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24 HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE EXISTING PREMISES AT No.13, WEST HAMPSTEAD MEWS, LONDON NW6 AND A REPORT ON THE NOISE CONTROL MEASURES REQUIRED TO MINIMISE THE NOISE IMPACT OF THE PROPOSED NEW AIR CONDITIONING PLANT

Test Engineer : M G Roberts

Report Author : M G Roberts

Authorised for Release by : I J Marchant

Client	:	Farrell Design Studios/ Apex Brook (Minories) Ltd
Project	:	13 to 13a West Hampstead Mews, London NW6
Emtec Ref.	:	QF7614/PF4939/RP1(B)
Original Issue Date	:	2nd September 2013
Updated & Revised	:	7th December 2015

EMTEC PRODUCTS LTD

QF7614/PF4939/RP1(B)

24 HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE EXISTING PREMISES AT No.13, WEST HAMPSTEAD MEWS, LONDON NW6 AND A REPORT ON THE NOISE CONTROL MEASURES REQUIRED TO MINIMISE THE NOISE IMPACT OF THE PROPOSED NEW AIR CONDITIONING PLANT

1.0. INTRODUCTION

This report details the results of a 24 hour noise survey carried out on the roof of the building at 13 West Hampstead Mews, London NW6.

The objectives of this survey were as follows:

- To establish the existing background noise level on the roof of the building.
- To assess the proposed new Air Conditioning Plant that is to be mounted onto the roof of the new development and to recommend areas that may require particular treatment to ensure that the operation of the new plant does not disturb the occupants of the neighbouring residential properties.

This report has been divided into the following sections for ease of analysis:

2.0. TEST INSTRUMENTATION

All measurement equipment used during the survey complied with the requirements of BS4142:2014 "Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas". Details of the equipment are as follows:

Integrating Sound Level Meters	: Bruel & Kjaer type 2231 fitted with a Bruel & Kjaer type 4155 ½ inch condenser microphone.
Statistical Analysis Modules	: Bruel & Kjaer type BZ 7115 capable of computing, percentile levels L1, L10, L50, L90 and L99 and also the Leq level.
Acoustic Calibrator	: Bruel & Kjaer type 4231 electronic calibrator.

Calibration was performed before and after the surveys and found to be, in all cases, +/- 0.1 dB from the reference source.

3.0. TEST PROCEDURE

The survey was conducted during a continuous 24 hour period from 08:40am on Monday the 5th of August 2013 to 08:20am on Tuesday the 6th of August 2013.

Data was continuously acquired throughout the measurement period with the individual averaging time for statistical noise data set to 20 minutes. The following statistical measurements were recorded concurrently:

LA1 - The Sound Pressure Level exceeded for 1% of the measurement period.

LA10 - The Sound Pressure Level exceeded for 10% of the measurement period.

LA50 - The Sound Pressure Level exceeded for 50% of the measurement period.

LA90 - The Sound Pressure Level exceeded for 90% of the measurement period. LA90 is considered to represent the "background noise level" during the measurement period and is used for the assessment of noise to determine the likelihood of complaints (See BS 4142).

LA99 - The Sound Pressure Level exceeded for 99% of the measurement period.

LAeq - The continuous steady state Sound Pressure Level that has the same acoustic energy as the real fluctuating level.

All noise levels recorded were filtered using a standard 'A' Weighting filter.

3.1. Measurement Position

The noise levels were measured at a position on the roof at the rear of the building.

The microphone was placed on a tripod and the tripod positioned just behind the edge of the parapet wall at the rear face of the building.

The microphone was positioned so that it was pointing away from the building and out over the gardens to the rear. The position of the microphone, and the location of the rear of the buildings on Campayne Gardens, are shown on the attached photo A.

The microphone was approximately 1.2 metres above the roof level. The rest of the measurement equipment was located within a weatherproof enclosure with a low impedance cable running from the microphone to the instrumentation.

3.2. Weather Conditions

The weather conditions prevailing during the measurement period were in line with those recommended in BS 4142:2014 with no wind and no rain other than a shower that probably occurred around 6pm in the evening of the 5th of August. The shower did not effect the noise readings during the overnight period so the data is considered representative of the prevailing background noise environment.

The microphone was protected throughout the tests by an acoustically transparent wind balloon.

4.0. RESULTS

The raw test data, gathered during the 24 hour noise survey, is given in Appendix 'A 'of this report.

The 'A' Weighted Leq levels measured over each 20 minute interval throughout the 24 hour period (denoted by LAeq, (20 mins) are displayed as a bar graph on the attached Sketch No QF/7614/T1 at the back of this report.

The 'A' Weighted percentile levels measured over each 20 minute interval denoted by LA10 (20 mins), LA50 (20 mins) and LA90 (20 mins) are displayed as line graphs on the attached Sketch No QF/7614/T2 at the back of this report.

4.1. Summary of Results

The table QF/7614/D1 below summarises the noise levels taken over the 24 hour period in terms of the maximum and minimum Sound Pressure Levels recorded.

Table QF/7614/D1 – Summary of Maximum and Minimum Noise Levels

	LA1	LA10	LA50	LA90	LA99	LAeq
Min.	42.2dBA	37.2dBA	33.2dBA	31.2dBA	30.7dBA	34.9dBA
Max.	68.2dBA	62.2dBA	56.2dBA	53.2dBA	52.7dBA	58.9dBA

5.0. DISCUSSION OF RESULTS

The lowest recorded LA90 background noise level was 31.2dBA which occurred during one time period ending at 2am. The LA90 background noise level was between 35.2dBA and 31.2dBA during the period between midnight and 6:00am.

In order for any new ventilation or air conditioning plant to be acceptable to the Camden planning department it will have to be designed to have an LAeq noise level that is 5dBA less than the lowest LA90 background noise level for the periods of operation of the plant. This noise level should be achieved at a point 1 metre outside the nearest residential properties' window.

