Noise & Vibration Consultants
4 Mulberry Place, Pinnell Road, London, SE9 6AJ
Tel: **020 8859 0303** Fax: 020 8859 1211
Email: **info@acousticsplus.co.uk** Web: www.acousticsplus.co.uk

ACOUSTICS PLUS

Proposed Climate Control System

99A Frognal, London, NW3 7RH

Environmental Noise Assessment

October 2013

Author: Phil Huffer B.Sc. (Hons) MIOA
Principal Consultant

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Noise Impact Assessment Proposed Installation of Mechanical Plant	
Project Address:	99A Frognal London NW3 7RH
Project Reference:	102572

Issue/Revision Record			
Issue:	**Date:**	**Remarks:**	**Author:**
1	14/10/2013	First Issue	Phil Huffer

	Signature:	Print:	Title:	Date:
Author:		**Phil Huffer**	**Principal Consultant**	**14/10/2013**
Reviewer:		**Andy Dodd**	**Consultant**	**14/10/2013**

1. INTRODUCTION

1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. APL is engaged by both private and public sector clients. APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).

1.2 APL has been instructed by the Applicant, Harrison Varma, to consider and advise upon the noise implications of a proposed installation of a climate control system.

1.3 The proposed climate control system will consist of two outdoor air condenser units that will be located in a purpose built ventilated enclosure within the grounds of the site.

1.4 It is understood the Local Planning Authority (LPA) require further information on noise levels from the proposed installation in order to fully assess the potential noise impact upon the surrounding neighbourhood. This report provides the response to the LPA, on behalf of the Applicant.

2. BASELINE SITUATION

2.1 The Application Site (the “site”) is situated at 99A Frognal, London, NW3. The site and its surroundings can be seen in Figures 1 to 3.

2.2 The site is currently a detached property located over a number of levels. It is proposed to demolish the existing building and erect a new dwelling located over basement and three upper storeys. As part of the development proposals it is proposed to install a mechanical climate control system.

2.3 The proposal is also to erect a purpose built ventilated enclosure within the grounds of the site that will contain 2No. condenser units to service the climate control system. This enclosure will be brick built and include an acoustic louvre to facilitate adequate ventilation. The proposed location of the enclosure and its proximity to noise sensitive accommodation is shown in Figure 1.

2.4 It is anticipated that the nearest noise sensitive façade belongs to the apartment block located to the west of the site at 1-12 Oak Hill Way. It is anticipated that the distance from this façade to the proposed location of the plant enclosure is approximately 22m (estimated from scaled drawings).

2.5 Information in regard of the noise level from the air condenser units has been provided by Daikin HVAC (copy of the data sheets is provided in Appendix A). The units are itemised below:

(a) 1No. Daikin Condenser REYQ30 (REMQ14 + REMQ16)

3. NOISE OUTLINE

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

3.2 Measurements of background noise were obtained over a 24 hour period at a location deemed representative of background noise levels experienced at the nearest noise sensitive façade. Measurements were obtained on the roof terrace directly opposite the noise sensitive façade.

3.3 The particulars of the measurement exercise are recorded below:

Date:	3rd – 4th October 2013
Start Time:	15:48 hrs.
Location:	rear of 99A Frognal, Hampstead, NW3.
Weather:	Light wind, no precipitation.

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

L_{90} percentile level (dB re 20μPa) at 15 minute intervals

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

3.6 For the sake of clarity, the lowest measured background noise over the anticipated operational hours of the condenser units is highlighted. As the units will be utilised for climate control of residential accommodation, it is anticipated that the operational hours will be on a demand basis during any given 24hr period.

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

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

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

3.8 The noise level of the proposed plant was established from the information provided (Appendix A) as detailed.

(a) 1No. Daikin Condenser REYQ30 (REMQ14 + REMQ16) @ 63dBA @ 1m

3.9 The sound reduction offered by the acoustic louvres was obtained from Gilberts and is detailed in an information sheet contained in Appendix A.

4. EQUIPMENT

4.1 All measurements were obtained using the following equipment:

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

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

5. CALCULATIONS

5.1 Given the proposed location of the condensing units and the proposed means of ventilation of the enclosure, the following noise impact was considered:

(a) the egress of noise from the plant located within the enclosure through the louvre to the window of the nearest noise sensitive property;

5.2 Given the proposed location of the condensing units within an enclosed ventilated plant room, the egress of noise from the condensing units through the louvre to the adjacent noise sensitive façade has been considered. The distance from the louvred panel to the nearest noise sensitive façade was determined from scaled drawings as 22m.

