

THE LORE OF THE LAND, FITZROVIA

PLANT NOISE IMPACT ASSESSMENT

On behalf of:

The Fat Boy Pub Co.



Report No P18-171-R01v6 September 2018

# THE LORE OF THE LAND, FITZROVIA PLANT NOISE IMPACT ASSESSMENT

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> On behalf of: The Fat Boy Pub Co.

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# **CONTENTS**

1.0	INTRODUCTION	1
2.0	ACOUSTIC DESIGN CRITERIA	2
3.0	ENVIRONMENTAL NOISE SURVEY	3
4.0	ASSESSMENT	5
5.0	CONCLUSION	ç
FIGUF	RE 1 – LOCATION PLAN	10
APPEI	NDIX I: NOISE UNITS & INDICES	11
APPEI	NDIX II: NOISE SURVEY RESULTS	13
APPEI	NDIX III: NOISE CALCULATIONS	14

## 1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by The Fat Boy Pub Co. to carry out a noise impact assessment of the proposed new mechanical equipment to be installed at The Lore of the Land public house (formerly The Lukin), 4 Conway Street, Fitzrovia, London W1T 6BB.

1.2 The assessment has been commissioned in connection with the planning application for the proposed development. The aim of this report is to assess whether the existing and proposed new equipment will meet suitable limits for noise, and to make recommendations for noise mitigation where required.

1.3 The site is bounded by Conway Street to the south west. To the south east is Rebecca Hossack Art Gallery. The other buildings in the vicinity include offices and private residences. The most affected noise-sensitive premises, to the best of our knowledge, are the flats in County House. We have also taken into consideration the residences on Conway Street and Maple Street, the rear windows of which overlook The Lore of the Land and the location of the existing and proposed equipment. Other residences are further away so will be less affected. A location plan is shown in Figure 1.

1.4 The three existing condensers on the first-floor flat roof to the rear of the premises are proposed to be replaced with new, quieter, models and relocated to the third-floor flat roof. One new condenser is proposed to be added, serving the cellar. The new cellar condenser can operate intermittently at any time, according to demand. The three condensers being relocated are for air-conditioning so can potentially operate during the premise's opening hours, but will not be used outside of these times.

1.5 There will be also be new kitchen extract and supply fans installed within the existing pitched roof void.

The new inlet louvre is on the rear wall of the premises, and the new outlet (extract) comes through the new office window and discharges a minimum of 1 metre above eaves level on the north-east side of the roof. This is expected to operate from around 10:00 to 23:00 daily.

1.6 The existing kitchen ventilation system and two heat dumps to the rear of the premises will remain in situ. We have been requested by Camden Council also to consider the noise impact of this existing equipment. The existing kitchen ventilation system will have up to the same operating hours as the new kitchen ventilation system noted above. For assessment purposes, we have assumed for a cautious approach that the heat dumps can switch on at any time, although in practice they are unlikely to operate at night.

1.7 This assessment is based on drawing 3175/35, Revision J, from Pembrook Design, dated 14<sup>th</sup> September 2018.

1.8 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC DESIGN CRITERIA

**Camden Council** 

2.1 Camden Council has the following guidance in Camden Planning Guidance: Amenity, dated March

2018:

Developments proposing plant, ventilation, air extraction or conditioning equipment and flues

will need to provide the system's technical specifications to the Council accompanying any

acoustic report. 'BS4142 Method for rating Industrial and Commercial Sound'i [SIC] contains

guidance and standards which should also be considered within the acoustic report.

2.2 The following additional guidance is included for industrial and commercial noise sources in Appendix

3: Noise Thresholds of the Camden Local Plan 2017:

A relevant standard or guidance document should be referenced when determining values for

LOAEL and 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'i (BS 4142) will be used. For such cases a 'Rating Level's of 10 dB below background (15 dB if tonal components are present) should be considered as the design

criterion.

2.3 BS 4142: 2014 Methods for rating and assessing industrial and commercial sound provides methods

for rating and assessing sound of an industrial and/or commercial nature.

