FRAME, FARRINGDON ROAD

PLANT NOISE ASSESSMENT

Acoustics Report A1234 R01
17th November 2017

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1 Introduction

Ion Acoustics is appointed by gym operator Frame to advise on operational noise from the new AC and air supply plant to service the proposed Frame Gym at 35 Farringdon Road, London. The new plant will be added to an existing servicing yard at the rear of 29-35 Farringdon Road. A planning application is required for this plant and it is expected that a noise assessment will be required. This document is provided to form that planning noise assessment.

Ion Acoustics carried out a baseline noise survey at the site between 13th and 14th November 2017 to measure existing local baseline noise levels. These have been used to derive the noise limits applicable to the proposed plant in line with BS4142:2014 and London Borough of Camden's standard plant noise limits. The noise of the plant has been calculated to the nearby sensitive receptors and compared with the limits. The proposed scheme can meet the noise limits.

2 Scheme Details

2.1 Site Location

Farringdon Point, at 29-35 Farringdon Road is located approximately 70 metres east of Farringdon Station, London. It is located in a mixed residential and commercial area. The nearest sensitive receptor locations are located:

- Within the same scheme of29-35 Farringdon Road in the form of residences on 5th and 6th floors
- Residences at 39 Farringdon Road with rear windows facing the plant
- Residential guest rooms above The One Tun pub to the east on Saffron Hill.

Figure 1 indicates the location of the site in the context of the surrounding area, with the measurement position and nearest sensitive receptors indicated.

The current plant serving other parts of the building is located in a plant area at the rear of the property, abutting Saffron Hill. The proposed plant will be located on a wall separating the rear yard and Saffron Hill. The plant will be therefore facing east across the courtyard and will have some line of sight to north and west facing façades of 29-35 Farringdon Road. The nearest residential windows are the One Tun guest rooms which are 12 metres west from the proposed plant, but are substantially shielded by the wall upon which the plant items will be mounted. The nearest unshielded sensitive receptor, which is the most affected receptor, is on the 5th floor of the westernmost corner of 29-35 Farringdon Road, almost directly above the proposed plant location. Figure 2 indicates the location of and the item of plant and the sensitive receptors. Table 1 shows the distances; the measurements were made on site using a laser rangefinder distance meter.

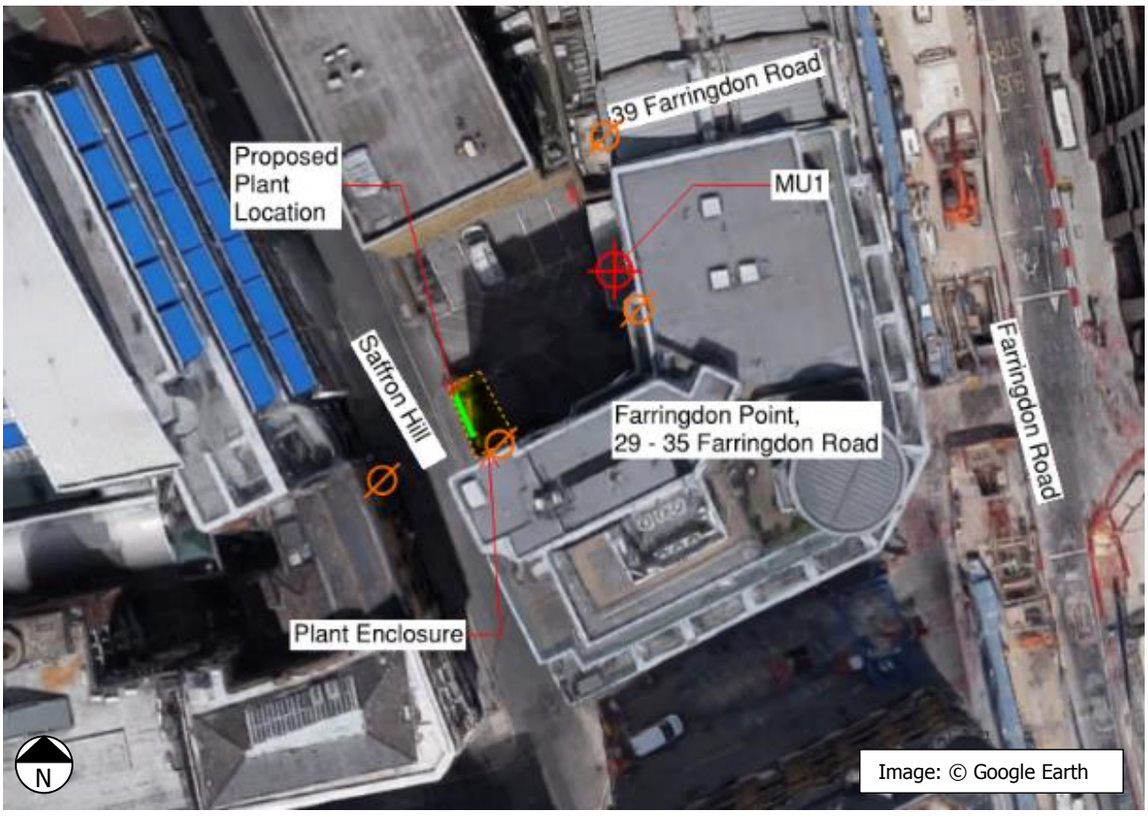


Figure 1 – Site location showing the measurement location and the nearest sensitive receptors