5.3 In considering the propagation of noise from the condenser, consideration was given to the following equation.

$SPL_2 = SPL_1 – R – 6$

Where SPL_1 is the sound pressure level on the source side of the louvre
SPL_2 is the sound pressure level close to the louvre on the outside
R is the sound reduction index of the louvre

5.4 The sound reduction index of the louvred panel within the enclosure was assumed to be as follows (extracted from Gilberts literature contained in Appendix A). From the anticipated background noise and predicted noise levels from the enclosure it was considered that a single banked acoustic louvre would be required.

Louvre type	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Single bank	4	4	6	9	12	17	11	10	

Table 1

5.5 A reverberant correction was not applied to the calculation as it is understood the enclosure will be lined with an acoustically absorbent material such as mineral fibre.

5.6 A further correction to account for building edge diffraction of -5dB was assumed. This was extracted from the Department of Energy and Climate Change Planning Standard MCS020.

5.7 The planning standard MCS020 states the following (Note 5):

"Note 5: Barriers between the heat pump and the assessment position (STEP 5)
A correction should be made for attenuation due to barriers between the air source heat pump and an assessment position. A correction will be necessary if an installer is unable to see an assessment position from the top edge of the air source heat pump. Use the following instructions to determine whether a correction is appropriate:

- *For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed.*
- *Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed.*
- *If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed. "*

5.8 The calculation exercise is shown in Table 2. Propagation over distance was based on a point source and attenuated using $20Log_{10}(r)$.

	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Daikin REMQ14,16P9	66	63	62	58	54	49	45	43	60
Daikin REYQ30 (14+16)	69	66	65	61	57	52	48	46	63
R_w louvre (single bank)	4	4	6	9	12	17	11	10	
Distance attenuation	-27	-27	-27	-27	-27	-27	-27	-27	
Building edge diffraction	-5	-5	-5	-5	-5	-5	-5	-5	
Level at façade @ 22m	27	24	21	14	7	0	0	0	17

Table 2

5.1 In order to comply with the requirements of the LPA, any noise from the proposed installation of mechanical plant should not exceed a level of 26 dBA (10dB below the lowest measured background noise over the operational hours of the plant) at 1m from the nearest noise sensitive facade.

5.2 The lowest measured background noise was $L_{A90,15min}$ 36dB that occurred during the period between 02:48hrs to 03:03hrs on 4th October 2013.

5.3 The calculated noise impact is 18dBA. The calculation exercise (Table 2) demonstrates that the proposed installation meets the LPA criteria by 9dB.

6. CONCLUSION & MITIGATION MEASURES

6.1 The foregoing assessment indicates that the proposed installation will meet the requirements imposed by the LPA. Further mitigation measures will not be required.

6.2 The above calculations are based on the use of a single banked acoustic louvre to minimise the breakout of sound from the condenser enclosure and lining the enclosure with an acoustically absorbent material such as mineral fibre. An example of an acoustic louvre can be seen below:

Typical louvre detail

6.3 If an alternative louvre is specified, it should be approved prior to installation to ensure it meets the minimum performance requirements.