2.4 BS 4142 requires the 'rating'; noise level for the operation to be compared with the background ( $L_{A90}$ )

noise level in the absence of the operational noise being assessed.

2.5 The 'rating' level is derived based on the 'specific' L<sub>Aeq</sub> noise level attributable to the operation with an

 $\verb|`acoustic feature|'; penalty added for any noise sources which give rise to tonal, impulsive, intermittent,$ 

or other characteristics readily distinctive against the residual acoustic environment.

2.6 In the context of this development, we consider the guidance in BS 4142: 2014 to be appropriate so

this will be adopted, along with Camden Council's 'Rating Level's criteria stated above.

2.7 Camden's Development Policy 28 (Noise and Vibration) recommends that noise levels from plant and

machinery at 1 metre external to a sensitive façade should be < 5 dB(A) below background noise levels,

or < 10 dB(A) below if the noise has a distinguishable discrete continuous note or distinct impulses.

Page 2 of 16

Report No: P18-171-R01v6

## 3.0 ENVIRONMENTAL NOISE SURVEY

## **Survey Details and Results**

- 3.1 Environmental noise measurements were carried out at the site at Location 1 marked on Figure 1, which is on the third-storey flat roof to the rear of the premises.
- 3.2 The description and measurement of environmental noise has been carried out in accordance with the guidance in BS 7445 *Description and measurement of environmental noise*, as stipulated in the *Camden Local Plan 2017*.
- 3.3 Noise measurements were taken between 19:45 on Tuesday 17<sup>th</sup> April and 14:45 on Thursday 19<sup>th</sup> April 2018.
- 3.4 The weather conditions throughout the noise survey were dry and overcast, with wind speeds below 5 m/s. Wind was from the south and east. Temperatures were between 10°C and 18°C. These were considered suitable conditions for the survey.
- 3.5 The noise measurements were taken in 'free-field' conditions with the microphone at approximately 1.5 metres above the level of the third storey flat roof. Measurements were taken in 15-minute samples for the duration of the survey.
- The results of the noise survey are detailed in Appendix II in graphical form. The measured noise levels are summarised in Table 1.

Table 1: Background Noise Levels Summary (dBA)

Location	Daytime (07	:00 to 23:00)	Night-time (2	3:00 to 07:00)		
Location	Lowest L <sub>A90,15mins</sub>	Modal L <sub>A90,15mins</sub>	Lowest L <sub>A90,15 mins</sub>	Modal L <sub>A90,15 mins</sub>		
1	48	55	44	46		

3.7 The lowest measured noise level while the kitchen ventilation system, heat dumps, and condensers will be operating together (10:00 to 23:00) was 48 dB L<sub>A90,15mins</sub>. The lowest measured noise level while the heat dumps and condenser only will be operating (23:00 to 10:00) was 44 dB L<sub>A90,15mins</sub>.

# **Noise Sources**

3.8 The dominant noise source during the day was noise from the existing mechanical plant located to the rear of the premises. The influence of the noise from the existing kitchen extract fan is noticeable

The Fat Boy Pub Co. The Lore of the Land, Fitzrovia

between 10:00 and 21:00 in the chart in Appendix II.

3.9 When the kitchen extract fan was not running, local road traffic became the dominant noise source.

**Sound Level Meter Details** 

3.10 The noise monitoring was carried out using a Rion NL-31 Type 1 sound level meter (serial no. 01120844). The calibration level of the meter was checked before and after the survey with a Brüel & Kjær Type 4231 sound calibrator (serial no. 2412667). No significant calibration deviation was observed.

# 4.0 ASSESSMENT

## **Equipment Noise Data**

4.1 The manufacturer's sound power level data by octave band of the proposed new equipment is shown in Table 2a. The measured sound pressure levels of the existing equipment are shown in Table 2b.

