DTF-4A	72	70	63	54	58	49	47	45	40	35
TF/DTF-4AL	72	70	63	53	55	57	55	52	47	39
TF/DTF-5A	74	72	65	58	55	53	51	49	44	36
TF/DTF-5AL	74	72	65	55	57	59	57	54	49	41
TF/DTF-6A	79	75	73	70	71	71	65	51	47	39
TF/DTF-6AL	79	75	73	69	68	67	61	59	58	50
TF/DTF-7A	89	85	75	75	79	80	76	70	54	46
TF/DTF-7AL	89	85	75	74	78	78	72	66	64	60

*See note on Sound Levels, Page 3.

Sound pressure levels are measured in dB(A) @ 20 µPa.
The breakout Sound Levels assume the unit is fully ducted.

Model ref AL = Acoustically Lined Unit
Model ref A = Unlined Unit

SHEET 5 OF 8



DUCT TRAVERSE

CLIENT	DRAKE & SULLIVAN		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	SECURITY TOILET EXTRACT EX08		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
FAN 1	0.09	160 x 12	0.0176	5.11

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	
1	5.2	4.6					
2	4.8	4.6					
3	4.6	4.9					
4	4.7	5.3					
5							
6							
7							
8							
9							
10							
							TOTAL 38.7

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST PRESS (P)
4.83	0.085	95	239

COMMENTS/ TP. LOCATION

INSTRUMENT REF.: UK 07 A
TEST ENGINEER R BAUKE

DATE 01.07.99 SHT 6 OF 8



GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SKULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	SECURITY TOILET EXTRACT EXHIBIT

INSTRUMENT REFS:- 449 07

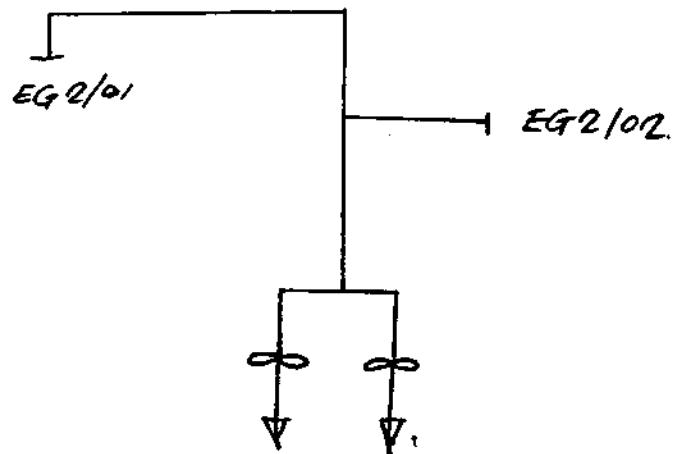
TEST ENGINEER P. SAKER

DATE 01-07-99 SHT. 7 OF 8



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	SECURITY TOILET EXTRACT EXHOB.



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 Facsimile: +44 (0)1206 574434
 E-mail: enquiry@woods-fans.com
 Website: www.woods-fans.com



DRAKE & SCULL ENGINEERING LTD
 REDCLIFFE HOUSE
 10 WHITEHOUSE STREET
 BEDMINSTER
 BRISTOL
 AVON

BS3 4AU

EXH08

CERTIFICATE OF TEST

Our Order No 573923/16S

Date 01/10/98

W7805C

We submit herewith our Certificate of Test as required for
 your Order 12/5192 dated 13/08/98

Quantity	Description	Diameter	Impeller	Duct	Angle	Frame
1	Copford Twin - Direct Drive	200mm				DTF4A
Speed	Poles	Supply	F L Amps	F L Watts	S C Amps	Cos Ø
1350	4	220/240-50-1				Rating (Kw)
TEST VOLTS	Capacitor		Winding Design	Flash volts	Secs	TEST LIMITS
230			1500	5		
Reference		Lt / Load Amps	Lt / Load Watts	RPM	Vac	
FAN 1		1.4		1250		
FAN 2		1.4		1250		

ACKNOWLEDGEMENT

CONTRACT 5192 JS

ENGINEERS copy for Technical Approval
 Advise Buying Department within 3 days
 of any discrepancies

We certify the above to be a true record and that the equipment has passed the flash test specified above, and has an insulation resistance above 10 Megohms

Signed for and on behalf of
Tom Morley
 WOODS AIR MOVEMENT LIMITED

Registered in England No. 233771.
 Registered office as above
 Holding Company-- The General Electric Company, p.l.c.



S&C company
 P. No. 28383



UNDERWOOD KEBBLE
ENGINEERING LTD

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ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	CARLTON GARDENS LONDON
SYSTEM	TANK & BOILER Room EXTRACT EXH09

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

[Handwritten signature]
CMLT

Dated

14.9.99



AIR PRE-COMMISSIONING SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	Tank & Boiler Room Extract EX H09

PRE-RUNNING CHECKS		RUNNING CHECKS	
<u>FANS</u>			
1. IMPELLER FREE TO ROTATE	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
2. BEARINGS FREE TO ROTATE	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
3. PULLEYS:	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
(i) TIGHT ON SHAFT	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(ii) ALIGNED	<input checked="" type="checkbox"/>	<u>MOTORS</u>	
4. V BELTS:	<input checked="" type="checkbox"/>	1. BEARINGS:	<input checked="" type="checkbox"/>
(i) TENSIONED	<input checked="" type="checkbox"/>	(i) NOISY	<input checked="" type="checkbox"/>
(ii) ALL SIMILAR	<input checked="" type="checkbox"/>	(ii) RUNNING HOT	<input checked="" type="checkbox"/>
5. GUARDS:	<input checked="" type="checkbox"/>	2. A.V.M'S OPERATING	<input checked="" type="checkbox"/>
(i) SATISFACTORY	<input checked="" type="checkbox"/>	<u>SYSTEM CHECKS</u>	
6. ANTI-VIB MOUNTINGS FITTED	<input checked="" type="checkbox"/>	1. VCD'S OBD'S OPEN	<input checked="" type="checkbox"/>
7. TRANSIT BOLTS REMOVED	<input checked="" type="checkbox"/>	2. MOTORISED DAMPERS OPEN	<input checked="" type="checkbox"/>
8. FLEXIBLE CONN'S INSTALLED	<input checked="" type="checkbox"/>	3. FIRE DAMPERS OPEN	<input checked="" type="checkbox"/>
9. DRAINS:	<input checked="" type="checkbox"/>	4. DUCTWORK DISTRIBUTION CLEAN	<input checked="" type="checkbox"/>
(i) FREE FROM OBSTRUCTION	<input checked="" type="checkbox"/>	5. PRESSURE TEST CERTS COMPLETE	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	6. DIFFUSER FITTED	<input checked="" type="checkbox"/>
(iii) OVERFLOW TRAPS FITTED	<input checked="" type="checkbox"/>	7. FLEXIBLE CONNS FITTED	<input checked="" type="checkbox"/>
10. FILTERS:	<input checked="" type="checkbox"/>	<u>MOTORS (VISUAL CHECKS)</u>	
(i) FITTED	<input checked="" type="checkbox"/>	1. ELECTRICAL CONNECTIONS:	<input checked="" type="checkbox"/>
(ii) CLEAN	<input checked="" type="checkbox"/>	(i) O'LOADS CORRECT	<input checked="" type="checkbox"/>
		(ii) TERMINALS SECURE	<input checked="" type="checkbox"/>
		(iii) COVER FITTED	<input checked="" type="checkbox"/>

COMMENTS

SATISFACTORY	X	NOT APPLICABLE	O	ACTION REQUIRED
TEST ENGINEER	11/11/2011	DATE	2011-11-11	SHT. 2 OF 13



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK & BOILERROOM EXTRACT EXH09

THE ABOVE SYSTEM HAD AN INITIAL VOLUME
RECORDED OF $0.962 \text{ m}^3/\text{s}$ FAN 1 AND
 $0.928 \text{ m}^3/\text{s}$ FAN 2.

ALL DAMPERS & CBD'S WERE FULLY OPEN.
WE HAVE PROPORTIONALLY BALANCED THE
GRILLE'S USING AN ANEMOMETER.

THE FACTOR FOR THE ANEMOMETER
HAS BEEN CALCULATED AGAINST THE
SYSTEM TOTAL AS FOLLOWS:

$$\begin{aligned} & \frac{\text{SYSTEM MICROMANOMETER VOLUME}}{\text{SYSTEM ANEMOMETER VOLUME}} \\ & = \frac{0.890 \text{ m}^3/\text{s}}{1.159 \text{ m}^3/\text{s}} = 0.768 \end{aligned}$$

THE FOLLOWING CALIBRATED INSTRUMENTS
HAVE BEEN USED TO COMMISSION THE
ABOVE SYSTEM:-

ANEMOMETER: UKA 09. - CALIB. CERT. MISSING

MICROMANOMETER: N° 7526. - (CALIB. CERT. RECEIVED).