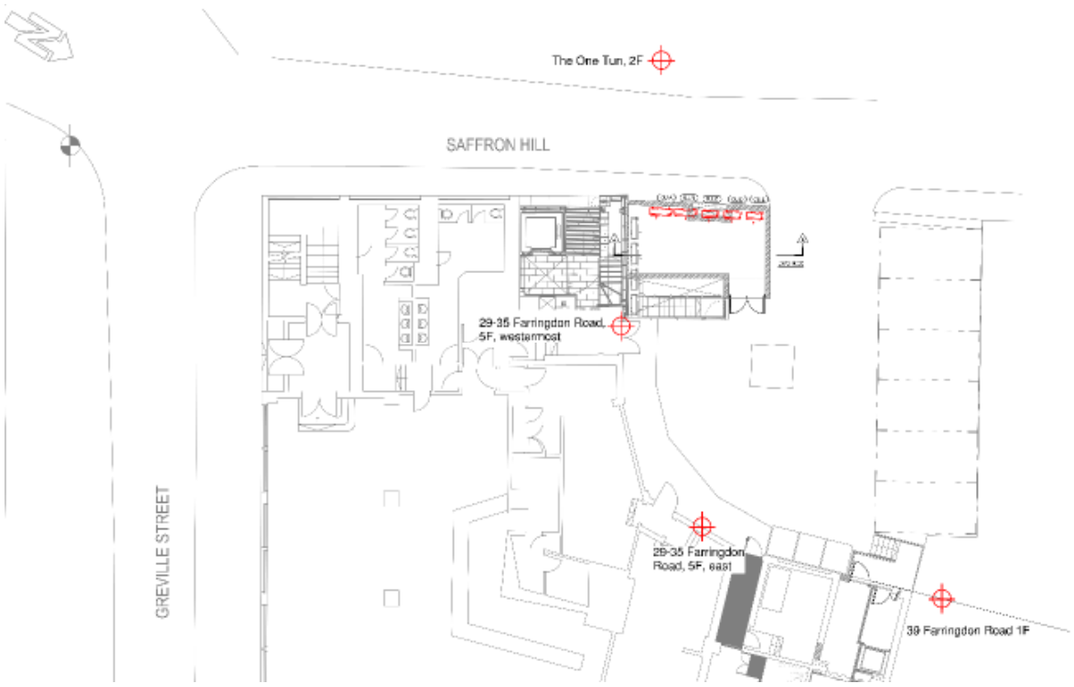


Figure 2 – Site location showing plant location (red) and nearest sensitive receptors

For reference the distances between the proposed condenser location and the receptor locations are presented in Table 1:

Table 1: Receptor Locations and Distance to Noise Sources

Receptor Address	Distance, m
The One Tun, 2nd floor	11
29-35 Farringdon Road, 5th floor, westernmost	16.5
29-35 Farringdon Road, 5th Floor, east	21
39 Farringdon Road, 1st floor	23

2.2 Existing Plant

There are a number of existing plant items in the servicing yard, believed to be serving the public house on the ground floor, as well as offices on the upper floors of 29-35 Farringdon Road. The condenser plant appears to operate on an as-required basis, and has some contribution to the local noise climate, but does not operate continuously. The operation of the existing plant will be unaffected by the proposed plant.

2.3 Proposed Plant

The proposed plant is to be located in the existing servicing yard. The information provided by Lehding Services Design indicates that the new condenser units will be Mitsubishi units, detailed below. Noise data provided is presented in Appendix A of this report. The noise data for the ZRP50 and ZRP35 units is identical. The proposed arrangement of the units is indicated in Figure 3.

Table 2: Mitsubishi Condenser Unit Noise Data

Plant Type	**Number of units**	**Sound Pressure Level (dB lin) at 1m at Octave Band Centre Frequency (Hz)**							**Overall, dBA**
		63	**125**	**250**	**500**	**1000**	**2000**	**4000**	
PUHZ-ZRP100YKA	2	54	54	53	49	46	41	36	51.3
PUHZ-ZRP71VHA	2	53	51	52	43	42	38	33	47.9
PUHZ-ZRP50YKA	1	58	51	45	44	40	37	32	46.0
PUHZ-ZRP35YKA	2								

Figure 3 – Proposed arrangement of new plant (red) and acoustic roof/lid (blue)

3 Planning Guidance

3.1 Local Planning Authority Criteria

Camden Council's Local Plan document states a typical plant noise requirement in Appendix 3, which reads:

> *"A relevant standard or guidance document should be referenced when determining values for LOAEL or SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion."*

The principles of a BS4142:2014 assessment are discussed in the following section.