Table 2a: Proposed Equipment Octave Band Sound Power Level Data, dB Lw

Equipment	Tune		Octa	ve Ban	d Centi	re Fre	quen	ncy (Hz)	
Equipment	Type	63	125	250	500	1k	2k	4k	8k
Condenser A	Daikin RZASG100MV1	58	58	66	67	66	63	59	51
Condenser B	Daikin RZASG100MV1	58	58	66	67	66	63	59	51
Condenser C	Daikin RZASG125MV1	60	60	64	66	67	62	58	51
Cellar Condenser	TeCool E050H	58	56	62	62	62	60	55	50
New Kitchen	Systemair MUBT 062 560 EC outlet	67	69	73	75	74	71	66	59
Extract	Systemair MUBT 062 560 EC surroundings	50	51	56	58	57	54	49	42
New Vitaban Supply	Systemair MUBT 062 560 EC inlet	65	67	71	73	72	69	64	57
New Kitchen Supply	Systemair MUBT 062 560 EC surroundings	50	51	56	58	57	54	49	42

Table 2b: Existing Equipment Octave Band Sound Pressure Level Data, dB Lp

Equipment	Tuno		Octave Band Centre Frequency (Hz)							
Equipment	Туре	63	125	250	500	1k	2k	4k	8k	
Heat Dump 1	Cornelius 12 Watt @ 5 m	35	37	37	39	44	42	35	31	
Heat Dump 2	Cornelius 12 Watt @ 5 m	35	37	37	39	44	42	35	31	
Existing Kitchen	Lindab Ventilation outlet @ 2 m	57	59	63	65	64	61	56	49	
Extract	Lindab Ventilation surroundings @ 2 m	47	48	54	55	54	51	46	38	

4.2 Based on our experience of this type of equipment and the data in Tables 2a and 2b, we do not expect the equipment to feature tonal or impulsive characteristics readily distinctive against the residual acoustic environment. Therefore, the Rating Level (L<sub>Aeq,15min</sub>) is required not to exceed 10 dB(A) below the minimum external L<sub>A90,15min</sub> background noise during the proposed hours of operation at the nearest noise sensitive properties in accordance with the guidance in Appendix 3 of the *Camden Local Plan 2017*.

## **Daytime**

4.3 The assessment predicting the noise emission level to compare to the corresponding background noise level for the equipment at 1 metre outside the window of the nearest residence is summarised in Table

3. This shows that with no mitigation measures the overall emission levels will be 15 dB(A) above background noise levels during the kitchen extract fans proposed operating hours (i.e. 10.00 to 23.00 daily). During this time, all equipment is assumed to be operating in order to consider the worst-case scenario. The detailed calculation is in Appendix III.

Table 3: Total Predicted Noise Levels at Nearest Residential Window Without Mitigation

Description	dB(A)
Resultant condensers and heat dumps emission level at 1 metre from nearest residence window (dB LAeq,15mins)	57
Resultant new kitchen ventilation emission level at 1 metre from nearest residence window (dB Laeq,15mins)	57
Existing kitchen ventilation emission level at 1 metre from nearest residence window (dB L <sub>Aeq,15mins</sub> )	59
Total emission level at 1 metre from nearest residence window without mitigation (dB L <sub>Aeq,15mins</sub> )	63
Lowest measured background noise level, 10.00 to 23.00 (dB Lago,15mins)	48
Comparison (Laeq,15mins – La90,15mins)	+15

- 4.4 As can be seen from Table 3, the emissions level without noise mitigation is calculated to be 15 dB(A) above the background noise level 1 metre outside the window of the most-affected noise-sensitive premises. Noise mitigation measures will therefore be required.
- 4.5 To mitigate noise from the new kitchen ventilation system, we recommend duct attenuators to be installed on the atmosphere side of the new kitchen supply and extract fans. The duct attenuators should be selected with the insertion loss values shown in Table 4a.

Table 4a: Duct Attenuator Minimum Insertion Loss Values (dB)

Description			Octave B	and Cent	re Freque	ency (Hz)		
	63	125	250	500	1k	2k	4k	8k
Insertion loss	1	7	15	30	33	22	17	14

4.6 To mitigate noise from the existing kitchen ventilation system, we recommend a duct attenuator to be installed on the atmosphere side of the existing kitchen extract. The duct attenuator should be selected with the insertion loss values shown in Table 4b.