Figures

Proposed Location of Mechanical Plant and Surrounding Area

Figure 1

Figure 2

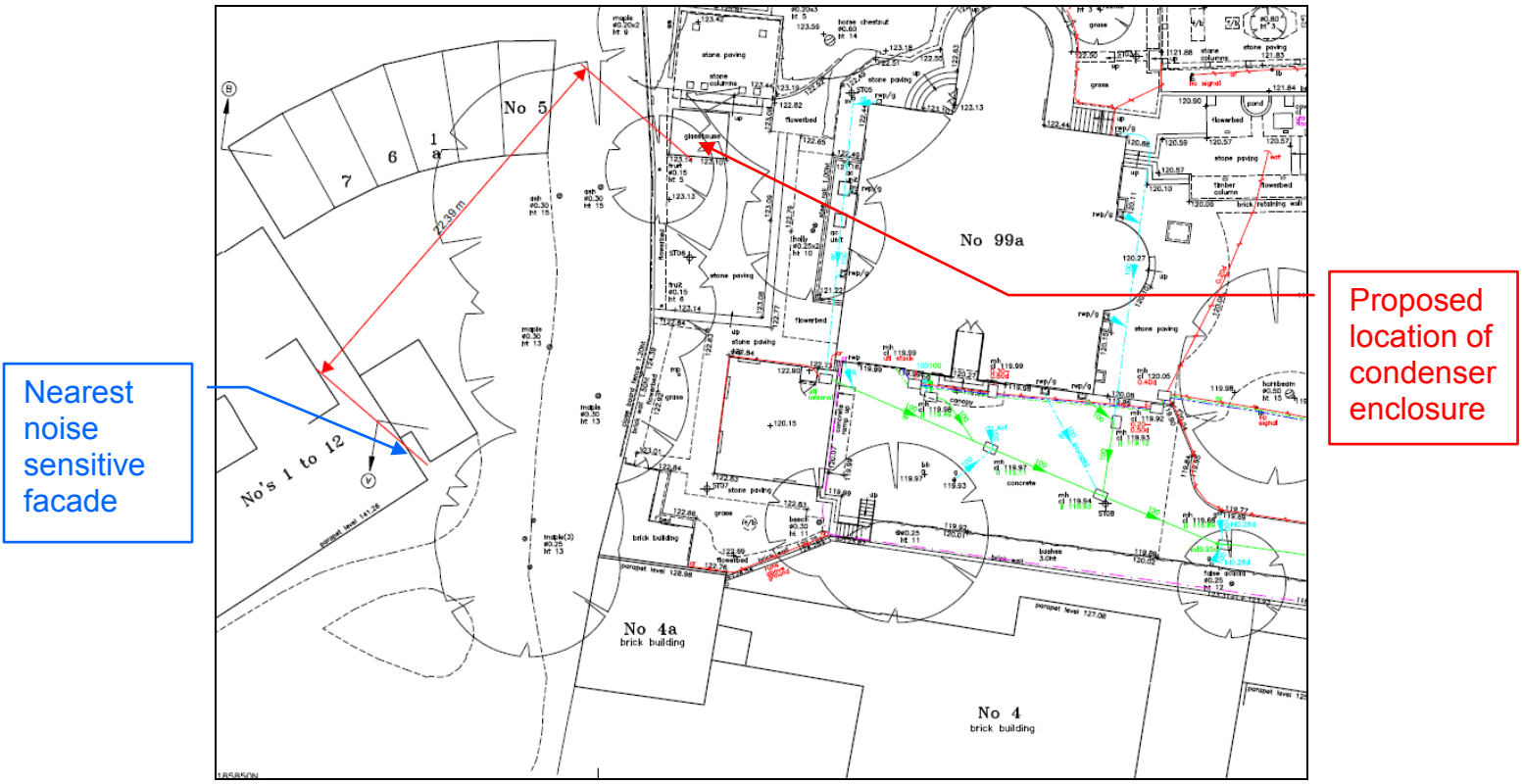

Nearest noise sensitive facade
Proposed location of condenser enclosure
No 5
No 99a
No 4a
brick building
No 4
brick building
No's 1 to 12
22.39 m

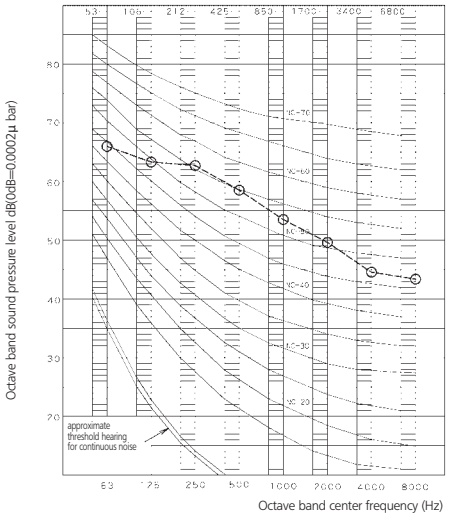
Figure 3

Appendix A

8 Sound data

8 - 1 Sound pressure spectrum

REMQ14,16P9 4D057845



NOTES

1 Over all (dB)
(B,G,N is already rectified)

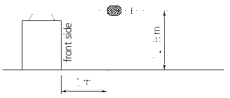
Scale	50Hz
A	60
C	69

2 Operating conditions:
- Power source: Y1: 380-415V 50Hz
- JIS standard

Measuring place: Anechoic chamber (conversion value)

3 The operating sound is measured in anechoic chamber, if it is measured under the actual installation conditions, it is normally over the set value due to enviromental noise and sound reflection.