Based upon the lowest LA90 background noise level recorded during this survey the table QF/7614/D2 below gives the limiting LAeq noise level, at 1 metre from the nearest noise sensitive neighbours' window, when all the proposed ventilation and/or air conditioning plant is in operation.

Table QF/7614/D2 – Limiting LAeq Noise Level for New Plant

Hours of Operation	Lowest LA90 Background Noise Level	Limiting LAeq Noise Level for New Plant
24 Hours	31.2dBA	26.2dBA*
Extended Office Hours (8am to 10pm)	37.7dBA	32.7dBA*

*Note: These limiting noise levels will apply at 1 metre from the nearest residential property's window.

It is proposed to install a Daikin RYYQ14T air cooled condenser within the plant area shown on our John Slater and Howard drawing No. MO3(P1) and a Daikin RXYSQ5P8V1 condenser on the roof of the house, again as indicated on the attached drawing.

The free field Sound Pressure level of each of these units is as stated below:-

Unit Description	dBA	Sound Pressure Level (db ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k
Daikin RYYQ14T at 1m free field on max duty	61	65	68	64	59	54	50	47	39
Daikin RXYSQ5P8Y1 at 1m free field on max duty	53	63	55	54	52	48	43	37	31

Note:- The above data was taken from the Daikin data books on the above equipment.

In order to achieve a daytime noise level of LAeq 32.7dBA the above units will need attenuation as given by the following calculations:-

A) Attenuation of Daikin RYYQ14T Condenser to Nearest Residential Window at rear of No.12 West Hampstead Mews

Description	dBA	Sound Pressure Level (db ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k
Daikin RYYQ14T Condenser at 1m free field	61	65	68	64	59	54	50	49	39
Distance correction to nearest window (10 log A_{12}/A_1)		-17	-17	-17	-17	-17	-17	-17	-17
Reverberation		+5	+5	+5	+5	+5	+5	+5	+5
Barrier Effect of rear extension (200mm)		-5	-7	-9	-11	-12	-12	-12	-10
Resultant SPL at 1 metre from window at rear of property	39	48	49	43	36	30	26	23	17
Emtec PAC 30 outlet plenum silencer		-5	-7	-7	-9	-9	-9	-8	-7
Attenuated Resultant SPL at 1 metre from windows at rear of property	31.5	43	42	36	27	21	17	15	10

B) Attenuation of Daikin RYYQ14T Condenser to Nearest Residential Window at rear of 84 West End Lane

Description	dBA	Sound Pressure Level (db ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k
Daikin RYYQ14T Condenser at 1m free field	61	65	68	64	59	54	50	49	39
Distance correction to nearest window (10 log A20/A1)		-21	-21	-21	-21	-21	-21	-21	-21
Reverberation		+5	+5	+5	+5	+5	+5	+5	+5
Resultant SPL at 1 metre from window at rear of property	45	49	52	48	43	38	34	31	23
Emtec LAAC30/105 high performance acoustic louvres		-6	-9	-11	-17	-25	-32	-30	-23
Attenuation Resultant SPL at 1 metre from windows at rear of property	31.4	43	43	37	26	13	2	1	0

C) Attenuation of Daikin RYYQ14T Condenser to Nearest Residential Window at Rear of 88 West End Lane

Description	dBA	Sound Pressure Level (db ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k
Daikin RXYSQ5P8V1 Condenser at 1m free field	53	63	55	54	52	48	43	37	31
Distance correction to nearest window (10 log A_{23}/A_1)		-23	-23	-23	-23	-23	-23	-23	-23
Reverberation		+5	+5	+5	+5	+5	+5	+5	+5
Resultant SPL at 1 metre from window at rear of property	35	45	37	36	34	30	25	19	13
Acoustic Shielding of partial screen (Emtec PAC 30 panels)		-6	-8	-10	-12	-14	-16	-16	-14
Attenuated Resultant SPL at 1 metre from windows at rear of property	23.4	39	29	26	22	16	9	3	-