FAN TEST SHEET

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09 (FAN 1)		

FAN

MANUFACTURER	WOODS	IDENT/SERIAL No	573923/19A - 1
FAN TYPE	AXIAL	PITCH ANGLE	10°
SIZE	56/5M/16/4/E/10	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	1.0	1.5C	
DESIGN SYSTEM VOLUME	1.01		
TESTED SYSTEM VOLUME & PRESSURE	0.890	Dis. 52Pa Suct. - 22 Pa	Total 140 Pa

MOTOR

MANUFACTURER	WOODS	IDENT/SERIAL No	NO ACCESS
VOLTAGE	415/3/50	POWER	0.55 KW
FULL LOAD CURRENT	1.6	RUNNING CURRENT	1.16/1.26/1.15
DESIGN SPEED	1440 RPM.		

DRIVE

MANUFACTURER	DIRECT DRIVE	TYPE /	DIRECT DRIVE
BELT SIZE	" "	QUANTITY	" "
	MOTOR	/	FAN
SERV. BELT	" "		" "
SERV. SHAFT	" "		" "
BUSH REF.	" "		" "
MEAS. RPM	NO ACCESS		" "

STARTER

MANUFACTURER	TELEMECHANIQUE	TYPE	D.O.L.
O/L RANGE	1.25 - 2.00	O/L SETTING	1.6
TIMER		FUSE RATING	6.0

COMMENTS

COMPLETE
IN ALL CASES.

INSTRUMENT REFS:-

TEST ENGINEER K. BROWN

DATE 6.7.94 SHT. 4 OF 13



FAN TEST SHEET

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09 (FAN 2)		

FAN

MANUFACTURER	WOODS	IDENT/SERIAL No	573923/19A-2
FAN TYPE	AXIAL	PITCH ANGLE	10°
SIZE	56/JM/16/4/5/10	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	1.0	150	
DESIGN SYSTEM VOLUME	1.01		
TESTED SYSTEM VOLUME & PRESSURE	0.926	Dis. 46 Pa Suct. - 77 Pa Total 123 Pa	

MOTOR

MANUFACTURER	WOODS	IDENT/SERIAL No	NO ACCESS
VOLTAGE	415/3/50	POWER	0.55 KW
FULL LOAD CURRENT	1.6	RUNNING CURRENT	1.2 / 8.1.3 / 11.20
DESIGN SPEED	1440 RPM		

DRIVE

MANUFACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
		QUANTITY	"
		MOTOR	FAN
SER. BELT	"	"	"
SER. BUSH	"	"	"
MEAS. RPM	"	"	"

STARTER

MANUFACTURER	TELEMECHANIQUE	TYPE	D.O.L.
O/L RANGE	1.25 - 2.0	O/L SETTING	1.6
TIMER		FUSE RATING	6.0

COMMENTS

See previous comments which have not been dealt with.

INSTRUMENT REFS:-

TEST ENGINEER K. J. L.

DATE 07-06-99 SHT. 5 OF 13

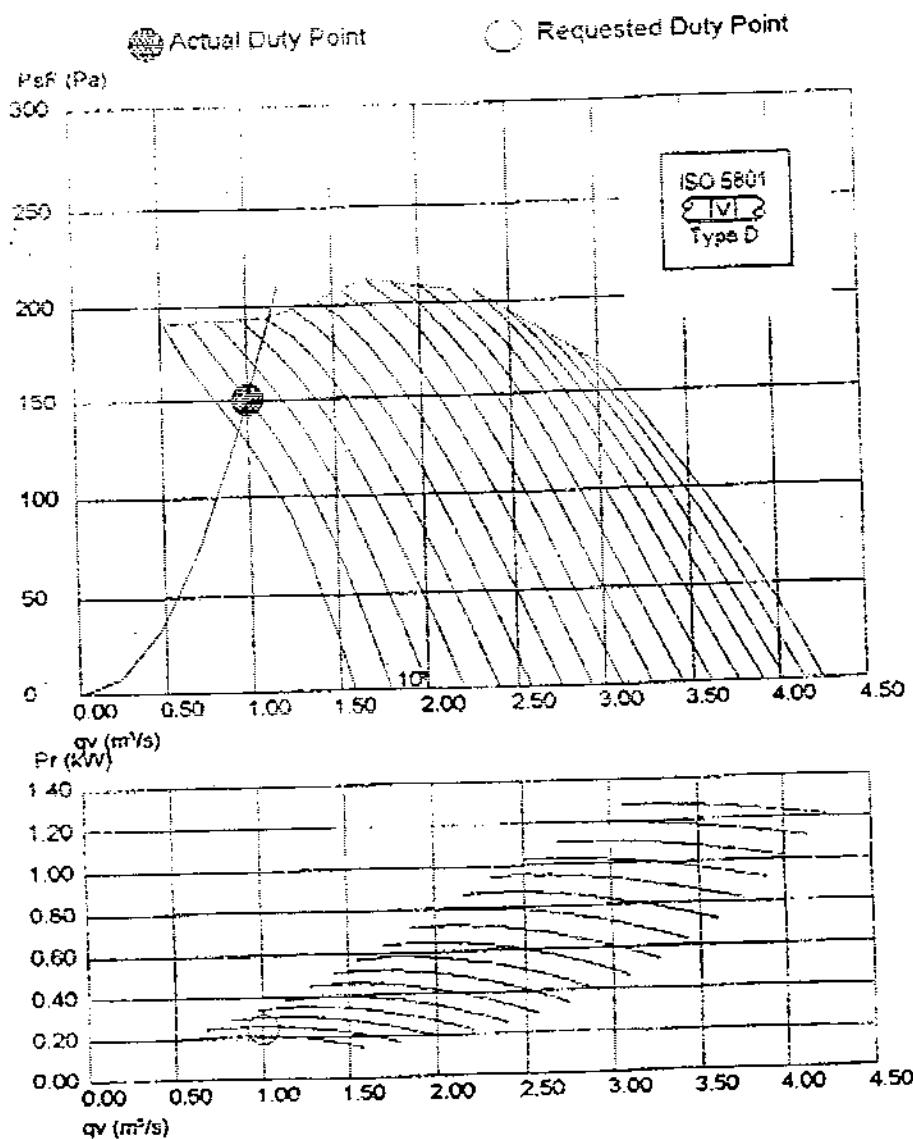
WOODS OF COLCHESTER LTD.

JM AEROFOIL - H.T. SERIES (400°C/2E)



Quote Number :
 Customer : Drake & Scull
 Project Reference : 5/7 Carlton Gardens
 Fan Code : 66JM/18/4/6/10

Date: 04/09/98
 Fan Reference : EXH02



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 PF Fan (Total) Pressure, qv Volume Flow Rate

Woods of Colchester Ltd.

Tubell Way, Colchester, Essex, CO4 9AR, England

Tel: +44 (0) 1206 544122, Fax: +44 (0) 1206 574434, Telex: 98427

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Fan Selector v1.1.99

EFC group company

01206 544122 01206 574434

100-001-001-101-100

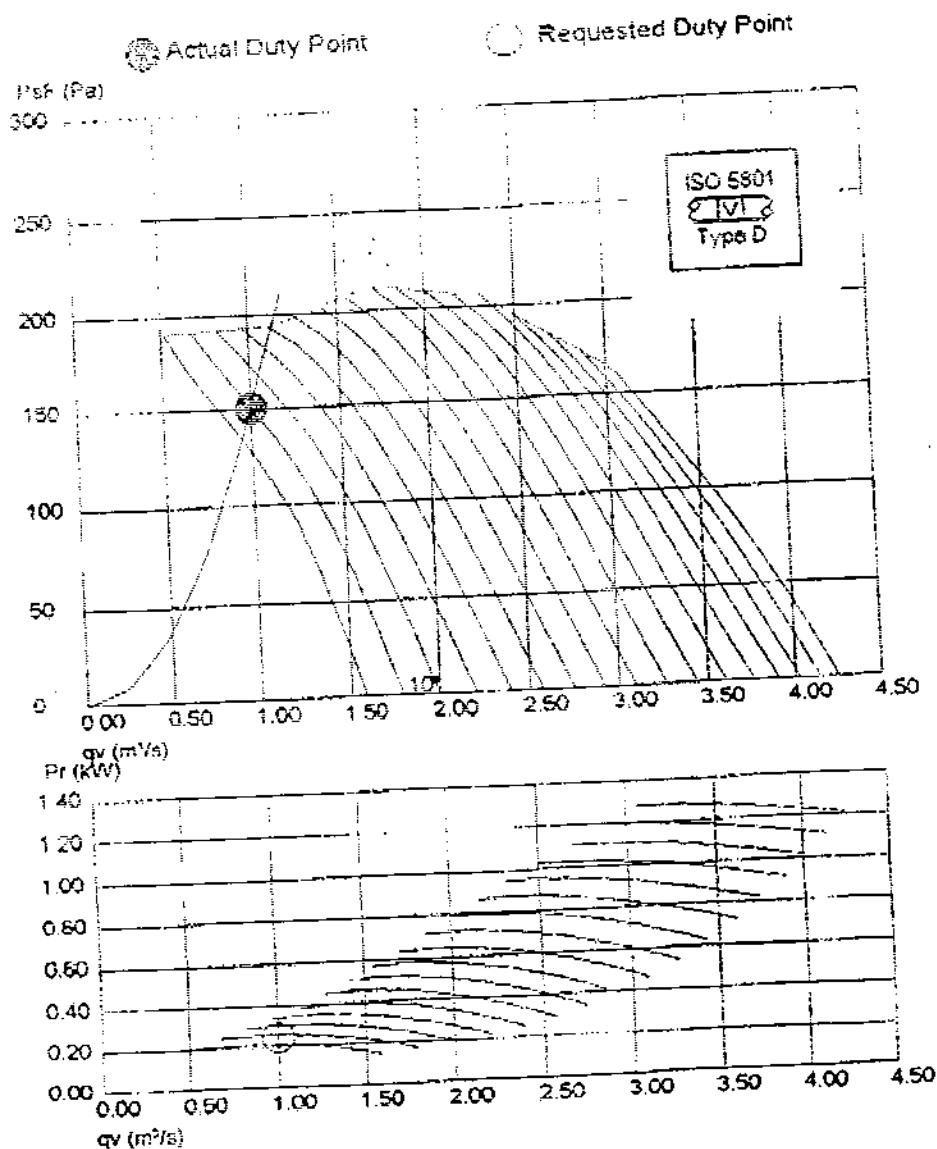
WOODS OF COLCHESTER LTD.