Table 4b: Duct Attenuator Minimum Insertion Loss Values (dB)

Description			Octave E	Sand Cent	re Freque	ency (Hz)		
	63	125	250	500	1k	2k	4k	8k
Insertion loss	3	13	20	30	33	27	17	14

4.7 The existing kitchen ventilation fan will also require an enclosure. The enclosure should achieve the sound reduction values shown in Table 4c.

Table 4c: Enclosure for Existing Kitchen Extract Fan Minimum Sound Reduction Values (dB)

Description			Octave B	Band Cent	re Freque	ency (Hz)		
	63	125	250	500	1k	2k	4k	8k
Sound reduction	11	11	21	21	26	32	33	29

- 4.8 To reduce the noise impact of the condensers, we recommend installing a 1.5 metre high solid timber screen around the condensers, along the edge of the third-floor flat roof. The screen is to be imperforate (no gaps), sealed at the base, and with surface mass no less than 10 kg/m². Proprietary acoustic screening is recommended. Note that the purpose of this screen is to attenuate noise from the condensers, not for the kitchen ventilation systems. The noise from the kitchen ventilation systems is addressed with the measures described in Paragraphs 4.5 to 4.7.
- 4.9 The barrier calculation parameters for the noise attenuation of the proposed screen are shown in Appendix III. The attenuation is calculated based on the guidance in BS 5228-1: 2009 + A1: 2014 and the Fresnel-Kirchhoff theory.
- 4.10 In addition to the screen described above, we recommend acoustic enclosures for the condensers. The existing heat dumps will also require acoustic enclosures. Each enclosure should have the minimum sound reduction performance shown in Table 5. A suitable product would be the Panther Box's produced by Noise Solutions Ltd, for example, or approved equal.

Table 5: Condenser and Heat Dump Enclosure Minimum Sound Reduction Values (dB)

Description			Octave B	Band Cent	re Freque	ency (Hz)		
	63	125	250	500	1k	2k	4k	8k
Sound reduction	11	11	21	21	26	32	33	29

4.11 With the above measures, the rating level of the equipment is predicted to be reduced by 25 dB(A) to 38 dB L<sub>Aeq,15mins</sub>, which brings the total emission level at 1 metre outside the nearest window down to 10 dB(A) below the lowest measured background noise level between 10.00 and 23.00 as shown in Table 6. This will therefore be compliant with the Local Authority's criteria. The detailed calculations including the effect of the noise mitigation measures are shown in Appendix III.

Page 7 of 16

Table 6: Total Predicted Noise Levels at Nearest Residential Window with Mitigation

Description	dB(A)
Resultant condensers and heat dumps emission level at 1 metre from nearest residence window (dB LAeq,15mins)	33
Resultant new kitchen ventilation emission level at 1 metre from nearest residence window (dB Laeq,15mins)	34
Existing kitchen ventilation emission level at 1 metre from nearest residence window (dB LAeq,15mins)	36
Total emission level at 1 metre from nearest residence window with mitigation (dB L <sub>Aeq,15mins</sub> )	38
Lowest measured background noise level, 10.00 to 23.00 (dB Lago,15mins)	48
Comparison (Laeq,15mins - Lago,15mins)	-10

## **Night-time and Early Morning**

4.12 When the kitchen ventilation systems are not operating and hence the condensers and heat dumps are operating alone, the predicted noise levels with mitigation are shown in Table 7. This is for the unlikely scenario that all heat dumps and condensers are operating simultaneously, in order to consider the worst case.