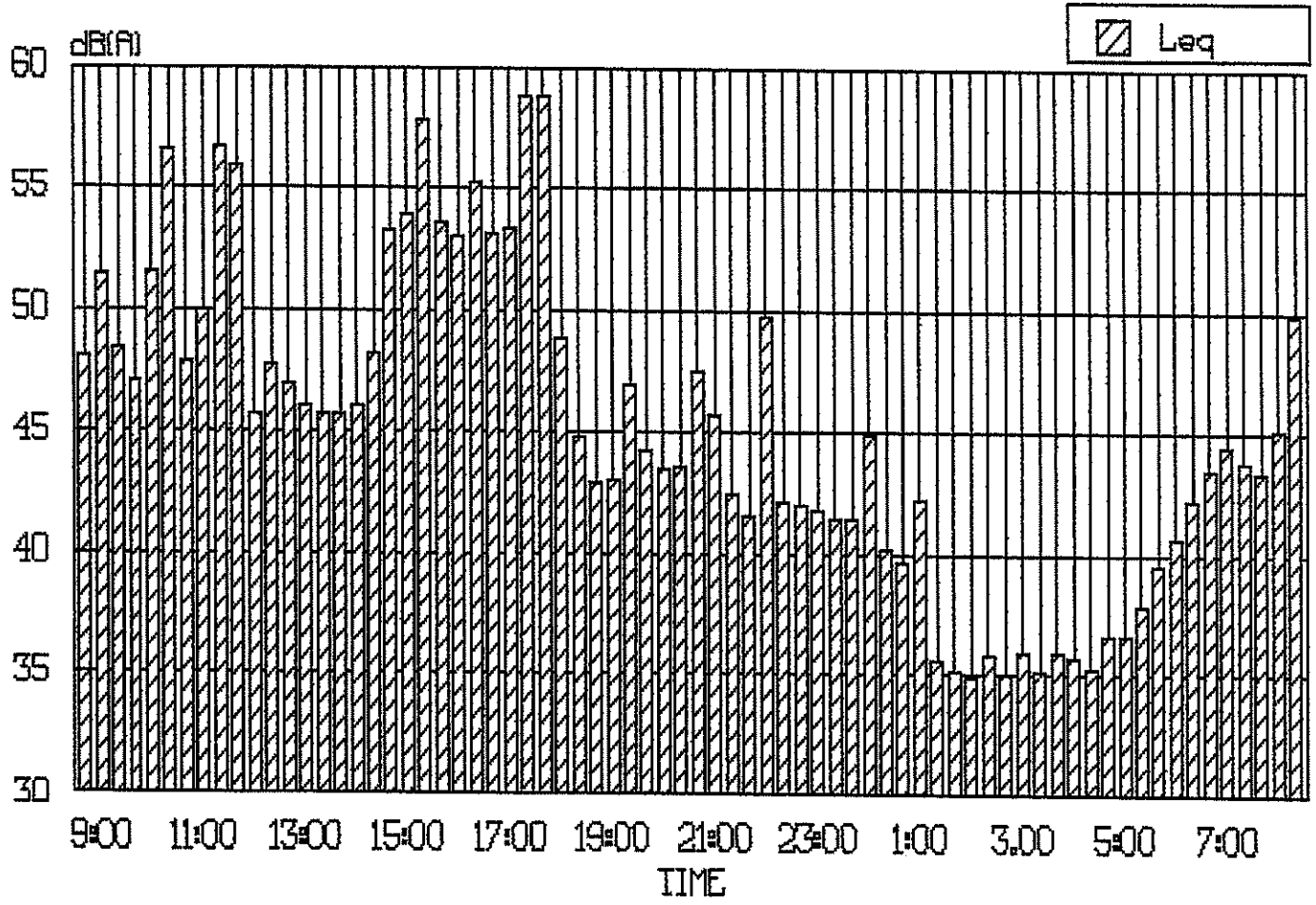
In order to achieve the attenuation of the units it will be necessary to place the Daikin RYYQ14T condenser within a suitable Emtec LAAC30/105 acoustic louvred enclosure with an Emtec PAC 30 outlet plenum silencer fitted onto the top of the unit. The layout of this mitigation is shown on the attached sketch No.QF/7614/GA3. It will also be necessary to fit a simple acoustic screen in front of the Daikin RXYSQ5P8Y1 condenser to provide the attenuation listed. This screening is shown on our attached sketch No.QF/7614/GA4.

There are to be two small toilet extract fans and a heat recovery unit on each floor of the offices as indicated on the JSH drawing No.M03 (P1). These fans should be fitted with atmospheric duct mounted silencers to ensure that a noise level of no more than 40dBA at 1 metre from the inlets/discharges of the units is maintained.

If the internal fans are fitted with atmospheric silencers and the two condenser units are installed in the locations shown on the attached JSH drawing No.M03 (P1) and enclosed in by enclosures/screening, as detailed on our attached sketches No.QF/7614/GA3 and -/GA4, then the noise output from the new plant should not exceed the limiting LAeq level of 32.7dBA for daytime use of the Daikin RYY14T condenser (8am to 10pm) and 26.2dBA for nightime use of the Daikin RXYQ5P8V1 condenser. The operation of the new plant should, then be acceptable to the local authority's planning department.

EMTEC PRODUCTS LTD
7th December 2015

13 West Hampstead Mews, London NW6.
5th to 6th August 2013



TITLE: LAeq Levels	*ISSUE DATE:* 06/08/2013				*DRAWN BY:* MGR	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
CLIENT: De Metz Forbes Knight Architects Ltd	*PF No: 4939*				*APPROVED BY:* MGR	*REVISION*							
PROJECT: 13 West Hampstead Mews	*Q*	*A*	*M*	*I*	*DESIGN AUTH:* MGR	*SKETCH No. QF/7614/T1*							