JM AEROFOIL - H.T. SERIES (400°C/2E)

Quote Number :
Customer : Drake & Scull
Project Reference : 5/7 Carlton Gardens
Fan Code : 66JM/16/4/b/10

Date: 04/09/98
Fan Reference : EXH08



Symbols

PaF Fan (Stable) Pressure, Pt Absorbed Impeller Power
PtF Fan (Total) Pressure, qv Volume Flow Rate

Woods of Colchester Ltd.

Tunhill Way, Colchester, Essex, CO4 5AF, England

Tel: +44 (0) 1206 544122, Fax: +44 (0) 1206 574031, Telex: 913477

E-mail: Woods@Colchester.Ernst.PC.UK

Fax: Colchester 911 972

• SEC Group Company

Chancery 4 Oct 1998



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS		
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09 (FAN 1)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
MAIN TP1	1.01	M³/S	600 x 400	0.240

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.0	4.0	5.0	5.2	5.8			
2	2.0	3.0	4.9	5.8	5.4			
3	0.6	2.2	4.5	5.6	5.2			
4	0.1	2.3	4.7	5.7	5.6			
5								
6								
7								
8								
9								
10	4.7	11.5	19.1	22.9	22.0			
						TOTAL	80.2	

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.01	0.962	96%	53

COMMENTS/ TP. LOCATION

ALL VCD'S & OBD'S FULLY OPEN.

Complete (Previous comment).

INSTRUMENT REF..

TEST ENGINEER

DATE 24-26.97 SHT. 2 OF 3



DUCT TRAVERSE

CLIENT	DURKE & SCOTT Engineering		
PROJECT	CHARLTOW CHILDRDN.		
SYSTEM	THIN & Built Room Extract Exch (FAN 2)		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
MAIN TP1	1.01 m³/s	600 x 400	0.240	4.21

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.2	4.2	5.4	6.0	5.2			
2	2.0	3.3	5.4	5.8	5.5			
3	1.0	2.5	5.0	5.6	5.4			
4	0.2	1.2	4.6	5.6	5.6			
5								
6								
7								
8								
9								
10	6.0	11.2	20.4	23.0	21.7			
	TOTAL 82.3							

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
4.115	0.988	99%	-57 Pa

COMMENTS/ TP. LOCATION

ALL VCD'S & OBD'S FULLY OPEN.

INSTRUMENT REF:-

TEST ENGINEER P. MCCAIG

DATE 11/11/2004 SHT. 1 OF 1

GRILLE/DIFFUSER BALANCE SHEET

CLIENT	DRAKE & SCULL ENG.
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09

INSTRUMENT REFS: ANI - UKACIT

TEST ENGINEER

DATE

SHT. 10 OF 12



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09(FAN1)

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
MAIN TP1	1.01 m ³ /s	600 x 400	0.240	4.21

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.6	4.3	4.9	4.6	4.3			
2	2.4	3.5	4.8	4.7	4.2			
3	1.7	2.8	4.3	4.8	3.8			
4	0.6	2.4	4.1	4.9	4.5			
5			.					
6								
7								
8								
9								
10	7.3	13.0	18.1	19.0	16.8			
						TOTAL	74.2	

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
3.71	0.290	89%	58

COMMENTS/ TP. LOCATION

FINAL VOLUME AFTER BALANCING.

INSTRUMENT REF:-

TEST ENGINEER : [Signature]

DATE 07-06-99 SHT. II OF 15



DUCT TRAVERSE

CLIENT	DRAKE & SKULL ENGINEERING			
PROJECT	5-7 CARLTON GARDENS			
SYSTEM	TANK & BOILER ROOM EXTRACT EXH09 (FAN 2)			

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
	1.01	600 X 400	0.240	4.21

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.8	4.5	5.0	4.7	4.4			
2	2.6	3.8	5.0	5.0	4.2			
3	1.7	3.0	4.6	4.9	4.1			
4	1.0	2.2	4.2	4.9	4.6			
5								
6								
7								
8								
9								
10	8.1	13.5	18.8	19.5	17.3			
						TOTAL 77.2		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
3.86	0.926	93	-65

COMMENTS/ TP. LOCATION

FINAL VOLUME AFTER BALANCING.

INSTRUMENT REF:-

TEST ENGINEER N ECCLES

DATE 04/06/14 SHT.17 OF 17



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK AND BOILER ROOM EXTRACT EX-09

THE FOLLOWING TESTS ARE TO BE MADE IN ACCORDANCE WITH THE CAUSE AND EFFECT CHART.

EACH ROOM, SPRINKLER TANK ROOM, BOILER ROOM AND COLD WATER STORAGE TANK ROOM HAVE BEEN TAKEN AS INDIVIDUALLY AS BEING THE ROOM OF INCIDENT.

THEREFORE: DAMPER TO ROOM OF INCIDENT OPEN AND OTHER ROOMS CLOSED.



DUCT TRAVERSE

CLIENT	DEAKE AND SCULL ENGINEERING,
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK AND BOILER ROOM EXTRACT EXHCG

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
TP1	N/A	600 x 400	0.24	N/A

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	5.0	3.8	2.8	1.2	0			
2	4.3	2.9	1.9	0.7	0			
3	3.8	2.3	1.6	0.1	0			
4	5.0	4.2	2.9	1.9	0			
5								
6								
7								
8								
9								
10	18.6	13.2	9.2	3.9	0			
	TOTAL 44.9							

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.25	0.54		148

COMMENTS/ TP. LOCATION

THIS TEST WAS TAKEN WITH SD 37 BLD WATER STORAGE TANK
ROOM DAMPER OPEN.

3527 AND 3528, BUMP FROM AND SPINNING OF TANK (WHEN
DAMPERS WERE CLOSED).



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS
SYSTEM	TANK AND BoILER ROOM EXTRACT EXH09

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
T-1	N/A	100 x 400	0.24	N/A

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.6	2.7	2.5	2.2	2.2			
2	2.7	2.8	2.6	2.4	2.6			
3	2.4	2.5	2.6	2.6	2.3			
4	2.0	2.3	2.4	2.5	2.0			
5								
6								
7								
8								
9								
10	9.7	10.6	9.9	9.7	9.1			
	TOTAL	49	0					

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
2.45	0.59		120

COMMENTS/TP. LOCATION

THIS TEST WAS TAKEN WITH SD28 BOILER ROOM DAMPER OPEN.
SD27 AND SD37, SPRINKLER TANK ROOM AND COLD WATER STORAGE
TANK ROOM DAMPERS WERE CLOSED

INSTRUMENT REF.

TEST ENGINEER



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL ENGINEERING			
PROJECT	5-7 CARLTON GARDENS			
SYSTEM	TANK AND BOILER ROOM EXTRACT Extract			

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TP1	N/A	603 x 400	0.24	N/A

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	2.1	2.3	1.9	2.8	2.7			
2	2.4	2.6	2.8	2.9	3.0			
3	2.3	2.7	2.6	3.0	2.8			
4	2.0	2.4	2.5	2.6	2.2			
5								
6								
7								
8								
9								
10	8.8	10.0	9.8	11.3	10.7			
						TOTAL 50.6		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
2.53	0.61		116

COMMENTS/ TP. LOCATION

THIS TEST WAS TAKEN WITH SD 27 SPRINKLER TANK ROOM DAMPER OPEN.