Table 7: Predicted Heat Dump and Condenser Noise at Nearest Residential Window with Mitigation

Description	dB(A)
Resultant total condenser and heat dump emissions level at 1 metre from nearest residence window (dB Laeq,15mins)	32
Lowest measured background noise level, 23.00 to 10.00 (dB LABO,15mins)	44
Comparison (LAeq,15mins – LA90,15mins)	-12

- 4.13 This shows that with the proposed mitigation measures, the total combined condenser and heat dump rating levels will be 12 dB(A) below the lowest measured background noise levels at 1 metre from the nearest residence window. This is therefore compliant with the Local Authority's noise requirements.
- 4.14 We recommend that all mechanical equipment is mounted on suitable vibration isolation mounts to control structure-borne noise. All vibration isolators should be specified to achieved isolation efficiency of 0.95 at 125 Hz. Ductwork and pipework should be connected to mechanical equipment using flexible connectors.

The Fat Boy Pub Co. The Lore of the Land, Fitzrovia

5.0 CONCLUSION

5.1 The Fat Boy Pub Co. appointed Hepworth Acoustics to assess the impact of noise on the neighbouring

noise-sensitive premises from the existing equipment and the proposed new equipment to be installed

at The Lore of the Land, 4 Conway Street, Fitzrovia, London W1T 6BB.

5.2 A noise survey has been undertaken at the site and the background noise levels have been determined

in accordance with the requirements of the Camden Local Plan 2017.

5.3 Using the noise data for the proposed equipment and the existing equipment, the levels for the noise

emissions at the nearest noise-sensitive premises has been predicted using the guidance in BS 4142:

2014. Suitable noise mitigation measures have been recommended to allow compliance with the noise

requirements of the Local Authority.



Figure 1 – Location Plan

The Lore of the Land, Fitzrovia

The Fat Boy Pub Co.

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these

variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of

pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is

used to convert the values into manageable numbers. Although it might seem unusual to use a

 $logarithmic \ scale \ to \ measure \ a \ physical \ phenomenon, \ it \ has \ been \ found \ that \ human \ hearing \ also$ 

responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit

used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB

(threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together,

the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise

levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived floudness, a 3 dB(A) variation in

noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of

10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level

of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very

high frequencies, compared with the frequencies in between. Therefore, when measuring a sound

 $made\ up\ of\ different\ frequencies,\ it\ is\ often\ useful\ to\ \ \ \ \ weight\ \ \ each\ frequency\ appropriately,\ so\ that$ 

the measurement correlates better with what a person would actually hear. This is usually achieved by

using an electronic filter called the 'A1 weighting, which is built into sound level meters. Noise levels

measured using the 5A1 weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency

is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz

(Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the

upper frequency limit gradually reduces as a person gets older.

Report No: P18-171-R01v6

Page 11 of 16

The Fat Boy Pub Co. The Lore of the Land, Fitzrovia

**Glossary of Terms** 

When a noise level is constant and does not fluctuate, it can be described adequately by measuring

the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as

well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value.

In order to describe noise where the level is continuously varying, a number of other indices can be

used. The indices used in this report are described below.

L<sub>Aeq,T</sub> This is the A-weighted 'equivalent continuous noise level' which is an average of the total

sound energy measured over a specified time period, T. In other words, L<sub>Aeq</sub> is the level of a

continuous noise which has the same total (A-weighted) energy as the real fluctuating noise,

measured over the same time period. It is increasingly being used as the preferred parameter

for all forms of environmental noise.

This is the sound pressure level of a sound source, in decibels, which is 20 times the logarithm

to the base 10 of the ratio of sound pressure radiated by the source to a reference pressure.

The reference pressure is 20 micropascals (2 x  $10^{-5}$  Pa). Sound Pressure is the difference

between the pressure caused by a sound wave and the ambient pressure of the medium the  $\,$ 

sound wave is passing through.

 $L_{W}$  This is the sound power level of a sound source, in decibels, which is 10 times the logarithm to

the base 10 of the ratio of sound power radiated by the source to a reference power. The  $\,$ 

reference power is 1 picowatt (1 x  $10^{\text{-}12}$  watt). The sound power level is the fundamental

measure of the total sound energy radiated by a source per unit time.