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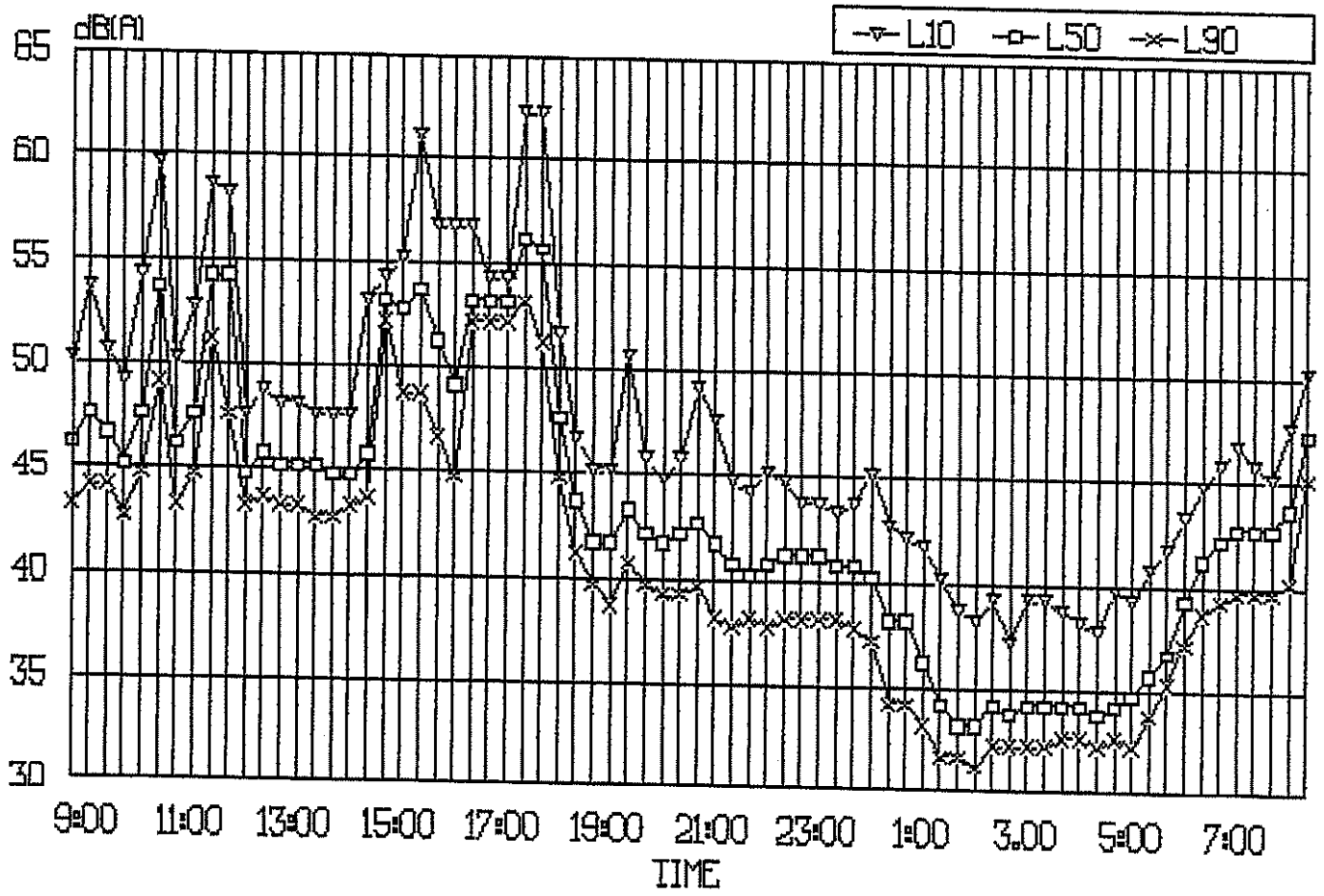
13 West Hampstead Mews, London NW6.
5th to 6th August 2013



TITLE: LA10; LA50 & LA90 Levels	*ISSUE DATE:* 06/08/2013				*DRAWN BY:* MGR	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
CLIENT: De Metz Forbes Knight Architects Ltd	*PF No: 4939*				*APPROVED BY:* MGR	*REVISION*							
PROJECT: 13 West Hampstead Mews	*Q*	*A*	*M*	*I*	*DESIGN AUTH:* MGR	*SKETCH No. QF/7614/T2*							

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APPENDIX A

Raw Data – Noise Survey

5th to 6th of August 2013

NOISE SURVEY DATA FROM BACKGROUND NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE EXISTING PROPERTY AT 13 WEST HAMPSTEAD MEWS, LONDON NW6.

Project : 13 West Hampstead Mews, London NW6.
Client : IPM Personal Pension Trustees.
Ref : QF7614
Date : 6th August 2013