4 Location of microphone



REYQ18,20,34,36P9 - REYQ22~32,38~48P8

Sound power and pressure (Cooling)

Unit	Sound Power [dBA]	Sound Pressure [dBA]
REYQ18P9	81	61
REYQ20P9	83	62
REYQ22P8	83	63
REYQ24P8	83	63
REYQ26P8	83	63
REYQ28P8	83	63
REYQ30P8	83	63
REYQ32P8	83	63
REYQ34P9	84	64
REYQ36P9	85	64
REYQ38P8	85	65
REYQ40P8	85	65
REYQ42P8	85	65
REYQ44P8	85	65
REYQ46P8	85	65
REYQ48P8	85	65

4TW29127-2A

NOTES

1 Sound power level is an absolute value that a sound source generates.

2 Sound pressure level is a relative value, depending on the distance and acoustic environment. For more details, please refer to the sound level drawings.

3 Mentioned values are theoretical values based on sound results of individual installed units. Possible deviatons for sound values due to variety of installation patterns are not taken into account.

SERIES 15, 27 & 30

Acoustic Weather Louvres

PUBLICATION
LOUVRES 5
APRIL 2012

GILBERTS

SERIES 15,27 & 30

Accoustic Weather Louvres

Introduction

Gilberts acoustic weather louvre ranges interface directly with the exterior fabric of a building in either steelwork frames and cladding or brickwork.
Primarily utilised where a combination of good weathering protection and accurate noise emission control are required, the louvre can be manufactured to accommodate the various dimensional and aesthetic requirements a project may demand. With size ranges from 300 x 300 to 1500-2000 in single assemblies, larger formats can be accommodated by the use of a modular approach to assist on site handling and installation. The louvre is available with a channel frame housing for side or rear fixing and 50mm flange for front face fixing.

Construction

Standard construction comprises of outer casings of not less than 1.2mm galvanised mild steel with outer faces at the top and bottom support sections not less than 0.7mm. Inner absorptive faces will not be less than 0.7mm galvanised perforated mild steel sheet.
Materials and finishes available include stainless steel, anodised aluminium and aluminium with a polyester powder or synthapulvin paint finish to the BS/RAL colour range. The mineral wool acoustic infill is organic, flame, moisture and vermin proof with a minimum density of 48 Kg/m3. It is packed under compression to prevent voids due to settlement. Bird guards or insect screens can be fitted if required.

Performance Data

	Octave bands								
	63	125	250	500	1k	2k	4k	8k	Hz
Series 15 Transmission Loss	4	4	6	9	12	17	11	10	dB
Series 27 Transmission Loss	6	7	10	13	17	19	13	11	dB
Series 30 Transmission Loss	6	6	9	14	21	29	27	27	dB

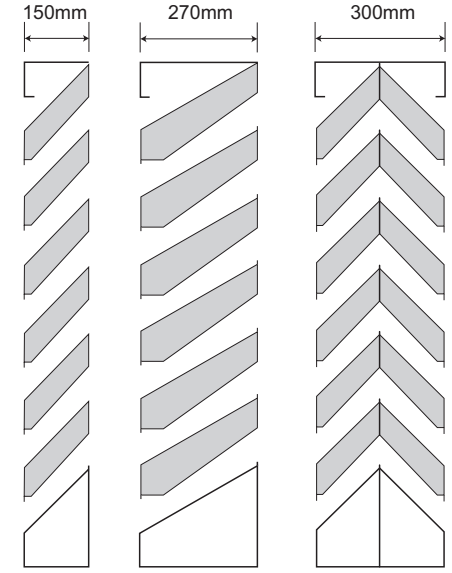
Performance test in accordance with BS 2750:1980

Transmission Loss

This is the acoustic performance (dB) of an acoustic louvre to BS 2750:1980 and is defined as the ratio, in decibels, of acoustic energy transmitted through the louvre sample to that which is incident upon it. Also expressed as Sound Reduction Index SRI.