 $L_{A90,T}$  This is the A-weighted noise level exceeded for 90% of the time period, T.  $L_{A90}$  is used as a

measure of background noise.

Report No: P18-171-R01v6 Page 12 of 16

## **Appendix II: Noise Survey Results**

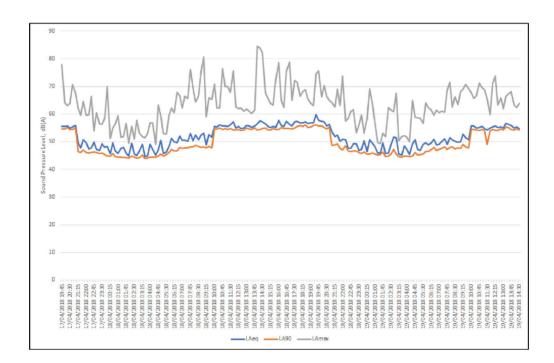
## Location 1

Equipment: Rion NL-31 'Type 1' sound level meter (serial no. 01120844) with

tripod and windshield

Weather: Dry, wind speed below 5 m/s

All measured sound pressure levels in dB re 20  $\mu Pa$ .



## **Appendix III: Noise Calculations**

# Without noise mitigation

Description	63	125	250	500	1k	2k	4k	8k	dB(A)	Comments
Kitchen Outlet Lw	67	69	73	75	74	71	66	59		Manufacturer's data
Duct attenuator	0	0	0	0	0	0	0	0		
Duct losses	0	0	0	0	0	0	0	0		Negligible
Outlet area	2	2	2	2	2	2	2	2		
End reflections	-4	-1	0	0	0	0	0	0		Woods Practical Guide to Noise Control, Fig 5.7
Outlet directivity	1	1	1	0.5	-0.5	-2	-15	-15		SRL Noise Control in Building Services, Fig 11.2
Distance attenuation	-28	-28	-28	-28	-28	-28	-28	-28		10
Receiver façade correction	3	3	3	3	3	3	3	3		
Resulting SPL from duct outlet	41	46	51	53	51	46	28	21	54	
Kitchen Inlet Lw	65	67	71	73	72	69	64	57		Manufacturer's data
Duct attenuator	0	0	0	0	0	0	0	0		
Duct losses	0	0	0	0	0	0	0	0		Negligible
Outlet area	2	2	2	2	2	2	2	2		regingatio
End reflections	-4	-1	0	0	0	0	0	0		Woods Practical Guide to Noise Control, Fig 5.7
Outlet directivity	1.5	1.5	1.5	1.5	1	1	0	0		SRL Noise Control in Building Services, Fig 11.2
Distance attenuation	-28	-28	-28	-28	-28	-28	-28	-28		10
Receiver façade correction	3	3	3	3	3	3	3	3		10
	40	45	50	52	50	47	41	34	54	
Resulting SPL from duct inlet	50	45 51	56	58	57	54	41	42	54	Manufactural data
Kitchen supply fan case breakout Lw									-	Manufacturer's data
Kitchen extract fan case breakout Lw	50	51	56	58	57	54	49	42	-	Manufacturer's data
Total kitchen fan case breakout Lw	53	54	59	61	60	57	52	45		
Roof attenuation	-7	-11	-16	-23	-23	-24	-24	-27		Measured data for tiled slate roof
Distance attenuation	-30	-30	-30	-30	-30	-30	-30	-30		12
Receiver façade correction	3	3	3	3	3	3	3	3		
Resulting SPL from case breakout	19	16	16	11	10	6	1	-9	15	
Total kitchen ventilation SPL	43	48	53	55	53	50	41	34	57	
Existing Kitchen Outlet Lp	57	59	63	65	64	61	56	49		Measured SPL @ 2 metres
Outlet directivity	1	1	1	0.5	-0.5	-2	-15	-15		SRL Noise Control in Building Services, Fig 11.2
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12		8
Receiver façade correction	3	3	3	3	3	3	3	3		
Resulting SPL from duct outlet	49	51	55	57	55	50	32	25	58	
Existing Kitchen supply fan case breakout Lp	47	48	54	55	54	51	46	38	58	Measured SPL @ 2 metres
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12		8
Receiver façade correction	3	3	3	3	3	3	3	3		
Resulting SPL from case breakout	38	39	45	46	45	42	37	29	49	
Total existing kitchen ventilation SPL	49	51	55	57	55	51	38	31	59	
Condenser A Lw	76	73	72	69	61	56	59	53	- 00	Manufacturada data
Enclosure reduction	0	0	0	0	0	0	0	0		Manufacturer's data
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	_	8
	-26	-20	-20	-26	-20	-20	-12	-14		8
Barrier attenuation	-5	3	3	-6	-8	-9	-12	-14		
Reflecting plane behind condensers										
Receiver façade correction	3		3	3	3	3	3	3		