Measure No.	End Time	MaxP (dBA)	L1 (dBA)	L10 (dBA)	L50 (dBA)	L90 (dBA)	L99 (dBA)	Leq (dBA)
1	08:40	102.5	55.2	50.2	46.2	43.2	41.7	48.1
2	09:00	97.1	61.2	53.7	47.7	44.2	42.2	51.4
3	09:20	76.8	58.7	50.7	46.7	44.2	42.7	48.4
4	09:40	74.5	55.7	49.2	45.2	42.7	41.2	47.1
5	10:00	82.6	61.2	54.2	47.7	44.7	42.2	51.5
6	10:20	84.7	65.7	59.7	53.7	49.2	45.7	56.5
7	10:40	78	58.2	50.2	46.2	43.2	41.7	47.8
8	11:00	81.2	58.7	52.7	47.7	44.7	42.7	50
9	11:20	86.4	66.7	58.7	54.2	51.2	45.2	56.7
10	11:40	87	64.7	58.2	54.2	47.7	44.2	55.9
11	12:00	76.8	51.2	47.7	44.7	43.2	41.7	45.6
12	12:20	78.8	58.2	48.7	45.7	43.7	42.7	47.7
13	12:40	80.4	56.2	48.2	45.2	43.2	41.2	47
14	13:00	80.7	51.2	48.2	45.2	43.2	42.2	46
15	13:20	77.5	51.2	47.7	45.2	42.7	41.2	45.7
16	13:40	74.8	51.7	47.7	44.7	42.7	41.7	45.6
17	14:00	86.6	52.7	47.7	44.7	43.2	42.2	46.1
18	14:20	78.4	54.2	50.2	45.7	43.7	42.2	48.2
19	14:40	90.4	55.7	54.2	50.2	52.2	51.7	53.2
20	15:00	86.5	61.7	55.2	52.7	48.7	45.7	53.8
21	15:20	88	68.2	61.2	53.7	48.7	44.7	57.6
22	15:40	85.7	62.7	58.7	51.2	46.7	44.2	53.6
23	16:00	86.5	62.2	59.7	49.2	44.7	42.2	52.9
24	16:20	87.5	64.7	58.7	53.2	52.2	51.7	55.3
25	16:40	72.8	55.7	54.2	53.2	52.2	51.7	53.1
26	17:00	82.3	58.2	54.2	53.2	52.2	51.7	53.3
27	17:20	92.4	66.2	62.2	56.2	53.2	52.7	58.9
28	17:40	91	67.7	62.2	55.7	51.2	50.2	58.8
29	18:00	77.3	54.7	51.7	47.7	44.7	42.7	48.9
30	18:20	81.6	50.2	46.7	43.7	41.2	39.7	44.7
31	18:40	87.5	49.7	45.2	41.7	39.7	38.7	42.9
32	19:00	73.4	50.7	45.2	41.7	38.7	36.7	43
33	19:20	85.6	56.7	50.7	43.2	40.7	39.2	46.9
34	19:40	72.9	53.7	45.7	42.2	39.7	38.2	44.2
35	20:00	81.8	53.7	44.7	41.7	39.2	37.2	43.5
36	20:20	68.9	51.2	45.7	42.2	39.2	37.7	43.6
37	20:40	78.6	59.2	49.2	42.7	39.7	38.2	47.5
38	21:00	75.6	57.2	47.7	41.7	38.2	36.2	45.6
39	21:20	74.9	51.2	44.7	40.7	37.7	35.7	42.4
40	21:49	66.9	49.2	44.2	40.2	38.2	36.7	41.8
41	22:00	83.5	53.2	45.2	40.7	37.7	36.7	43.8
42	22:20	66.8	48.7	44.7	41.2	38.2	36.7	42.1
43	22:40	68.3	47.2	43.7	41.2	38.2	37.2	41.9
44	23:00	64.8	48.2	43.7	41.2	38.2	37.2	41.8
45	23:20	72.8	47.2	43.2	40.7	38.2	36.2	41.4
46	23:40	70.7	47.2	43.7	40.7	37.7	35.7	41.4
47	00:00	83.8	51.7	45.2	40.2	37.2	34.7	44.9
48	00:20	67.7	47.7	42.7	38.2	34.2	32.7	40.1
49	00:40	64.1	46.7	42.2	38.2	34.2	32.7	39.6
50	01:00	79.8	51.2	41.7	38.2	33.2	31.7	42.2
51	01:20	66.6	45.7	40.2	34.2	31.7	31.2	35.6
52	01:40	60.7	43.2	38.7	33.2	31.7	31.2	35.1
53	02:00	64.3	46.7	38.2	33.2	31.2	30.7	34.9
54	02:20	61.3	43.2	39.2	34.2	32.2	31.7	35.6
55	02:40	70.1	42.2	37.2	33.7	32.2	31.7	35
56	03:00	58.8	42.2	39.2	34.2	32.2	31.7	35.9
57	03:20	61	43.2	39.2	34.2	32.2	31.7	35.2
58	03:40	58.4	42.2	38.7	34.2	32.7	31.7	35.9
59	04:00	72.8	43.2	38.2	34.2	32.7	31.7	35.7
60	04:20	57.9	42.7	37.7	33.7	32.2	31.7	35.3
61	04:40	62.1	44.2	39.7	34.2	32.7	31.7	36.6
62	05:00	64.1	44.7	39.2	34.7	32.2	31.7	36.6
63	05:20	65	46.2	40.7	35.7	33.7	32.2	37.9
64	05:40	69.2	46.2	41.7	36.7	35.2	34.2	39.5
65	06:00	64.2	47.7	43.2	39.2	37.2	35.7	40.7
66	06:20	70.6	48.2	44.7	41.2	38.7	37.7	42.2
67	06:40	72.7	51.7	45.7	42.2	39.2	38.2	43.6
68	07:00	69.3	52.7	46.7	42.7	39.7	38.2	44.5
69	07:20	75.3	50.2	45.7	42.7	39.7	38.7	43.7
70	07:40	76.2	50.2	45.2	42.7	39.7	37.7	43.6
71	08:00	70.6	52.2	47.7	43.7	40.2	38.2	45.1
72	08:20	98.1	58.7	50.2	47.2	45.2	41.2	49.9

APPENDIX 'B'

Photos and sketches

Photo A: Location of Microphone at the rear of building with rear of properties in Compayne Gardens shown behind

No.12 West Hampstead Mews – Rear Window

Photo B: View "B" on drawing No.M03(P1) showing windows at rear of neighbouring flats

Photo C: View “C” on drawing No.M03(P1) showing rear façade of property on Campayne Gardens