3.2 BS4142:2014 – Assessment Principles

The standard method for assessing noise of an industrial nature affecting nearby housing is British Standard BS 4142 "Method for rating and assessing industrial and commercial sound". A BS 4142 assessment is made by determining the difference between the intrusive noise under consideration and the background sound level as represented by the L_{A90} parameter, determined

in the absence of the intrusive noise. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time. Therefore, it represents the underlying noise in the absence of short-term events. BS4142:2014 states: *'In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods'*.

The intrusive noise under consideration is assessed in terms of the ambient noise level, L_{Aeq}, but a character correction penalty can be applied where the noise exhibits certain characteristics such as distinguishable tones, impulsiveness or, if the noise is distinctively intermittent. The ambient noise level, L_{Aeq} is defined as the steady-state noise level with the same energy as the actual fluctuating sound over the same time period. It is effectively the average noise level during the period. The plant noise level (L_{Aeq}) with the character correction (if necessary) is known as rating level, L_{Ar}, and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The standard then states:

- *"Typically, the greater the difference, the greater the magnitude of the impact.*
- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

The standard outlines a number of methods for defining appropriate 'character corrections' to determine the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency.

The standard also highlights the importance of considering the context in which a sound occurs. The standard indicates that factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise impact.

4 Noise Survey

A baseline noise survey was carried out over the period 13th to 14th November 2017, to determine the local noise climate and hence derive plant noise limits. The measurements were made on a 1st floor flat roof at the rear of the property, as indicated in Figure 1. The measurement position was considered representative of noise levels at nearby residential properties.

A Larson Davis LD820 sound level meter with a BAP 21 weatherproof windshield was used for this survey, with the microphone mounted at approximately 1.5 metres above the roof level. The sound level meter was set to log data at 15 minute intervals. A photograph of the measurement

location is shown in Figure 4. The microphone was 1m away from the vertical reflecting surface of the building façade and therefore the measurements made are façade levels.

Figure 4 – Measurement location MU1, facing south-west

Figure 4 shows a view to the blank wall where the new plant is proposed and the bank of existing plant on the wall of the building.

On setup, the weather was dry, with 90% cloud cover, and no discernible wind and a temperature of 8°C. On collection the conditions were mild and dry; cloud cover was 100%, with a temperature of 11°C and again no discernible wind. The measurement period was selected as the weather forecast for the duration of the survey was for low wind speeds and dry conditions and the weather would have had no significant impact on the noise levels measured.

All measurement equipment was calibrated with a Brüel & Kjær Type 4231 calibrator prior to and upon completion of the survey. The calibration level between start and finish was within acceptable tolerances.

5 Survey Results

5.1 Noise Results – Unattended Survey

The noise levels measured over the whole survey period are shown in Figure 5 and tabulated in Appendix B.