The aerodynamic performance of single acoustic louvres is as follows:-

Face Velocity (m/s)	Series 15 (N/m^2)(Pa)	Series 27 (N/m^2)(Pa)	Series 30 (N/m^2)(Pa)
1.0	10	10	20
1.5	15	17	27
2.0	20	24	34
2.5	28	35	45
3.0	40	50	56
Weight per m^2(kg)	30	55	60



GILBERTS
Head Office and Works
GILBERTS (BLACKPOOL) LTD
Gilair Works, Clifton Road,
Blackpool.
Lancashire FY4 4QT.
Telephone: (01253) 766911
Fax: (01253) 767941
e-mail: sales@gilbertsblackpool.com
Web: www.gilbertsblackpool.com

Appendix B

Background noise measurements obtained at rear of 99A Frognal, London

No	Date & time	Filename	[hh:mm:ss]	MAX [dB]	MIN [dB]	LEQ [dB]	L10	L90
2	03/10/2013 15:48:12	@FRG0102	00:15:00	70	43	50	50	44
3	03/10/2013 16:03:12	@FRG0103	00:15:00	67	42	50	53	43
4	03/10/2013 16:18:12	@FRG0104	00:15:00	72	41	52	52	43
5	03/10/2013 16:33:12	@FRG0105	00:15:00	71	41	53	54	44
6	03/10/2013 16:48:12	@FRG0106	00:15:00	69	43	51	53	45
7	03/10/2013 17:03:12	@FRG0107	00:15:00	73	43	55	55	45
8	03/10/2013 17:18:12	@FRG0108	00:15:00	74	43	56	56	46
9	03/10/2013 17:33:12	@FRG0109	00:15:00	66	41	50	52	44
10	03/10/2013 17:48:12	@FRG0110	00:15:00	67	43	51	54	44
11	03/10/2013 18:03:12	@FRG0111	00:15:00	66	41	50	53	44
12	03/10/2013 18:18:12	@FRG0112	00:15:00	71	41	53	54	43
13	03/10/2013 18:33:12	@FRG0113	00:15:00	63	40	47	48	42
14	03/10/2013 18:48:12	@FRG0114	00:15:00	67	40	47	49	42
15	03/10/2013 19:03:12	@FRG0115	00:15:00	66	41	48	49	43
16	03/10/2013 19:18:12	@FRG0116	00:15:00	66	40	49	53	42
17	03/10/2013 19:33:12	@FRG0117	00:15:00	61	41	46	49	42
18	03/10/2013 19:48:12	@FRG0118	00:15:00	73	40	52	52	42
19	03/10/2013 20:03:12	@FRG0119	00:15:00	70	40	51	51	42
20	03/10/2013 20:18:12	@FRG0120	00:15:00	74	40	54	51	42
21	03/10/2013 20:33:12	@FRG0121	00:15:00	75	39	55	50	41
22	03/10/2013 20:48:12	@FRG0122	00:15:00	69	39	52	52	41
23	03/10/2013 21:03:12	@FRG0123	00:15:00	65	40	49	52	42
24	03/10/2013 21:18:12	@FRG0124	00:15:00	60	40	44	46	41
25	03/10/2013 21:33:12	@FRG0125	00:15:00	58	39	46	49	41
26	03/10/2013 21:48:12	@FRG0126	00:15:00	69	40	51	51	41
27	03/10/2013 22:03:12	@FRG0127	00:15:00	72	41	54	55	43
28	03/10/2013 22:18:12	@FRG0128	00:15:00	59	43	48	49	45
29	03/10/2013 22:33:12	@FRG0129	00:15:00	78	40	57	50	42
30	03/10/2013 22:48:12	@FRG0130	00:15:00	66	38	47	45	40
31	03/10/2013 23:03:12	@FRG0131	00:15:00	70	38	53	48	40
32	03/10/2013 23:18:12	@FRG0132	00:15:00	56	36	43	46	39
33	03/10/2013 23:33:12	@FRG0133	00:15:00	66	36	48	45	38
34	03/10/2013 23:48:12	@FRG0134	00:15:00	66	36	47	47	39
35	04/10/2013 00:03:12	@FRG0135	00:15:00	47	36	41	43	38
36	04/10/2013 00:18:12	@FRG0136	00:15:00	51	37	41	42	39
37	04/10/2013 00:33:12	@FRG0137	00:15:00	45	35	39	41	37
38	04/10/2013 00:48:12	@FRG0138	00:15:00	45	36	38	40	37
39	04/10/2013 01:03:12	@FRG0139	00:15:00	45	36	39	40	37
40	04/10/2013 01:18:12	@FRG0140	00:15:00	47	37	40	41	38
41	04/10/2013 01:33:12	@FRG0141	00:15:00	47	37	40	41	38