SD28 AND SJ27, HOLD WATER STORAGE TANK ROOM RD 10 PR. 4P ROOM DAMPERS WERE CLOSED

INSTRUMENT REF:

TEST ENGINEER

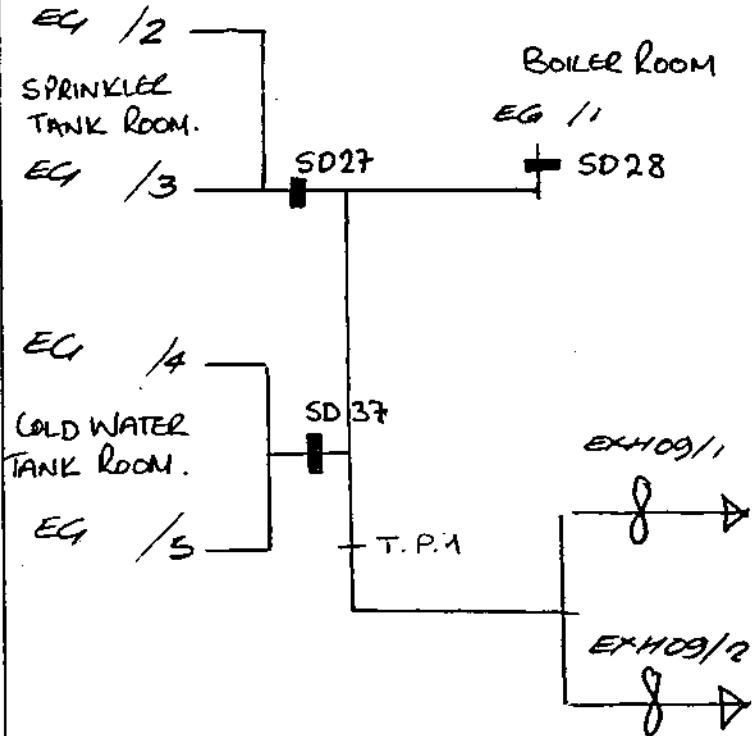
DATE 11/12/92

Page 1 of 1



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL ENGINEERING,
PROJECT	5-7 CARLTON GARDENS.
SYSTEM	TANK & BOILER RM EXTRACT EXH09



UNDERWOOD KEBBLE
ENGINEERING LTD



211 SOUTH STREET
ROMFORD ESSEX RM1 1QL
TEL 01708 733984
FAX 01708 733987

SYSTEM VERIFICATION SHEET

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	STAIRCASE 01 PRESSURISATION. SP01 1/2. FIRE FIGHTING STAIRCASE.

Verification that the presented commissioning figures contained herein
the following report are a true reflection of the system status as witnessed
by the Clients representative.

Signature of Clients representative
for & on behalf of

M. A.

PSE LTD

26/11/99

Note. demonstrated
to P. Moss (P.S) Satisfaction
3.45pm 26/11/99



SCHEMATIC/NOTE SHEET

CLIENT	DRAKE & SCULL
PROJECT	S-7 CARLTON GARDENS
SYSTEM	STAIRCASE N°1 PRESSURISATION SP01 142

WE HAVE TESTED THE ABOVE SYSTEM WITH FAN N°2 RUNNING, EXHOT & OS NOT RUNNING.

THE FOLLOWING PRESSURE DROPS WERE RECORDED ON ALL LEVELS.

WITH ACCOMODATION DOOR TO LOBBY OPEN.

- a) DROP ACROSS STAIRCASE & LOBBY DOOR
- b) DROP ACROSS LIFT SHAFT & LOBBY DOOR

WITH ACCOMODATION DOOR TO LOBBY CLOSED.

- a) DROP ACROSS ACCOMODATION & LOBBY DOOR.

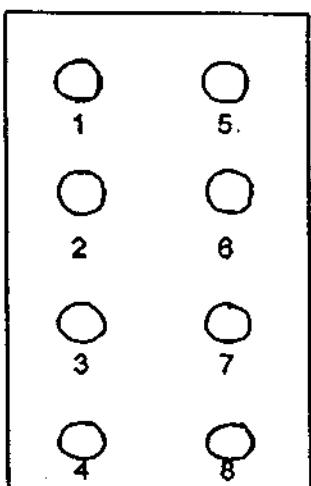
WE THEN OPENED LOBBY TO STAIRCASE & LOBBY TO ACCOMODATION ON BOTH LEVEL 7 & GROUND, & RECORDED VELOCITIES THROUGH THE ACCOMODATION DOOR ON LEVEL 7.

PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	STAIR 01 PRESSURISATION SPO1 / 1&2.

FAN N° 2.

LEVEL	PD STAIR / LOBBY (Pa)	PD LOBBY / OFF. (Pa)	PD LIFT / LOBBY (Pa)
7	57 Pa	30 Pa	49 Pa
6	58 Pa	28 Pa	48 Pa
5	56 Pa	29 Pa	49 Pa
4	57 Pa	30 Pa	48 Pa
3	58 Pa	29 Pa	47 Pa
2	57 Pa	27 Pa	48 Pa
1	56 Pa	28 Pa	48 Pa
GRD	54 Pa	28 Pa	49 Pa
L'GRD	57 Pa	29 Pa	49 Pa
BASE	57 Pa	29 Pa	—



1= 2.0
 2= 1.9
 3= 2.1
 4= 2.3
 5= 2.0
 6= 1.9
 7= 1.8
 8= 2.3
 TOTAL= 16.3

PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER	
EAST EXH05	NOT RUNNING
WEST EXH04	NOT RUNNING

$$\text{AVE VEL (m/s)} = 2.04 \text{ m/s}$$

DOOR VELOCITY TO BE TAKEN
 AT HIGHEST DOOR WITHIN
 STAIRWELL WITH GROUND FLOOR
 DOOR TO LOBBY OPEN



DUCT TRAVERSE

CLIENT	DRAKE & SCULL ENGINEERING
PROJECT	S-7 CARLTON GARDENS
SYSTEM	STAIRCASE N°1 PRESSURISATION SP01 FAN 2

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
TOTAL VOLUME	14.56	1500 x 600	0.900	16.18

Basement Car Park

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	10.7	11.4	11.3	9.4	11.7	11.8	11.6	
2	10.6	11.8	11.6	9.4	11.7	12.5	10.0	
3	10.3	11.4	11.3	9.3	9.6	11.7	9.5	
4								
5								
6								
7								
8								
9								
10	31.6	34.6	34.2	28.1	33.0	36.0	31.1	
							TOTAL	228.6

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
10.88	9.797	67	408

COMMENTS/TP. LOCATION

TESTED WITH GROUND & LEVEL 7 DOORS OPEN.

INSTRUMENT REF.

TEST ENGINEER

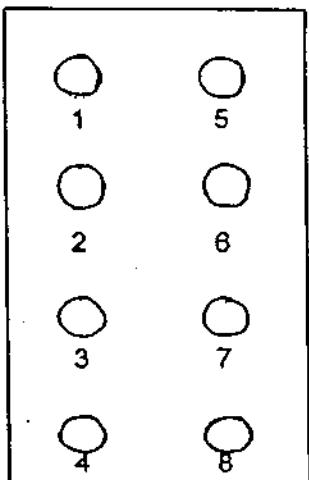
DATE 25/11/99

SHT. 4 OF 4

PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SCULL
PROJECT	5-7 CARLTON GARDENS
SYSTEM	STAIR 01 PRESSURISATION SPO1 / 1&2

FAN N°1			
LEVEL	PD STAIR / LOBBY (Pa)	PD LOBBY / OFF. (Pa)	PD LIFT / LOBBY (Pa)
7	58	31	49
6	53 58	17 32	49 49
5	57	29	48
4	57	28	48
3	58	30	50
2	58	31	49
1	59	28	48
GRD	58	27	49
L'GRD	58	27	50
BASE	58	28	-



1= 1.8
 2= 2.0
 3= 1.7
 4= 1.9
 5= 2.2
 6= 2.3
 7= 2.4
 8= 2.2
 TOTAL = 16.5

2, 3,

PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER	
EAST EXH05	NOT RUNNING
WEST EXH04	NOT RUNNING

AVE VEL (m/s) = 2.06 m/s.

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL WITH GROUND FLOOR
DOOR TO LOBBY OPEN

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shenley Pavilions Chalkdell Drive
Shenley Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: liz@drake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:

Telephone No: 0171 839 3081

Fax No: 0171 839 3084
40 MACE, 0171 839 3081,

TO:	Name:	CARIS THIFFIN
	Company:	CMU LTD
FAX NO:		MEMO
FROM:		MARK LAMBOURNE
NO: OF PAGES (Including this page)		TEN
DATE:		2 SEPT 99

RE. CAVENDISH GARDENS

REF. STAIRCASE TWO,

CARIS

PLEASE FIND COMMISSIONING RESULTS FOR
ABOVE STAIRCASE, ALSO ONE NUMBER
SHEET AS DEMONSTRATED TO THE DS
ON THE 01/09/99 AND ACCEPTED.

REGARDS

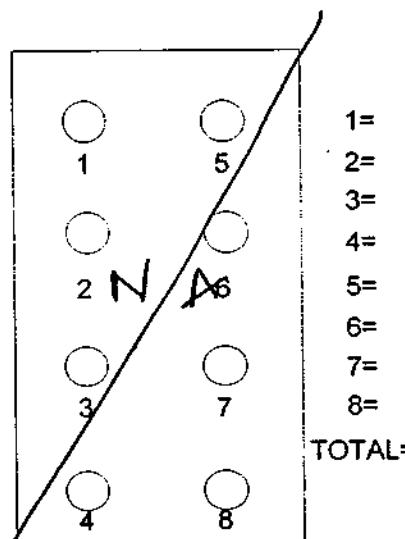


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**TEST DEMONSTRATION TO DS,
PRESSURE DIFFERENTIAL / DOOR VELOCITY**

CLIENT	DRAKE & SULL ENG LTD.
PROJECT	CARLTON GARDENS.
SYSTEM	STAIRCASE PRESSURISATION, STAIRCASE TWO.