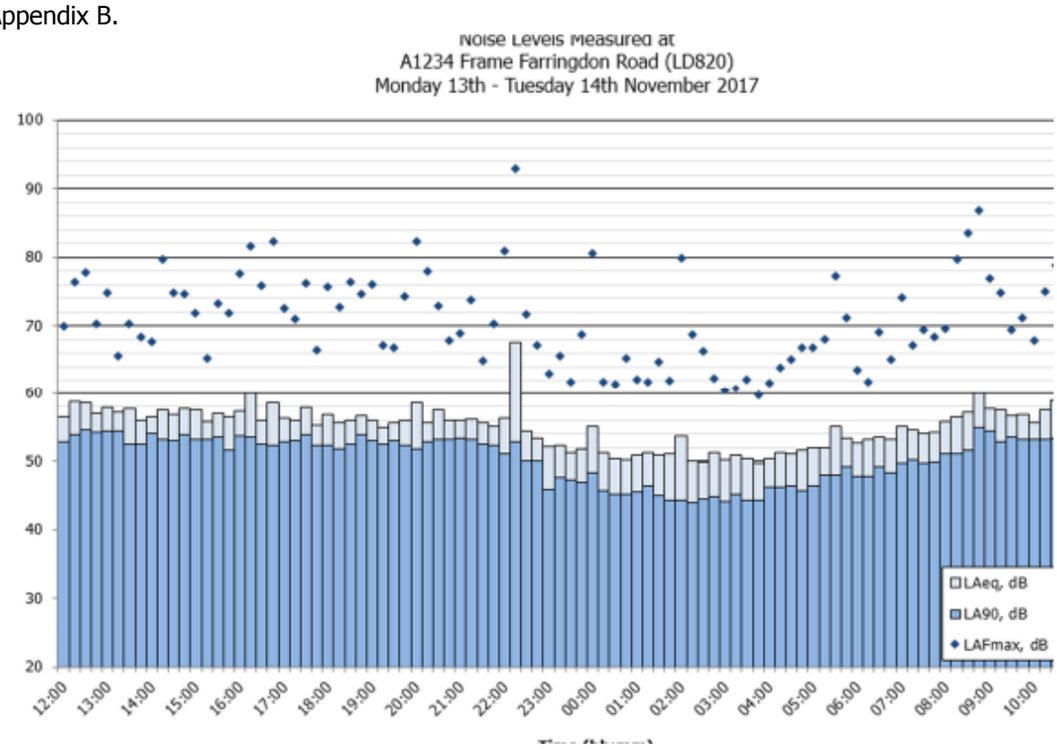


Figure 5 – Noise Monitoring Data for Location MU1

The noise climate in the rear yard is dictated primarily by nearby road traffic, local activity and the existing plant associated with Farringdon Point and other buildings on Saffron Hill. It is uncertain what caused the peak at 22:15, however the L_{A90} value remains largely unaffected, and the L_{Aeq} and L_{AFmax} values are of no consequence in this assessment. Overall the background noise environment is quite stable throughout the measurement period, with an expected roll-off during the night hours due to reduced road traffic and local activity. It was noted that the existing plant appeared to operate on an as-required basis, and it is likely there is less of a need for it during the night hours.

Table 3 summarises the measured noise levels during the proposed operating hours and Figure 6 shows the distribution of the LA90 values. The gym would not open until 06.30 hrs, but at times the plant may need to run up to half an hour before opening to bring the studios up to temperature; therefore the period 06.00 to 21.30 is used to determine the background noise levels.

Table 3: Measured Noise Data (corrected to free field)

Period	Duration hh:mm:ss	Ambient Sound Level, L_{Aeq}, dB	Background Sound Level, L_{A90}, dB	
			Mode	Typical
Operating hours 06:00 – 21:30	15:30:00	56.7	53	52

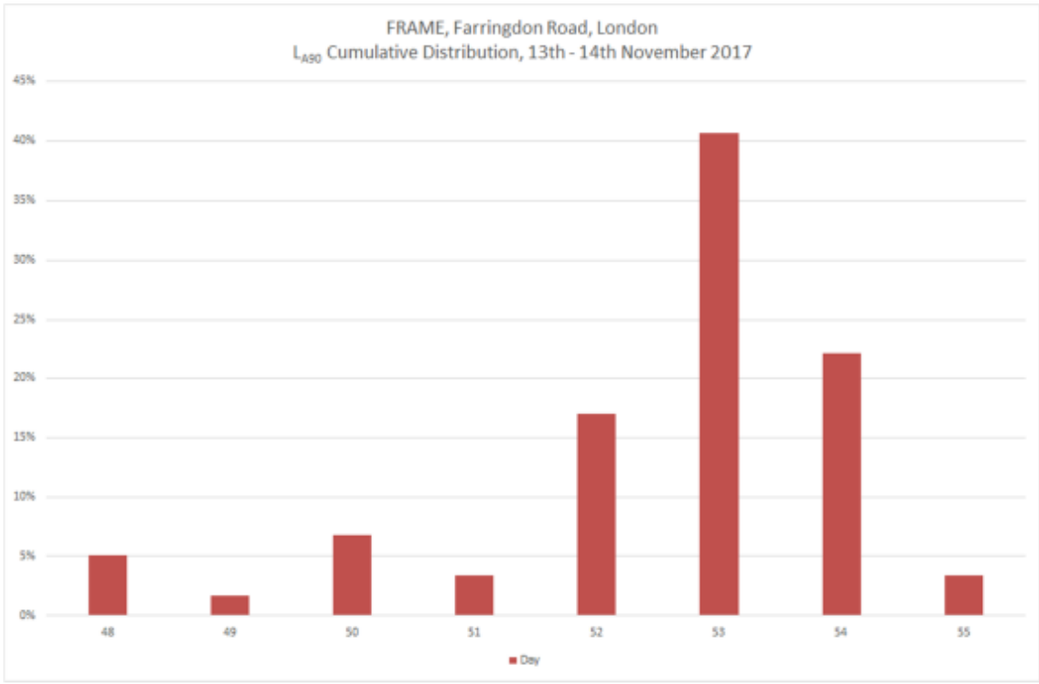


Figure 6 – Cumulative Distribution of LA90 values

5.2 Noise Limits

The plant noise limits has been derived in accordance with BS4142:2014 as specified in Camden Council's Local Plan detailed above, i.e. operational noise from plant should be at least 10dB below the existing background sound level (L_{A90}). Table 4 below presents the typical background sound level during the relevant periods and the noise limits in accordance with the Local Plan requirement. Typically, during the applicable period the typical background is described by the mode of the 15 minute L_{A90} values. However in this case, a lower value of 52dB L_{A90} has been used instead of the most occurring as it was deemed more representative.