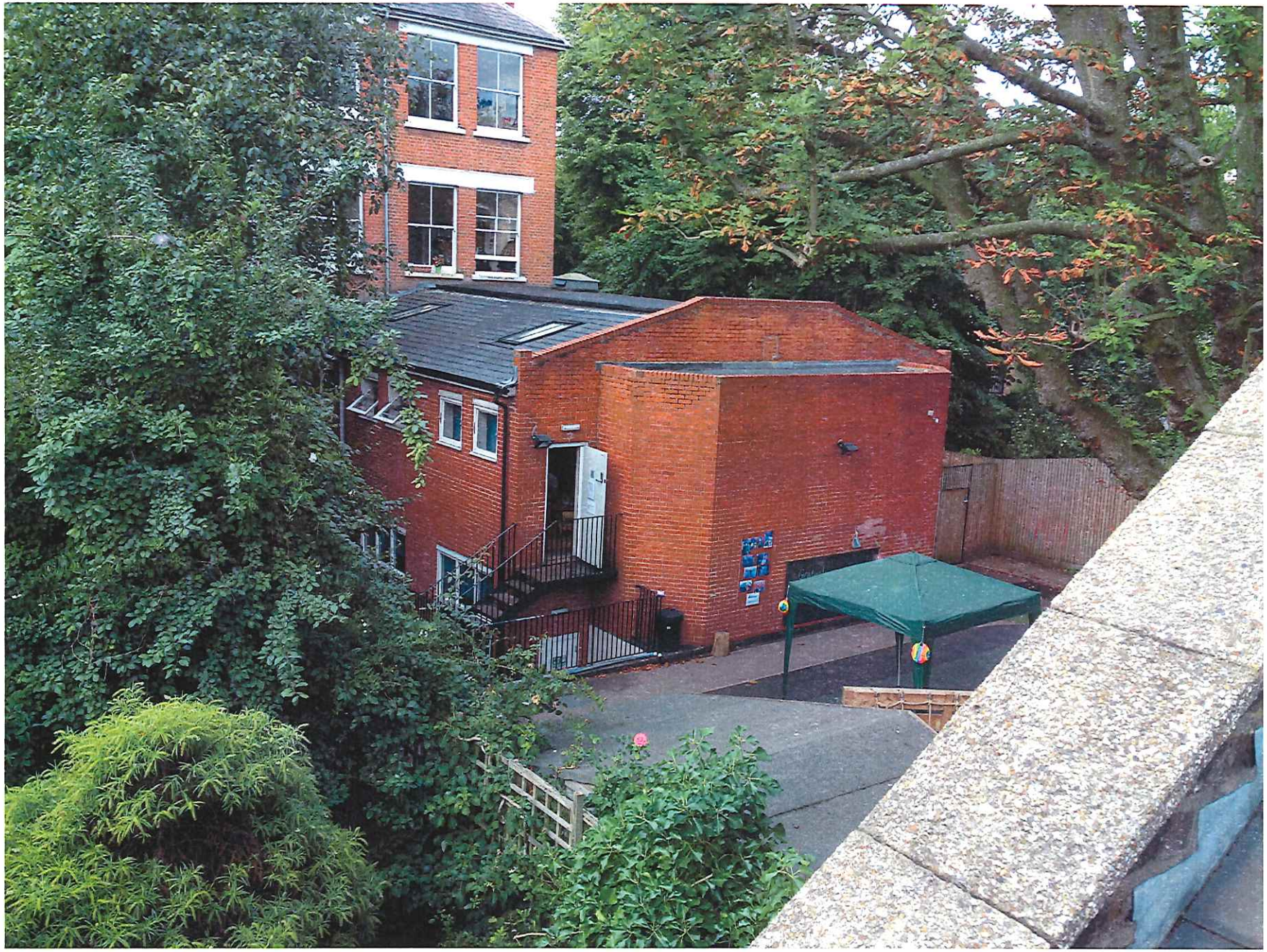
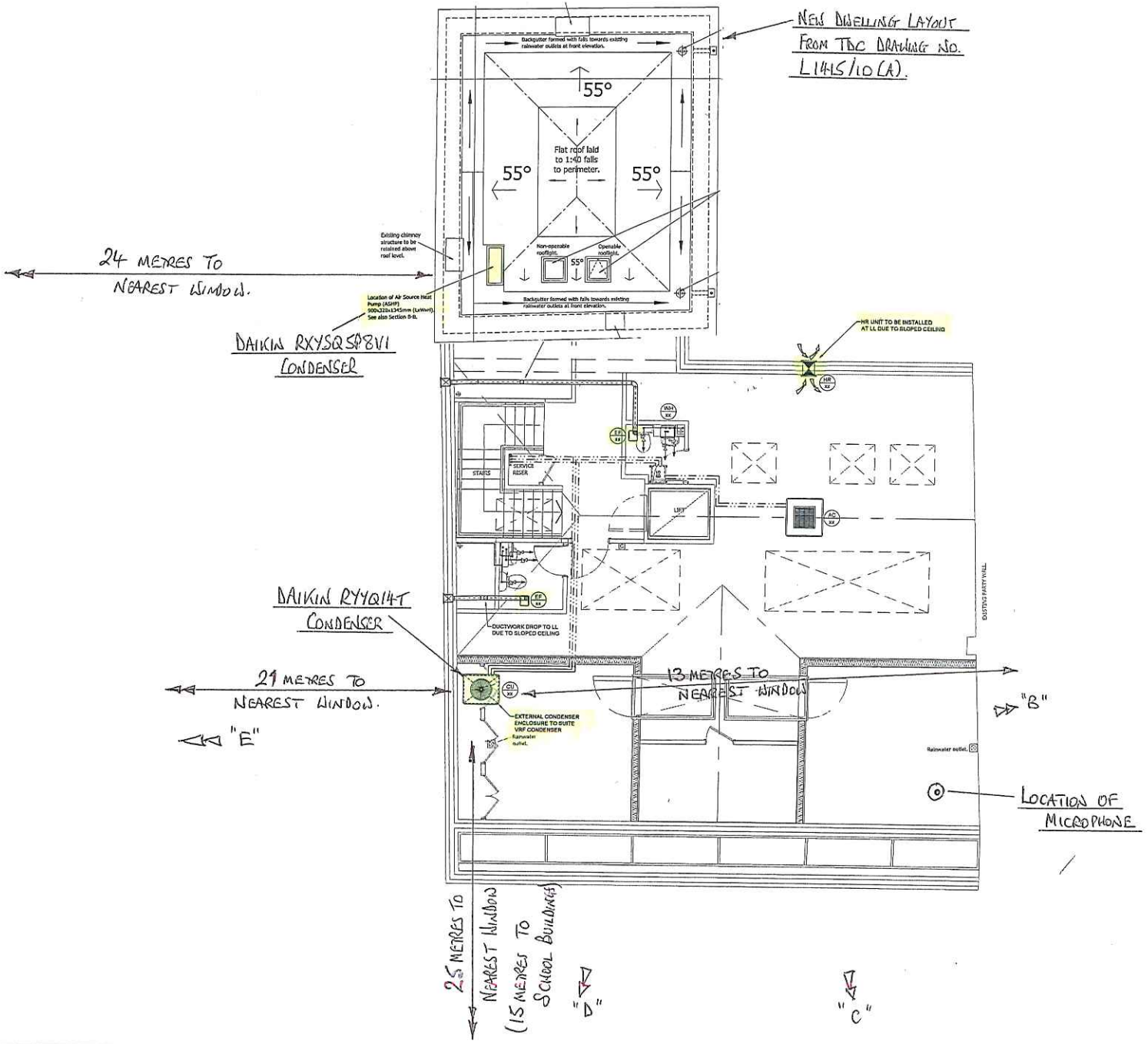


Photo D: View “D” on drawing No.M03(P1) showing Kindergarten School Building

Photo E: View “E” on drawing No.M03(P1) showing rear window of residential property on West End Lane



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH JSH MECHANICAL SPECIFICATION REF: _/_/_/_.
2. CONDENSATE FROM AC UNITS SHALL BE PUMPED TO NEAREST DRAIN AND HAVE DRY RUNNING TRAP BEFORE CONNECTING INTO STACK.