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY NOFP.(Pa)	PD LIFT / OFF.(Pa)
7	N/A	AVERAGE	
6	N/A	VELOCITY	
5	51 Pa	0.94 m/s	
4	55 Pa	1.06 m/s	
3	57 Pa	1.08 m/s	
2	56 Pa	1.01 m/s	
1	55 Pa	1.1 m/s	
GRD	56 Pa	0.92 m/s	
L'GRD	57 Pa	0.98 m/s	
BASE	55 Pa	1.01 m/s	



PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER	
EAST EXH05	✓
WEST EXH05	✓

FANS RUN AT FLOOR OF
INCIDENT.

AVE VEL (m/s)= SEE ABOVE.

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL

PRES·ENT.

M. LAMBOURNE
C. TUFFIN,
P. MOSS,
J. TAGGART.

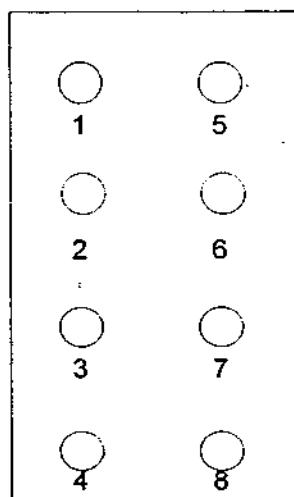
PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SAWYER LTD.
PROJECT	CARLTON EDNS
SYSTEM	STAIRCASE PRESSURISATION, FANCI

STAIRCASE TWO,

STAIR, OFFICE - LOBBY - STAIRS,

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY / OFF.(Pa)	PD LIFT/ OFF.(Pa)
7	—		
6	—		
5	58.3	54.1	
4	59.2	31.6	
3	57.7	40.0	
2	58.5	21.5	
1	55.4	41.3	
GRD	55.0	STAIR TO RECEPTION,	
L'GRD	58.7	41.0	
BASE	56.	STAIR TO CORRIDOR (CAR PARK / PLANT ROOM.)	



1= 1.21
 2= 1.02
 3= 0.67
 4= 0.69
 5= 1.06
 6= 0.70
 7= 0.62
 8= 0.79
 TOTAL= 6.96 m/s

PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER	
EAST EXH05	✓
WEST EXH04	✓

NOTE GRD FLOOR DOOR SHUT FOR VELOCITY TEST.

AVE VEL (m/s)= 0.87 m/s

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL

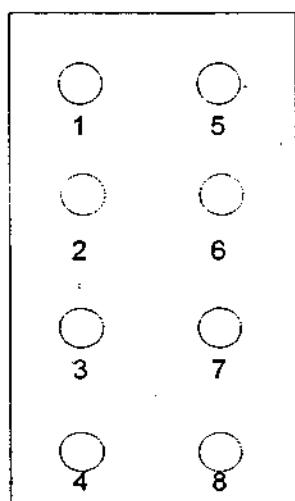
PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DEAKE & SAWYER LTD
PROJECT	CARTRON LTDNS
SYSTEM	STAIRCASE PRESSURISATION , FAN 02,

STAIRCASE TWO,

STAIR-OFFICE STAIR- LOBBY

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY / OFF.(Pa)	PD LIFT/ OFF.(Pa)
7	-	-	
6	-	-	
5	70.9	64.0	
4	71.8	43.4	
3	70.0	47.5	
2	65.0	24.7	
1	60.8	41.9	
GRD	61.9	STAIR TO RECEPTION	
L'GRD	62.1	48.2	
BASE	60.7	STAIR TO CORRIDOR (A/C PARK / PLANT ROOM)	

SEE
NOTE 2.

1= 1.24
 2= 1.08
 3= 0.68
 4= 0.73
 5= 1.05
 6= 0.93
 7= 0.84
 8= 0.81
 TOTAL = 7.36 m/s

PRESSURE RELIEF VOLUME FROM
LEVEL 5 EAST AND WEST RISER

EAST EXH05	✓
WEST EXH04	✓

NOTE GRD FLOOR DOOR SHUT
FOR VELOCITY TEST.

NOTE.

DOOR CUT'S
INCONSISTENT
LEADING TO
MICRO-TUBE
PINNING.

SEE DS RESULTS

AVE VEL (m/s) = 0.92 m/s

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL



FAN TEST SHEET

CLIENT	DRAKE AND SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	SPOZ/1 STAIRCASE PRESSURISATION		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573923/ABP1
FAN TYPE	AXIAL AEROFOIL	PITCH ANGLE	30°
SIZE	45/JM/20/216/30	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	2.53	560	
DESIGN SYSTEM VOLUME	2.55		
TESTED SYSTEM VOLUME & PRESSURE	1.399	Dis. 201Pa Suct. - 410Pa	Total 611 Pa

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	No DATA
VOLTAGE	415/3/50	POWER	40 KW
FULL LOAD CURRENT	7.5	RUNNING CURRENT	2.4 I/X:4.1/B:4.6A
DESIGN SPEED	1950		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	DIRECT DRIVE	QUANTITY	DIRECT DRIVE
	MOTOR		FAN
PULLEY DIA.	80		80
SHAFT DIA.	16mm		16mm
BUSH REF.			
MEAS. RPM	INACCESSIBLE		INACCESSIBLE

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	LR2 D13
OIL RANGE	7.0 - 10.0	OIL SETTING	7.5A
TIMER	DIRECT - ON - LINE	FUSE RATING	25A

COMMENTS

INSTRUMENT REFS:- MICROMANOMETER 87951/CLAMP METER 102

TEST ENGINEER S. BENEDETTI

DATE 26.08.99.

SHT. 4 OF 9

WOODS OF COLCHESTER LTD.

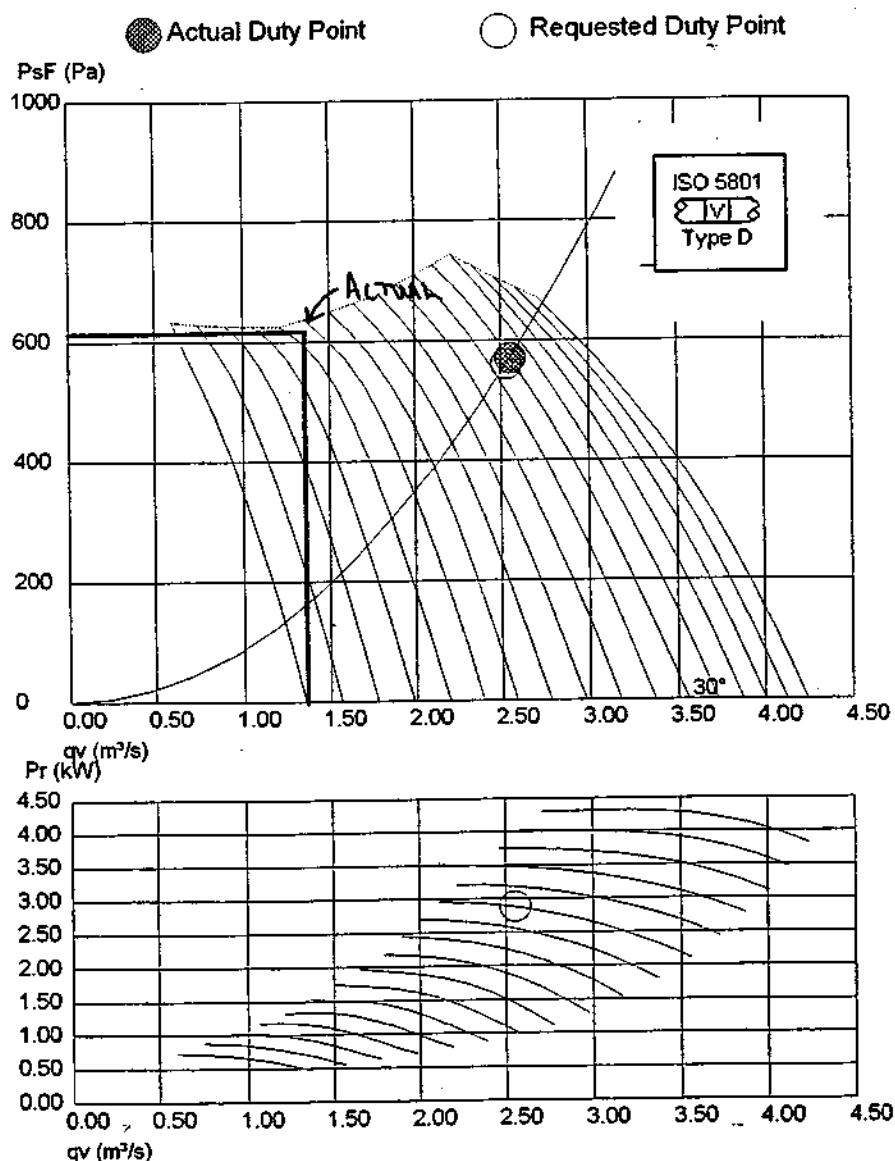


JM AEROFOIL HT 400/2H

Quote Number : QPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 45JM/20/2/6/30

Date: 12/08/98
 Fan Reference : SP02

SP02/1



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 PF Fan (Total) Pressure, qv Volume Flow Rate

5 of 9

Woods of Colchester Ltd.