Table 4: Proposed Noise Limit

Period	Typical L_{A90}	Limit ref L_{A90}	Noise limit (L_{Ar})
Operating hours 06:00 – 21:30	52 dB	-10 dB	42 dB

6 Calculations

6.1 Noise Level at Receptors

Calculations have been prepared to determine plant noise levels at the closest sensitive receptors. Plant sound pressure levels have been provided by the supplier and are indicated in the calculation sheets. The provided noise datasheet does not indicate any tonal qualities and it is not common for a well maintained condenser to be considered tonal, and the unit will not, within its specific operational periods, be used in an intermittent manner, therefore no character corrections have been added.

The original proposals comprised five condenser units, with the two ZRP100 replacing one ZRP200 unit, and the two ZRP71 units replacing the single ZRP140 unit. Initial scoping calculations found that the higher noise levels emitted by the larger units meant the appropriate noise limits could not be met. Therefore the submission is on the basis of the revised scheme as set out in this report.

The calculations include conservative shielding and directivity corrections. The noise limits would be slightly exceeded at the flats on 5th floor of Farringdon Point which are closest. Therefore the proposed scheme include a lid/roof over the plant array, extending 1 metre out from the wall and 0.5m either side. This will provide shielding between the upper most units to upper floors. This lid/roof is required to provide 3dB attenuation only, and therefore can be a single sheet of weather proof plywood, a metal sheet construction or other non-perforate element.

Noise levels have been predicted to receptors identified in Table 1 above. The results are summarised in Table 5 below. The full calculations are presented in Appendix C.

Table 5: Resultant Sound Pressure Levels at the receptors with all plant operating

Receptor	Calculated Specific Noise Level, L_{As}, dB	Rating noise Level, L_{Ar}, dB	Noise limit, dB	Difference, dB
The One Tun, 2nd Floor	34	34	42	-8
29-35 Farringdon Road, west, 5th Floor	41	41	42	-2
29-35 Farringdon Road, east, 5th Floor	42	42	42	0
39 Farringdon Road, 1st floor	42	42	42	0

Table 11 above shows that the noise levels generated by the proposed plant can, with the attenuation assumed, meet the noise limits with a margin of between 0dB and 8dB below the relevant noise limit. As such the proposed plant would comply with the requirements of Camden Council's Local Plan. It is noted that the plant rating level would also be more than 5dB below the lowest background level measured in the period too, which indicates that the plant levels would be acceptable and would also comply with the recently superseded LB Camden criteria for plant emissions limits.

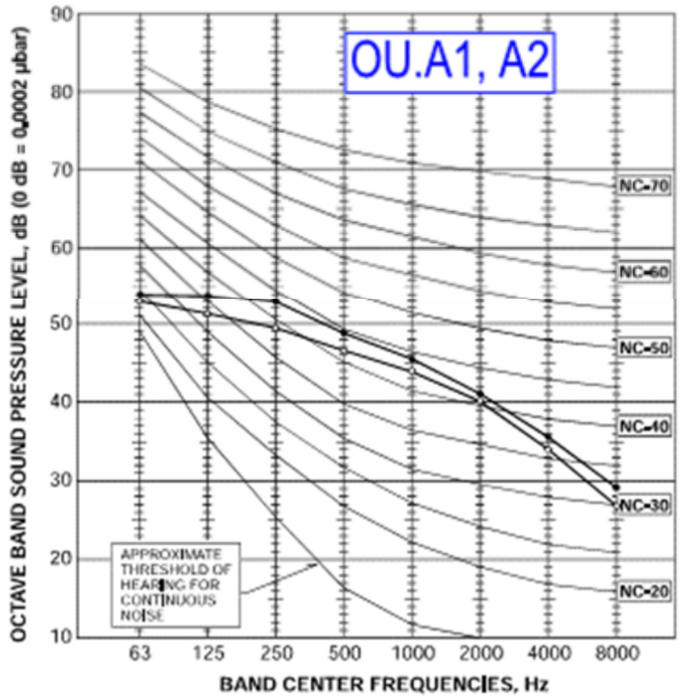
7 Summary

A noise assessment has been carried out to assess the noise impact of proposed new plant serving a development at 29-35 Farringdon Road, London, on nearby residential properties. The assessment has been informed by a noise survey carried out at the site between the 13th and 14th November 2017 and calculations based on information provided by the mechanical services engineer. The calculations show that noise generated by the proposed condenser units can comply with the noise limits stipulated in Camden Council's Local Plan and therefore will not have an unacceptable impact on the nearest noise sensitive properties.

Given the above, there are no reasons why, on noise grounds, the development should not be granted planning permission.