LEGEND:

- PIPEWORK RUN IN CEILING VOID (CV)
- PIPEWORK RUN AT HIGH LEVEL (HL)
- PIPEWORK RUN AT LOW LEVEL (LL)
- PIPEWORK RUN BELOW GROUND LEVEL (UG)
- PIPEWORK DROP / RISE
- CEILING MOUNTED CASSETTE (CAS)
- EXTERNAL CONDENSING UNIT - VERTICAL (CU)
- CONTROLLER / PROGRAMMER
- BRANCH SELECTOR / CONTROLLER BOX (BS or BC)
- ELECTRIC WATER HEATER
- ISOLATING VALVE (IV)
- HOT or COLD WATER OUTLET
- EQUIPMENT REFERENCE
- CIRCULAR DUCTWORK
- CEILING MOUNTED EXTRACT FAN (EF)
- THROUGH WALL LOUVRE TERMINAL

REV	DESCRIPTION	DRWN	CHK'D	DATE
P1	PRELIMINARY OUTLINE	NG	EB	10.15

Johns Slater and Haward
Chartered Building Services Consultants
Clydesdale House, 7 Sorrel Horse Mews, Grimwade Street, Ipswich, IP4 1LN
T: 01473 220405, F: 01473 232181, E: mail@jshipswich.co.uk, W: www.jshipswich.co.uk

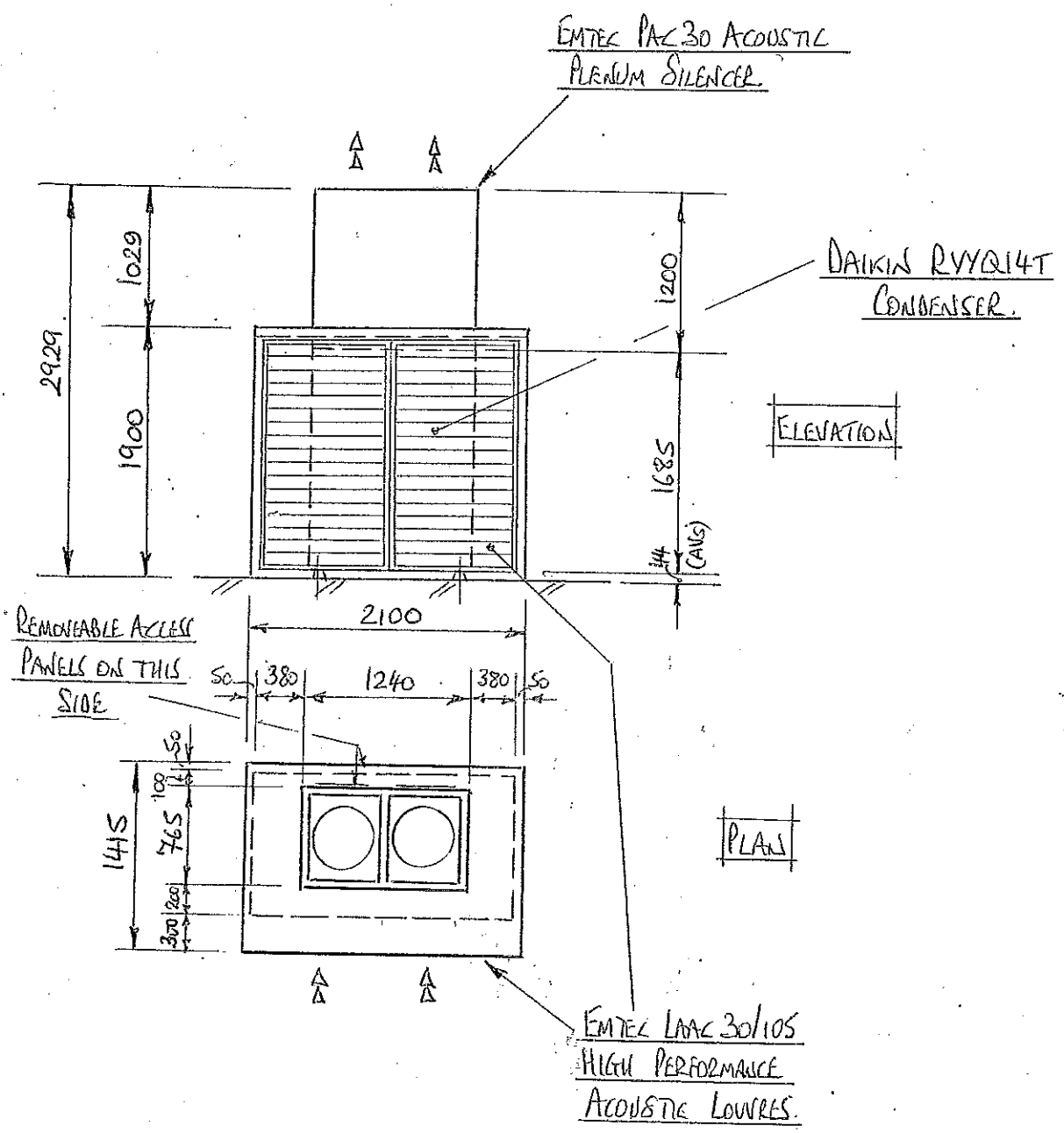
CLIENT: TDC GROUP

PROJECT: WEST HAMPSTEAD MEWS - COMMERCIAL AREAS

DRG TITLE: SECOND FLOOR LAYOUT PROPOSED MECHANICAL SERVICES WORKS

SCALE(S):	ORIG. SIZE:	DRAWN:	CHK'D:	DATE:
1:50	A1	NG	EB	OCT '15
PROJECT No:	DRAWING No:	REV:	STATUS:	
5223	M03	P1	PRELIMINARY	