Condenser A Resultant SPL		3					27	19	43	
	51	48	46	43	33	27				
Condenser B Lw	51 76	48 73	46 72	43 69	61	56	59	53		Manufacturer's data
Condenser B Lw Enclosure reduction	51 76 0	48 73 0	46 72 0	43 69 0	61 0	56 0	0	0		
Condenser B Lw Enclosure reduction Distance attenuation	51 76 0 -27	48 73 0 -27	46 72 0 -27	43 69 0 -27	61 0 -27	56 0 -27	0 -27	0 -27		Manufacturer's data 9
Condenser B Lw Enclosure reduction Distance attenuation Barrier attenuation	51 76 0 -27 -5	48 73 0 -27 -5	46 72 0 -27 -6	43 69 0 -27 -6	61 0 -27 -8	56 0 -27 -9	-27 -12	-27 -14		
Condenser B Lw Enclosure reduction Distance attenuation	51 76 0 -27 -5 3	48 73 0 -27 -5 3	46 72 0 -27 -6 3	43 69 0 -27 -6 3	61 0 -27 -8 3	56 0 -27 -9 3	0 -27 -12 3	0 -27 -14 3		
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction	51 76 0 -27 -5 3	48 73 0 -27 -5 3	46 72 0 -27 -6 3	43 69 0 -27 -6 3	61 0 -27 -8 3 3	56 0 -27 -9 3	0 -27 -12 3	0 -27 -14 3		
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers	51 76 0 -27 -5 3	48 73 0 -27 -5 3	46 72 0 -27 -6 3	43 69 0 -27 -6 3	61 0 -27 -8 3	56 0 -27 -9 3	0 -27 -12 3	0 -27 -14 3	42	
Condenser B Liv Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers Receiver Tagade correction	51 76 0 -27 -5 3	48 73 0 -27 -5 3	46 72 0 -27 -6 3	43 69 0 -27 -6 3	61 0 -27 -8 3 3	56 0 -27 -9 3	0 -27 -12 3	0 -27 -14 3	42	
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL	51 76 0 -27 -5 3 3 50	48 73 0 -27 -5 3 3 47	46 72 0 -27 -6 3 3 45	43 69 0 -27 -6 3 3 42	61 0 -27 -8 3 3	56 0 -27 -9 3 3 26	0 -27 -12 3 3 26	0 -27 -14 3 3 18	42	9
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser B Resultant SPL	51 76 0 -27 -5 3 3 50 73	48 73 0 -27 -5 3 3 47 72	46 72 0 -27 -6 3 3 45 71	43 69 0 -27 -6 3 3 42 71	61 0 -27 -8 3 3 32 64	56 0 -27 -9 3 3 26 57	0 -27 -12 3 3 26 59	0 -27 -14 3 3 18 54	42	9
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation	51 76 0 -27 -5 3 3 50 73	48 73 0 -27 -5 3 3 47 72	46 72 0 -27 -6 3 3 45 71	43 69 0 -27 -6 3 3 42 71	61 0 -27 -8 3 3 32 64	56 0 -27 -9 3 3 26 57	0 -27 -12 3 3 26 59	0 -27 -14 3 3 18 54 0	42	9 Manufacturer's data
Condenser B Liv Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Liv Enclosure reduction Distance attenuation Barrier attenuation	51 76 0 -27 -5 3 3 50 73 0 -28	48 73 0 -27 -5 3 3 47 72 0 -28	46 72 0 -27 -6 3 3 45 71 0 -28	43 69 0 -27 -6 3 3 42 71 0 -28	61 0 -27 -8 3 3 32 64 0 -28	56 0 -27 -9 3 3 26 57 0 -28 -9	0 -27 -12 3 3 26 59 0 -28 -12	0 -27 -14 3 3 18 54 0 -28	42	9 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers	51 76 0 -27 -5 3 50 73 0 -28 -5 3	48 73 0 -27 -5 3 3 47 72 0 -28 -5 3	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3	61 0 -27 -8 3 3 32 64 0 -28 -8 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3	0 -27 -12 3 3 26 59 0 -28 -12 3	0 -27 -14 3 3 18 54 0 -28 -14	42	9 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3	48 73 0 -27 -5 3 3 47 72 0 -28 -5 3 3	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3	0 -27 -12 3 3 26 59 0 -28 -12 3	0 -27 -14 3 3 18 54 0 -28 -14 3		9 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3	48 73 0 -27 -5 3 47 72 0 -28 -5 3 3	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 45	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 42	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25	0 -27 -14 3 3 18 54 0 -28 -14 3 3	42	9 Manufacturer's data 10