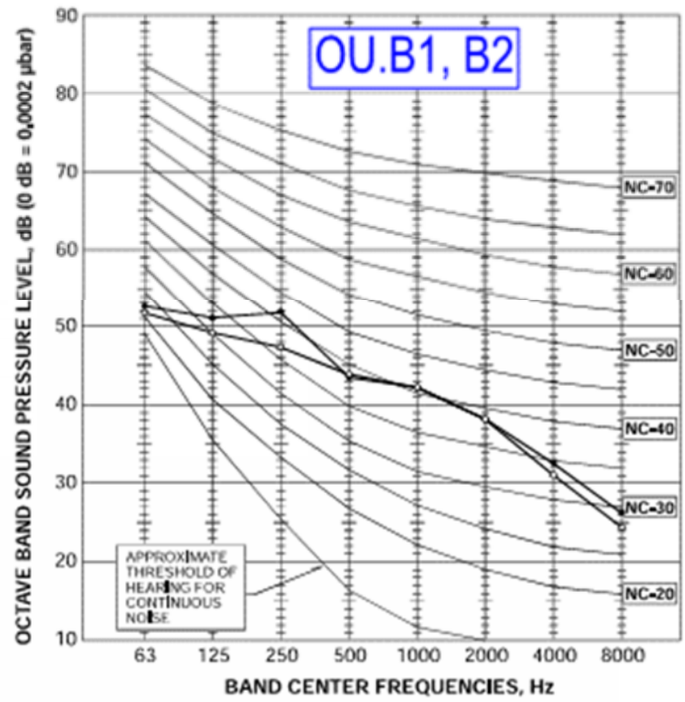
PUHZ-ZRP100VKA
PUHZ-ZRP100YKA

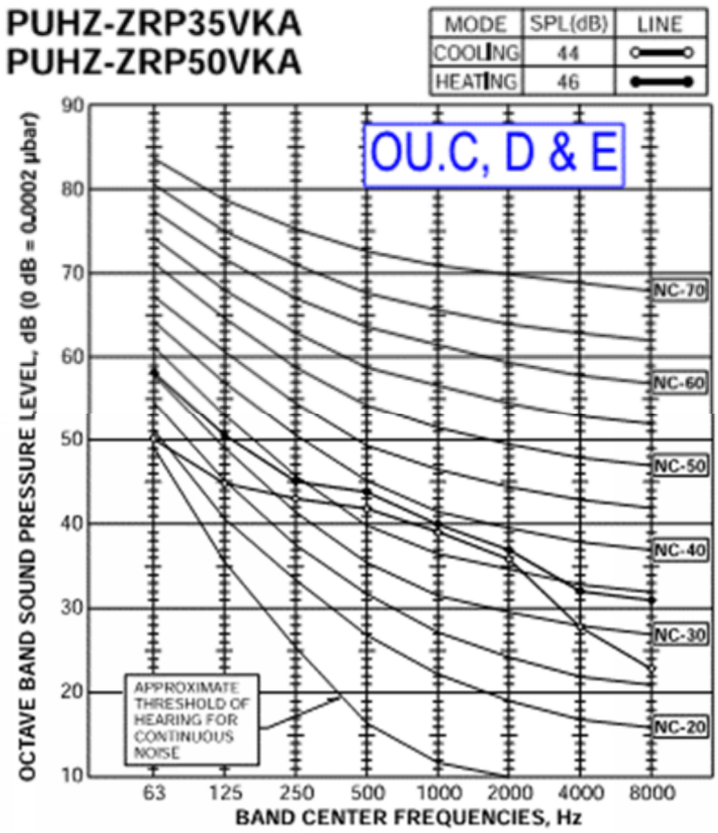
MODE	SPL(dB)	LINE
COOLING	49	
HEATING	51	



PUHZ-ZRP60VHA
PUHZ-ZRP71VHA

MODE	SPL(dB)	LINE
COOLING	47	
HEATING	48	




PUHZ-ZRP35VKA
PUHZ-ZRP50VKA
MODE
SPL(dB)
LINE
COOLING
44
HEATING
46
OU.C, D & E
OCTAVE BAND SOUND PRESSURE LEVEL, dB (0 dB = 0.0002 µbar)
90
80
70
60
50
40
30
20
10
NC-70
NC-60
NC-50
NC-40
NC-30
NC-20
APPROXIMATE THRESHOLD OF HEARING FOR CONTINUOUS NOISE
63
125
250
500
1000
2000
4000
8000
BAND CENTER FREQUENCIES, Hz