Tufnell Way, Colchester, Essex, CO4 5AR, England
 Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

group company

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 Fan Selector v1.1.05



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	SPOZ/1 STAIRCASE PRESSURISATION		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TPS/1	2.520	400x400	0.160	15.75

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	7.9	8.3	9.2	6.5				
2	9.0	9.5	10.1	8.4				
3	8.7	9.5	9.9	8.6				
4	8.3	8.9	8.9	8.2				
5								
6								
7								
8								
9								
10								
					TOTAL	139.9		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
8.74	1.399	56	1692

COMMENTS/ TP. LOCATION

INSTRUMENT REF:- MICROMANOMETER 87951
 TEST ENGINEER S.BENEDETTI DATE 26.08.99. SHT. 6 OF 9



FAN TEST SHEET

CLIENT	DRAKE AND SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	SP02/2 STAIRCASE PRESSURISATION		

FAN		IDENT/SERIAL No	573923/08P2
M'FACTURER	Woods	PITCH ANGLE	30°
FAN TYPE	AXIAL ALDOFOIL	m³/sec	Pascals
SIZE	45/JM/20/2/16/30	2.53	560
SPECIFIED VOLUME & PRESSURE		2.55	
DESIGN SYSTEM VOLUME		1.529	Dis. 311 Pa. Suct. -356 Pa.
TESTED SYSTEM VOLUME & PRESSURE		Total	66.7 Pa
MOTOR		IDENT/SERIAL No	No DATA
M'FACTURER	Woods	POWER	4.0
VOLTAGE	415/3150	RUNNING CURRENT	2.45/2.45/2.45
FULL LOAD CURRENT	7.5		
DESIGN SPEED	2950		
DRIVE		TYPE	DIRECT DRIVE
M'FACTURER	DIRECT DRIVE	QUANTITY	DIRECT DRIVE
BELT SIZE	DIRECT DRIVE	MOTOR	FAN
PULLEY DIA.	70		70
SHAFT DIA.	16		16
BUSH REF.			
MEAS. RPM	INACCESSIBLE		INACCESSIBLE
STARTER		TYPE	L22 D13
M'FACTURER	TELEMECHANIQUE	O/L SETTING	7.5A
O/L RANGE	7.0 - 10.0A	FUSE RATING	25A
TIMER	DIRECT - ON - LINE		
COMMENTS			

INSTRUMENT REFS:- MICROMANOMETER 87951 / CLAMP METER 102

TEST ENGINEER S. BENEDETTI DATE 26.08.99. SHT. 7 OF 9

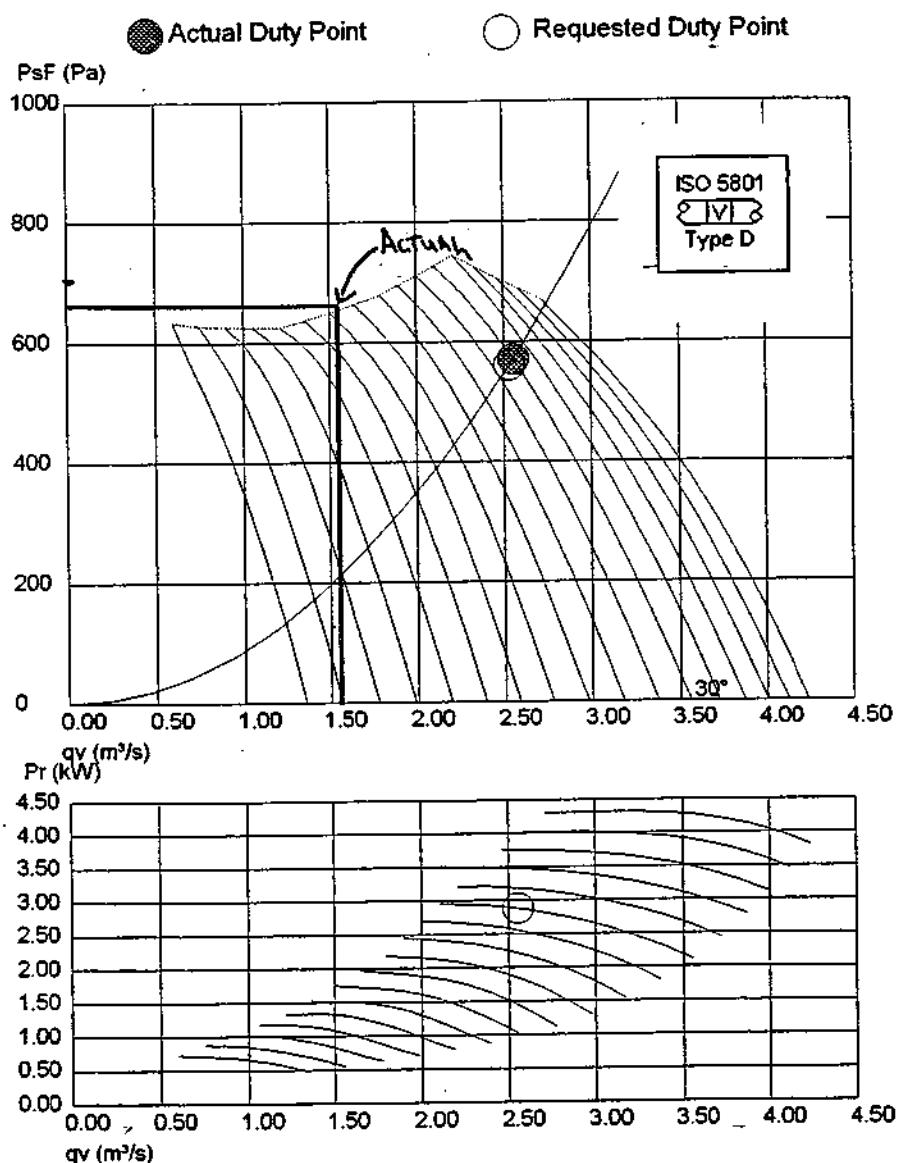
WOODS OF COLCHESTER LTD.



JM AEROFOIL HT 4000/2H

Quote Number : QOPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 45JM/20/2/6/30

Date: 12/08/98
 Fan Reference : SP02



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 PF Fan (Total) Pressure, qv Volume Flow Rate

80F9

Woods of Colchester Ltd.

Tufnell Way, Colchester, Essex, CO4 5AR, England

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Fan Selector v1.1.05



DUCT TRAVERSE

CLIENT	DRAKE AND SCULF ENGINEERING		
PROJECT	5-7 CARLTON CHAMBERS, LONDON		
SYSTEM	SPOZ/Z STAIRCASE PRESSURISATION		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TPS/1	2.520	400x400	0.160	15.75

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	9.1	10.1	10.0	8.3				
2	10.5	10.7	10.5	9.0				
3	9.8	10.1	10.1	9.2				
4	8.6	9.3	9.3	8.3				
5								
6								
7								
8								
9								
10								
					TOTAL	152.9		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
9.56	1.529	61	236 Pa

COMMENTS/ TP. LOCATION

INSTRUMENT REF:- MICROMANOMETER 87951

TEST ENGINEER S.BENEDETTI DATE 26.08.99. SHT. 1 OF 1

Drake & Scull Engineering (UK) Ltd
Home Counties Area Office
One Shentey Pavilions Chalkdell Drive
Shentey Wood Milton Keynes MK5 6LB
Telephone: 01908 506 005
Estimating Facsimile: 01908 504 669
Email: lizatdrake-scull.co.uk

Drake & Scull

Fax Message

If there is a problem with this fax, please call 01908 506005

Please reply to site:

Telephone No: 0171 839 3081

Fax No: 0171 839 3081
40 MACE, 0171 839 3081,

TO:	Name:	GRISS TUFFIN
	Company:	CML LTD.
FAX NO:		MEMO
FROM:		MARK HAMBURNE
NO: OF PAGES (Including this page)		TEN
DATE:		2 SEPT 1991

RE. CARLTON GARDENS.

REF. STAIRCASE THREE,

GRISS,

PLEASE FIND COMMISSIONING RESULTS FOR
ABOVE STAIRCASE, ALSO ONE NUMBER
SHEET AS DEMONSTRATED TO THE
DS ON THE 01/9/91 AND ACCEPTED.