Background noise measurements obtained at rear of 99A Frognal, London

No	Date & time	Filename	[hh:mm:ss]	MAX [dB]	MIN [dB]	LEQ [dB]	L10	L90
42	04/10/2013 01:48:12	@FRG0142	00:15:00	45	37	41	43	39
43	04/10/2013 02:03:12	@FRG0143	00:15:00	48	36	39	41	37
44	04/10/2013 02:18:12	@FRG0144	00:15:00	46	36	40	41	38
45	04/10/2013 02:33:12	@FRG0145	00:15:00	45	36	40	41	38
46	04/10/2013 02:48:12	@FRG0146	00:15:00	49	35	40	42	36
47	04/10/2013 03:03:12	@FRG0147	00:15:00	60	36	41	42	37
48	04/10/2013 03:18:12	@FRG0148	00:15:00	53	36	40	42	38
49	04/10/2013 03:33:12	@FRG0149	00:15:00	52	37	43	46	40
50	04/10/2013 03:48:12	@FRG0150	00:15:00	50	35	41	44	37
51	04/10/2013 04:03:12	@FRG0151	00:15:00	51	36	42	44	39
52	04/10/2013 04:18:12	@FRG0152	00:15:00	49	36	43	46	38
53	04/10/2013 04:33:12	@FRG0153	00:15:00	54	35	43	46	38
54	04/10/2013 04:48:12	@FRG0154	00:15:00	52	36	43	46	39
55	04/10/2013 05:03:12	@FRG0155	00:15:00	50	35	42	44	38
56	04/10/2013 05:18:12	@FRG0156	00:15:00	57	36	46	50	40
57	04/10/2013 05:33:12	@FRG0157	00:15:00	53	38	44	47	40
58	04/10/2013 05:48:12	@FRG0158	00:15:00	55	37	44	46	40
59	04/10/2013 06:03:12	@FRG0159	00:15:00	55	39	46	50	42
60	04/10/2013 06:18:12	@FRG0160	00:15:00	59	39	46	49	41
61	04/10/2013 06:33:12	@FRG0161	00:15:00	59	39	45	48	41
62	04/10/2013 06:48:12	@FRG0162	00:15:00	60	40	46	49	42
63	04/10/2013 07:03:12	@FRG0163	00:15:00	58	40	46	49	42
64	04/10/2013 07:18:12	@FRG0164	00:15:00	60	41	46	48	42
65	04/10/2013 07:33:12	@FRG0165	00:15:00	52	42	46	47	43
66	04/10/2013 07:48:12	@FRG0166	00:15:00	59	41	47	50	43
67	04/10/2013 08:03:12	@FRG0167	00:15:00	64	42	47	49	44
68	04/10/2013 08:18:12	@FRG0168	00:15:00	56	41	47	50	44
69	04/10/2013 08:33:12	@FRG0169	00:15:00	60	44	50	53	45
70	04/10/2013 08:48:12	@FRG0170	00:15:00	57	43	47	49	44
71	04/10/2013 09:03:12	@FRG0171	00:15:00	59	42	47	50	44
72	04/10/2013 09:18:12	@FRG0172	00:15:00	59	42	48	50	44
73	04/10/2013 09:33:12	@FRG0173	00:15:00	54	42	47	50	44
74	04/10/2013 09:48:12	@FRG0174	00:15:00	60	42	48	50	44
75	04/10/2013 10:03:12	@FRG0175	00:15:00	58	41	46	48	44
76	04/10/2013 10:18:12	@FRG0176	00:15:00	62	43	49	52	45
77	04/10/2013 10:33:12	@FRG0177	00:15:00	59	43	49	52	45
78	04/10/2013 10:48:12	@FRG0178	00:15:00	63	44	51	53	47
79	04/10/2013 11:03:12	@FRG0179	00:15:00	59	43	49	52	45
80	04/10/2013 11:18:12	@FRG0180	00:15:00	60	43	49	52	46
81	04/10/2013 11:25:22	@FRG0181	00:07:10	99	43	65	54	45