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
13/11/2017 12:15	58.7	76.3	53.8	14/11/2017 00:15	51.3	61.7	45.6
13/11/2017 12:30	58.5	77.8	54.5	14/11/2017 00:30	50.4	61.4	45.1
13/11/2017 12:45	56.9	70.3	54.1	14/11/2017 00:45	50.2	65.2	45.2
13/11/2017 13:00	57.9	74.7	54.4	14/11/2017 01:00	50.9	62.0	45.4
13/11/2017 13:15	57.1	65.6	54.4	14/11/2017 01:15	51.3	61.7	46.3
13/11/2017 13:30	57.6	70.3	52.5	14/11/2017 01:30	50.8	64.7	45.0
13/11/2017 13:45	55.9	68.3	52.5	14/11/2017 01:45	51.1	61.9	44.2
13/11/2017 14:00	56.5	67.7	54.0	14/11/2017 02:00	53.6	79.8	44.2
13/11/2017 14:15	57.5	79.7	53.1	14/11/2017 02:15	50.0	68.7	43.9
13/11/2017 14:30	56.7	74.7	53.0	14/11/2017 02:30	49.8	66.3	44.4
13/11/2017 14:45	57.6	74.6	53.9	14/11/2017 02:45	51.3	62.3	44.8
13/11/2017 15:00	57.5	71.9	53.1	14/11/2017 03:00	50.2	60.3	44.1
13/11/2017 15:15	55.8	65.3	53.2	14/11/2017 03:15	50.8	60.7	45.2
13/11/2017 15:30	56.9	73.3	53.5	14/11/2017 03:30	50.3	62.0	44.3
13/11/2017 15:45	56.5	71.9	51.6	14/11/2017 03:45	49.6	59.7	44.2
13/11/2017 16:00	57.3	77.5	53.6	14/11/2017 04:00	50.3	61.5	46.2
13/11/2017 16:15	59.9	81.5	53.5	14/11/2017 04:15	51.3	63.8	46.1
13/11/2017 16:30	56.0	75.8	52.4	14/11/2017 04:30	51.0	65.0	46.4
13/11/2017 16:45	58.6	82.3	52.3	14/11/2017 04:45	51.5	66.7	45.7
13/11/2017 17:00	56.3	72.5	52.8	14/11/2017 05:00	51.9	66.7	46.3
13/11/2017 17:15	56.0	71.0	53.0	14/11/2017 05:15	51.9	68.0	47.9
13/11/2017 17:30	57.8	76.2	53.9	14/11/2017 05:30	55.1	77.2	47.9
13/11/2017 17:45	55.3	66.5	52.2	14/11/2017 05:45	53.3	71.1	49.1
13/11/2017 18:00	56.8	75.6	52.3	14/11/2017 06:00	52.6	63.5	47.8
13/11/2017 18:15	55.6	72.7	51.8	14/11/2017 06:15	53.1	61.8	47.7
13/11/2017 18:30	56.0	76.4	52.4	14/11/2017 06:30	53.4	69.1	49.1
13/11/2017 18:45	56.6	74.6	53.9	14/11/2017 06:45	53.1	65.0	48.3
13/11/2017 19:00	55.9	76.0	52.9	14/11/2017 07:00	55.1	74.1	49.7
13/11/2017 19:15	54.9	67.2	52.5	14/11/2017 07:15	54.5	67.2	50.2
13/11/2017 19:30	55.6	66.8	53.0	14/11/2017 07:30	54.0	69.4	49.6
13/11/2017 19:45	55.9	74.3	52.3	14/11/2017 07:45	54.1	68.4	49.9
13/11/2017 20:00	58.6	82.3	51.7	14/11/2017 08:00	55.8	69.5	51.1
13/11/2017 20:15	55.6	77.9	52.7	14/11/2017 08:15	56.5	79.6	51.1
13/11/2017 20:30	57.5	72.8	53.1	14/11/2017 08:30	57.1	83.4	51.6
13/11/2017 20:45	55.9	67.8	53.1	14/11/2017 08:45	59.9	86.8	54.9
13/11/2017 21:00	56.0	68.9	53.3	14/11/2017 09:00	57.7	76.8	54.3
13/11/2017 21:15	56.1	73.7	53.1	14/11/2017 09:15	57.5	74.8	52.7
13/11/2017 21:30	55.6	64.8	52.5	14/11/2017 09:30	56.6	69.4	53.5
13/11/2017 21:45	55.0	70.3	52.2	14/11/2017 09:45	56.7	71.2	53.2
13/11/2017 22:00	56.2	80.9	51.1	14/11/2017 10:00	55.6	67.8	53.1
13/11/2017 22:15	67.6	92.9	52.7	14/11/2017 10:15	57.4	75.0	53.2
13/11/2017 22:30	54.3	71.7	50.0	14/11/2017 10:30	58.8	78.8	53.3
13/11/2017 22:45	53.3	67.1	50.0	14/11/2017 10:45	56.8	75.9	53.2
13/11/2017 23:00	52.1	62.9	45.8				
13/11/2017 23:15	52.3	65.6	47.5				
13/11/2017 23:30	51.3	61.8	47.3				
13/11/2017 23:45	51.7	68.7	46.8				
14/11/2017 00:00	55.0	80.5	48.2				

Calculations to The One Tun pub, 2nd Floor

To The One Tun, 2F		63	125	250	500	1000	2000	4000	dB(A)	
OU.A1	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	33.6	32.6	30.6	25.6	22.6	17.6	12.6	28.2	
OU.A2	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	33.6	32.6	30.6	25.6	22.6	17.6	12.6	28.2	
OU.B1	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	32.6	29.6	29.6	19.6	18.6	14.6	9.6	25.0	
OU.B2	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	32.6	29.6	29.6	19.6	18.6	14.6	9.6	25.0	
OU.C	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	37.6	29.6	22.6	20.6	16.6	13.6	8.6	23.0	
OU.D	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	37.6	29.6	22.6	20.6	16.6	13.6	8.6	23.0	
OU.E	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	11.0
Shielding	dB	-10	-10	-10	-10	-10	-10	-10		
Distance correction	dB	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4		
At receptor	dB	37.6	29.6	22.6	20.6	16.6	13.6	8.6	23.0	
At receptor	dB	44.0	39.1	36.7	31.0	28.1	23.8	18.8	34.1	
Noise limit	dB					LA90	52	-10	42	-7.9