REGARDS

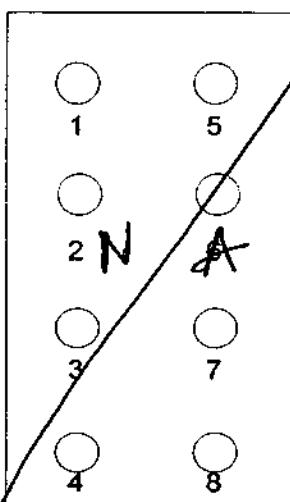


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TEST DEMONSTRATION TO DS,
PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SELL ENGT LTD.
PROJECT	CARLTON GARDENS.
SYSTEM	STAIRCASE PRESSURISATION SPG3. STAIRCASE 3.

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY / OFF.(Pa)	PD LIFT / OFF.(Pa)
7	-51 Pa STAIR - TO RESIDENCE RECEPTION,		
6	-54 Pa STAIR - TO RESIDENCE RECEPTION.		
5	N/A		
4	N/A		
3	N/A		
2	N/A		
1	N/A		
GRD	58 Pa - STAIR TO RECEPTION		
L'GRD	-		
BASE	56 Pa - STAIR TO CORRIDOR / CAR PARK,		



1= 5=
2= 6=
3= 7=
4= 8=

TOTAL=

PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER	
EAST EXH05	N/A
WEST EXH04	N/A

AVERAGE TAKEN .

FLOOR	VELOCITY . M/S
SEVEN	1.02 m/s
SIX	0.96 m/s
GROUND	0.77 m/s
BASEMENT	1.0 m/s

AVE VEL (m/s)=.

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL

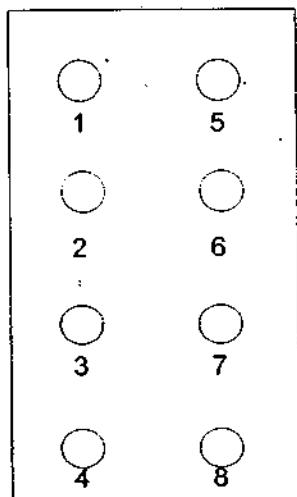
PRESENT

M.LAMBURNE
C.TUPPIN.
P.MOSS.
J.TASPART.

PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SAWYER ENG LTD
PROJECT	CARLTON EDNS,
SYSTEM	STAIRCASE 3, FAN, 2

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY / OFF.(Pa)	PD LIFT / OFF.(Pa)
7	54.0Pa STAIR TO FLAT / 30.0Pa STAIR TO LOBBY		
6	60.9 Pa STAIR TO FLAT / 47.0 Pa STAIR TO LOBBY		
5	/		
4	/		DOOR IN NEUTRAL GUT,
3	/		
2	/		
1	/		
GRD	59.0Pa STAIR TO RECEPTION,		
L'GRD	/		
BASE	58.8Pa STAIR TO CAR PARK,		



1= 1.28.
 2= 1.02
 3= 0.41
 4= 0.59
 5= 1.10
 6= 1.08
 7= 1.21
 8= 0.80
 TOTAL= 7.49 m/s

PRESSURE RELIEF VOLUME FROM LEVEL 5 EAST AND WEST RISER		
EAST EXH05	✓	N/A
WEST EXH04	✓	N/A

] SEE NOTES,

NOTE GRD FLOOR DOOR SHUT FOR VELOCITY TEST,

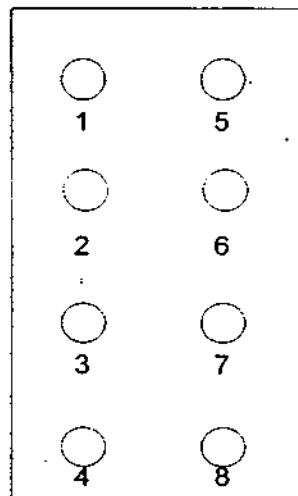
AVE VEL (m/s)= 0.936 m/s

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL

PRESSURE DIFFERENTIAL / DOOR VELOCITY

CLIENT	DRAKE & SWAN ENG LTD
PROJECT	CARDON GARDENS,
SYSTEM	STAIRCASE B, FAN 01,

LEVEL	PD STAIR / OFF.(Pa)	PD LOBBY / OFF.(Pa)	PD LIFT/ OFF.(Pa)	
7	53.0 Pa STAIR	TO FLAT / 34 Pa STAIR	TO LOBBY	
6	56.0 Pa STAIR	TO FLAT / 41 Pa STAIR	TO LOBBY	SEE NOTES
5	-			
4	-			
3	<			
2	-			
1	-			
GRD	55.4 Pa STAIR	TO RECEPTION		
L'GRD	/			
BASE	57.4 Pa STAIR	TO CAR PARK		



1= 1.08.
 2= 0.83
 3= 0.25
 4= 0.63
 5= 1.08
 6= 0.43
 7= 0.90
 8= 1.22
 TOTAL= 6.82 m/s

AVE VEL (m/s)= 0.85 m/s

DOOR VELOCITY TO BE TAKEN
AT HIGHEST DOOR WITHIN
STAIRWELL

PRESSURE RELIEF VOLUME FROM

LEVEL 5 EAST AND WEST RISER

EAST EXH05	✓ N/A
WEST EXH04	✓ N/A

NOTE GRD FLOOR DOOR
SHUT FOR VELOCITY TESTS.

NOTES

- a) FLOOR 6.57 EXTERNAL
DOOR UNDERCUT BY 10mm.
- b) FLOOR 6 INTERNAL
DOOR UNDERCUT UNDEFN
1-15mm.



FAN TEST SHEET

CLIENT	DRAILE AND SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	SP03/1 STAIRCASE PRESSURISATION		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573923/0932
FAN TYPE	AXIAL AEROFOIL	PITCH ANGLE	16°
SIZE		m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE		2.26	560
DESIGN SYSTEM VOLUME		2.27	
TESTED SYSTEM VOLUME & PRESSURE	1.641	Dis. 310Pa Suct. -221 Pa Total	531 Pa

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	No DATA
VOLTAGE	4,513,150	POWER	4.0 kW
FULL LOAD CURRENT	7.5	RUNNING CURRENT	2.39A/x:4.0A@4.2A
DESIGN SPEED	2850		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	DIRECT DRIVE	QUANTITY	DIRECT DRIVE
	MOTOR		FAN
PULLEY DIA.	7.0		3.0
SHAFT DIA.	1.5		1.5
BUSH REF.	11		11
MEAS. RPM	INACCESSIBLE		INACCESSIBLE

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	L22 D13
OIL RANGE	7.0 - 10.0A	OIL SETTING	7.5A
TIMER	DIRECT-ON-LINE	FUSE RATING	25A

COMMENTS

INSTRUMENT REFS:- MICROMANOMETER 879511/CLAMP METER 102

TEST ENGINEER S.BENEDETTI DATE 26.08.99.

SHT. 4 OF 9

WOODS OF COLCHESTER LTD.

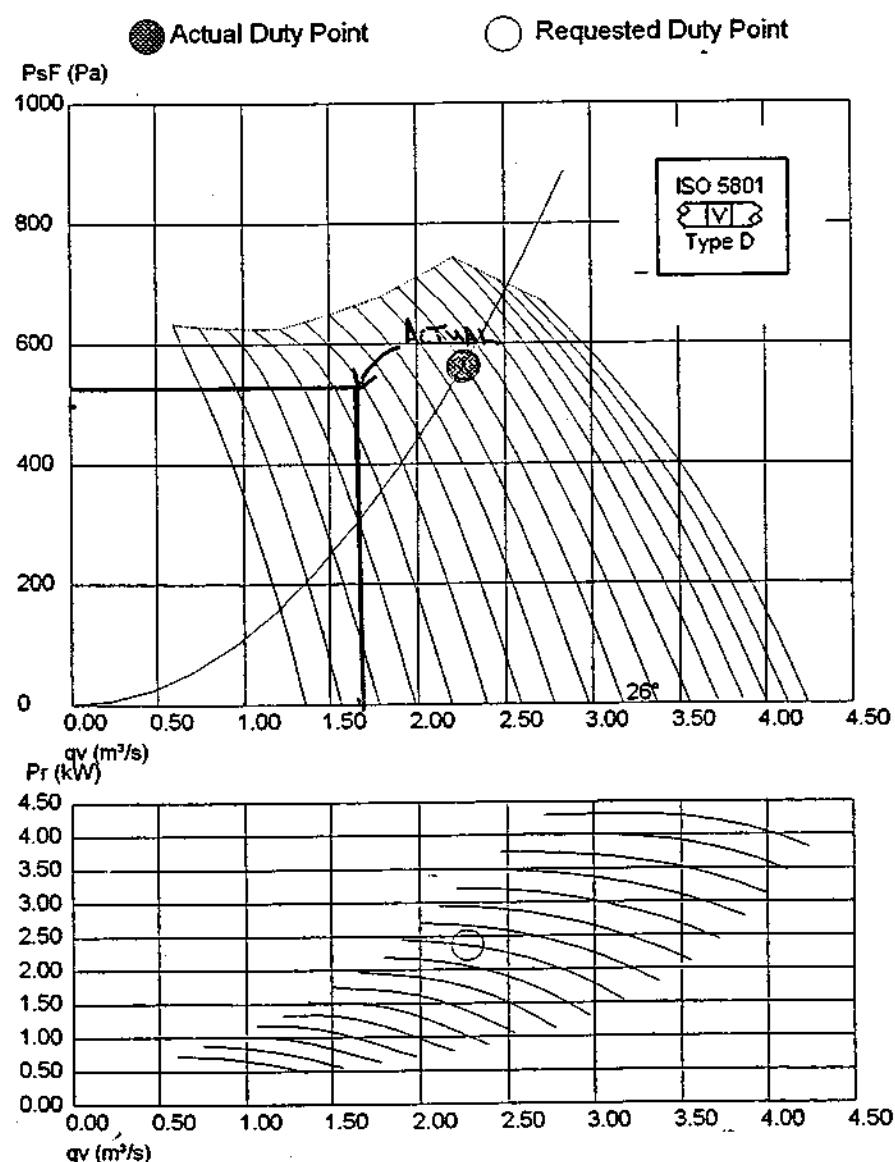
JM AEROFOIL HT 400°C / 212°



Quote Number : QPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 45JM/20/2/6/26

Date: 12/08/98
 Fan Reference : SP03

SP03/1



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 PF Fan (Total) Pressure, qv Volume Flow Rate

5 of 9

Woods of Colchester Ltd.