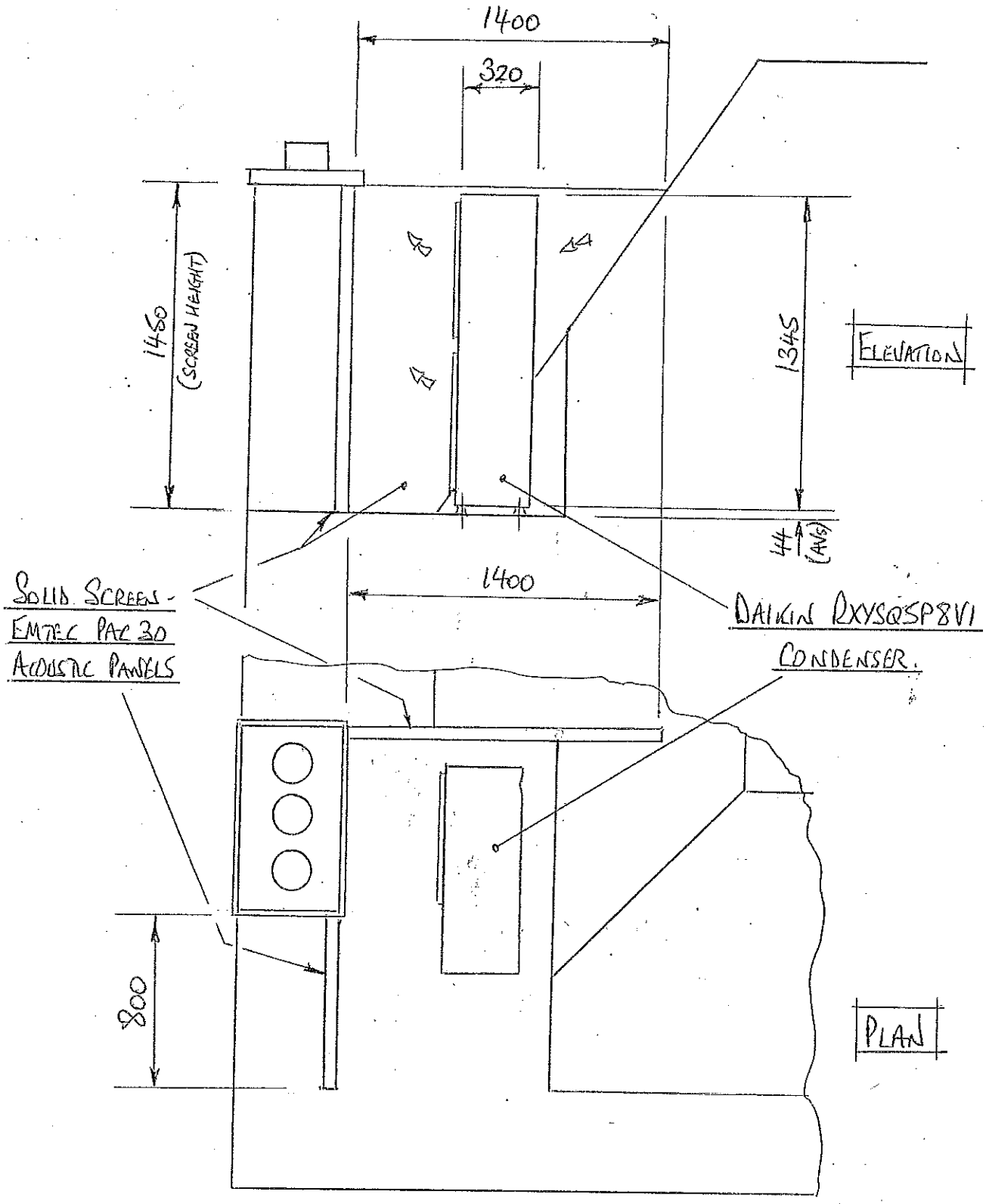
All dimensions in mm unless stated



ACOUSTIC MITIGATION TO DAIKIN RYYQ14T AIR COOLED CONDENSER.

TITLE: LAYOUT OF ACOUSTIC TREATMENT - RYYQ14T	A B C D E F G H REVISION	DOCUMENT No. QE/7614/GA3.	
CLIENT: FARRELL DESIGN STUDIOS.	Q A M I STATUS		
PROJECT: 13 TO 13A WEST HAMPSTEAD MEWS	APPROVED BY:		
ISSUE DATE: 7/12/2015 / PF No. / DRAWN BY: MGR	DESIGN AUTH: MGR	Emtec Products Ltd., Enterprise House, Blyth Road, Hayes, Middx UB3 1DD. Tel: 0161-548 3031 Fax 0161-573 3605	

All dimensions in mm unless stated



TITLE: LAYOUT OF ACOUSTIC TREATMENT - RXYSQ 5P8V1	A B C D E F G H REVISION	DOCUMENT No. QF/7614/GA4	
CLIENT: FARRELL DESIGN STUDIOS	Q A M I STATUS	EMTEC	
PROJECT: 13 TO 13A WEST HAMPSTEAD MEWS	APPROVED BY:	Emtec Products Ltd., Enterprise House, Blyth Road, Hayes, Middx UB3 1DD. Tel: 0181-848 3031 Fax 0181-573 3505	
ISSUE DATE: 7/12/2015	PF No.	DRAWN BY: MGR	DESIGN AUTH: MGR