Calculations to 29-35 Farringdon Road, Nearest 5th Floor Window

To Farringdon Point 5F nearest		63	125	250	500	1000	2000	4000	dB(A)	
OU.A1	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	15.5
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9		
At receptor	dB	39.1	38.1	36.1	31.1	28.1	23.1	18.1	33.7	
OU.A2	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	16.3
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-12.1	-12.1	-12.1	-12.1	-12.1	-12.1	-12.1		
At receptor	dB	41.9	40.9	38.9	33.9	30.9	25.9	20.9	36.5	
OU.B1	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	16.0
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0		
At receptor	dB	38.0	35.0	35.0	25.0	24.0	20.0	15.0	30.4	
OU.B2	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	17.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3		
At receptor	dB	40.7	37.7	37.7	27.7	26.7	22.7	17.7	33.1	
OU.C	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	17.5
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4		
At receptor	dB	42.6	34.6	27.6	25.6	21.6	18.6	13.6	28.0	
OU.D	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	18.0
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6		
At receptor	dB	42.4	34.4	27.4	25.4	21.4	18.4	13.4	27.9	
OU.E	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	Dist	18.5
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-12.7	-12.7	-12.7	-12.7	-12.7	-12.7	-12.7		
At receptor	dB	42.3	34.3	27.3	25.3	21.3	18.3	13.3	27.8	
At receptor	dB	49.7	45.6	43.5	37.6	34.8	30.4	25.4	40.7	

Calculations to 29-35 Farringdon Road, 5th Floor Across the Yard

To Farringdon Point 5F across		63	125	250	500	1000	2000	4000	dB(A)	
OU.A1	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	21.0
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	37.8	37.8	36.8	32.8	29.8	24.8	19.8	35.0	
OU.A2	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	40.8	40.8	39.8	35.8	32.8	27.8	22.8	38.0	
OU.B1	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	36.8	34.8	35.8	26.8	25.8	21.8	16.8	31.7	
OU.B2	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	39.8	37.8	38.8	29.8	28.8	24.8	19.8	34.7	
OU.C	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	41.8	34.8	28.8	27.8	23.8	20.8	15.8	29.8	
OU.D	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	41.8	34.8	28.8	27.8	23.8	20.8	15.8	29.8	
OU.E	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	Dist	21.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	41.8	34.8	28.8	27.8	23.8	20.8	15.8	29.8	
At receptor	dB	48.9	45.6	44.4	39.5	36.7	32.3	27.3	42.2	

Calculations to 39 Farringdon Road, 1st Floor

To 39 Farringdon Road 1F		63	125	250	500	1000	2000	4000	dB(A)	
OU.A1	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	0.0	-1.0	-1.0	-2.0	-2.0	-3.0	Dist	24.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.8	-13.8	-13.8	-13.8	-13.8	-13.8	-13.8		
At receptor	dB	40.2	40.2	38.2	34.2	30.2	25.2	19.2	36.1	
OU.A2	dB	54.0	54.0	53.0	49.0	46.0	41.0	36.0		
Directivity	dB	0.0	0.0	-1.0	-1.0	-2.0	-2.0	-3.0	Dist	24.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.8	-13.8	-13.8	-13.8	-13.8	-13.8	-13.8		
At receptor	dB	40.2	40.2	38.2	34.2	30.2	25.2	19.2	36.1	
OU.B1	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	23.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6		
At receptor	dB	39.4	37.4	38.4	29.4	28.4	24.4	19.4	34.3	
OU.B2	dB	53.0	51.0	52.0	43.0	42.0	38.0	33.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	23.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6		
At receptor	dB	39.4	37.4	38.4	29.4	28.4	24.4	19.4	34.3	
OU.C	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	22.0
Shielding	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Distance correction	dB	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4		
At receptor	dB	44.6	37.6	31.6	30.6	26.6	23.6	18.6	32.6	
OU.D	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	21.5
Shielding	dB	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Distance correction	dB	-13.3	-13.3	-13.3	-13.3	-13.3	-13.3	-13.3		
At receptor	dB	41.7	34.7	28.7	27.7	23.7	20.7	15.7	29.7	
OU.E	dB	58.0	51.0	45.0	44.0	40.0	37.0	32.0		
Directivity	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Dist	21.0
Shielding	dB	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0		
Distance correction	dB	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2		
At receptor	dB	39.8	32.8	26.8	25.8	21.8	18.8	13.8	27.8	
At receptor	dB	49.6	46.3	44.7	39.6	36.3	32.1	26.7	42.2	