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Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

SEC group company



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL ENGINEERING
PROJECT	5-7 CARLTON GARDENS, LONDON
SYSTEM	SPO3/1 STAIRCASE PRESSURISATION

TP REF.	DES VOL(m ³ /s)	DUCT SIZE(mm)	AREA(m ²)	DES VEL(m/s)
TDSI 1	2.26	400x400	0.160	14.13

VELOCITY PROFILE(m/s)

MEAN VEL(m/s)	TEST VOL(m ³ /s)	% OF DES.	ST. PRESS.(Pa)
10.26	1.641	73	234 Pa

COMMENTS/TP. LOCATION

INSTRUMENT REF:- MICROMANOMETER 87951

TEST ENGINEER

DATE 26.08.99.

SHT. 6 OF 9



FAN TEST SHEET

CLIENT	DRAKE AND SCULL ENGINEERING		
PROJECT	5-7 CARLTON GARDENS, LONDON		
SYSTEM	SPO3/2 STAIRCASE PRESSURISATION		

FAN

M'FACTURER	WOODS	IDENT/SERIAL No	573903/0971
FAN TYPE	AXIAL AEROFOIL	PITCH ANGLE	36°
SIZE	451JM1201215/16	m³/sec	Pascals
SPECIFIED VOLUME & PRESSURE	2.26	560	
DESIGN SYSTEM VOLUME	2.17		
TESTED SYSTEM VOLUME & PRESSURE	1.609	Dis. 235Pa Suct. -355Pa Total	590 Pa

MOTOR

M'FACTURER	WOODS	IDENT/SERIAL No	No DATA
VOLTAGE	415/3/50	POWER	4.0 kW
FULL LOAD CURRENT	7.5	RUNNING CURRENT	e:3.8/r:4.1/b:4.2A
DESIGN SPEED	2950		

DRIVE

M'FACTURER	DIRECT DRIVE	TYPE	DIRECT DRIVE
BELT SIZE	DIRECT DRIVE	QUANTITY	DIRECT DRIVE
	MOTOR		FAN
PULLEY DIA.	7.0		8.0
SHAFT DIA.	11.2		11.2
BUSH REF.			
MEAS. RPM	INACCESSIBLE		INACCESSIBLE

STARTER

M'FACTURER	TELEMECANIQUE	TYPE	L22 D13
O/L RANGE	7.0 - 10.0A	O/L SETTING	7.5A
TIMER	DIRECT-ON-LINE	FUSE RATING	25A

COMMENTS

INSTRUMENT REFS:- MICROMANOMETER 8795 / CLAMP METER 102

TEST ENGINEER S. BENEDETTI DATE 26.08.99. SHT. 7 OF 9

WOODS OF COLCHESTER LTD.

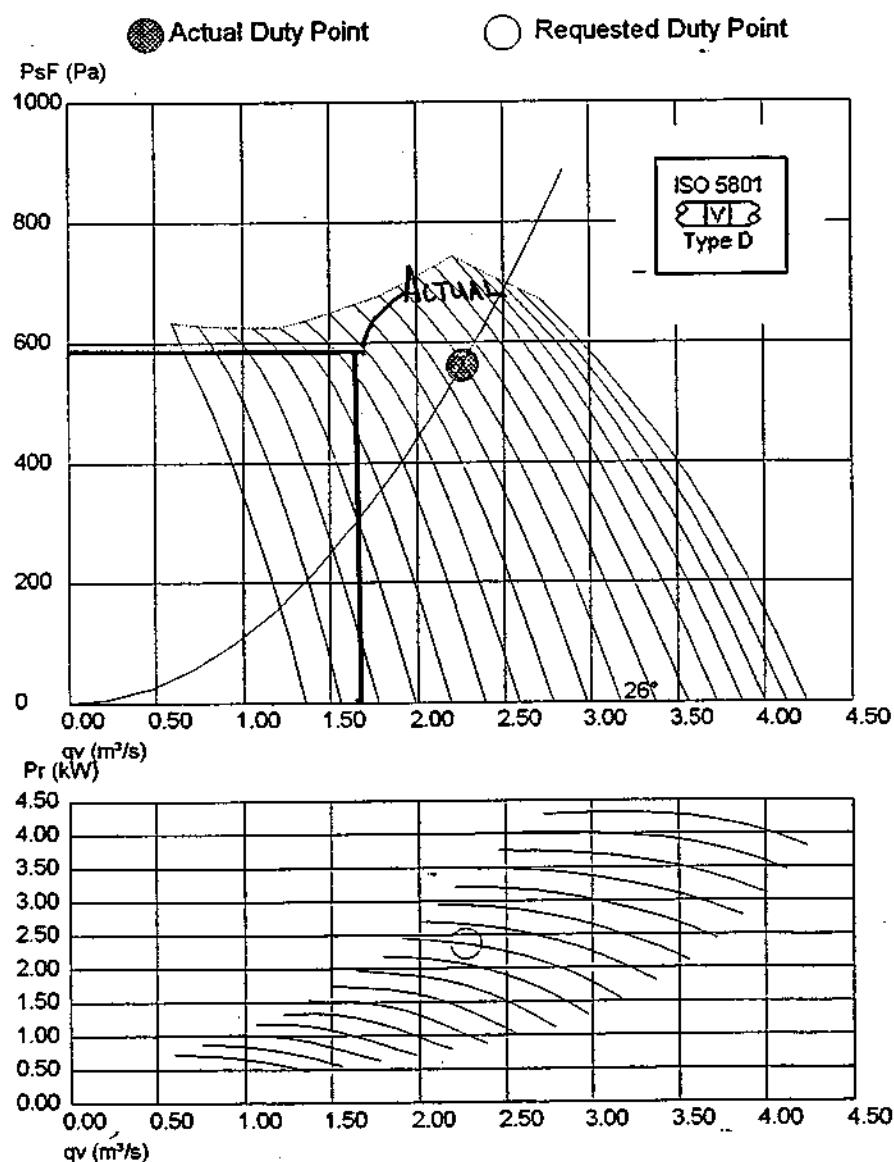
JM AEROFOIL HT 40°C / 21°C



Quote Number : QOPEN2594R
 Customer : Drake & Scull
 Project Reference : 5-7 Carlton Gardens
 Fan Code : 45JM/20/2/6/26

Date: 12/08/98
 Fan Reference : SP03

SP03/2



Symbols

PsF Fan (Static) Pressure, Pr Absorbed Impeller Power
 Pf Fan (Total) Pressure, qv Volume Flow Rate

8 AF 9

Woods of Colchester Ltd.

Tufnell Way, Colchester, Essex, CO4 5AR, England

Tel: + 44 (0) 1206 544122, Fax: + 44 (0) 1206 574434, Telex: 98422

a **SEC** group company



DUCT TRAVERSE

CLIENT	DRAKE AND SCULL ENGINEERING		
PROJECT	5-7 CECILIAN GARDENS, LONDON		
SYSTEM	SPO3/Z STAIRCASE PRESSURISATION		

TP REF.	DES VOL(m³/s)	DUCT SIZE(mm)	AREA(m²)	DES VEL(m/s)
TPS11	2.26	400x400	0.160	14.13

VELOCITY PROFILE(m/s)

	A	B	C	D	E	F	G	H
1	8.9	10.6	10.5	8.7				
2	10.2	10.8	11.3	9.8				
3	9.3	10.8	11.1	10.3				
4	9.5	10.1	9.6	9.4				
5								
6								
7								
8								
9								
10								
					TOTAL	160.9		

MEAN VEL(m/s)	TEST VOL(m³/s)	% OF DES.	ST. PRESS.(Pa)
10.06	1.609	71	227 Pa

COMMENTS/ TP. LOCATION

INSTRUMENT REF:- MICROMANOMETER 87951
 TEST ENGINEER S. BENEDETTI DATE 26.08.99. SHT. 0 OF 1