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver facade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver facade correction Condenser C Resultant SPL Celfar Condenser Lw	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3 46 58	48 73 0 -27 -5 3 47 72 0 -28 -5 3 3 45 56	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 45	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18		9 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3 46 58 0	48 73 0 -27 -5 3 3 47 72 0 -28 -5 3 3 45 56	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 43 62	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43 62 0	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3 3 4 62 0	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0		9 Manufacturer's data 10 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser S Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3 46 58 0 -26	48 73 0 -27 -5 3 3 47 72 0 -28 -5 3 3 45 56 0 -26	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 43 62 0 -26	43 69 0 -27 -6 3 3 42 71 0 -26 -3 3 43 62 0 -26	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3 3 4 62 0	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0		9 Manufacturer's data 10
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Distance attenuation	51 76 0 -27 -5 3 3 50 73 0 -28 -5 3 3 46 58 0 -26 -5	48 73 0 -27 -5 3 47 72 0 -28 -5 3 45 56 0 -26 -5	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 43 62 0 -28 -6	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43 62 0 -26 -6	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3 34 62 0 -26	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -9	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26 -12	0 -27 -14 3 3 18 54 0 -28 -14 3 18 50 0		9 Manufacturer's data 10 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers	51 76 0 -27 -5 3 50 73 0 -28 -5 3 3 46 58 0 -26 -5 3	48 73 0 -27 -5 3 47 72 0 -28 -5 3 3 45 6 0 -26 -5 3	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 43 62 0 -26 -6 3	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43 62 0 -26 -6 3	61 0 -27 -8 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8	56 0 -27 -9 3 3 26 57 0 -28 -9 3 26 60 0 -26 -9 3	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0 -26 -12 3 3	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0 -26 -14		9 Manufacturer's data 10 Manufacturer's data
Condenser B Liv  Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Liv Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Liv Enclosure reduction Distance attenuation Distance attenuation Barrier attenuation Barrier attenuation Barrier attenuation Barrier attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction	51 76 0 -27 -5 3 3 50 73 0 -28 -5 3 3 46 58 0 -28 -5 3 3 3 -5 -5 -5 -5 -5 -7 -5 -5 -7 -5 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7	48 73 0 -27 -5 -3 3 47 72 0 -28 -5 -5 3 3 45 -56 0 -26 -5 -3 3 3 47 -5 -5 -5 -5 -5 -5 -5 -5 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 43 62 0 -28 -6 3 3	43 69 0 -27 -6 3 3 42 71 0 -26 -6 3 3 43 62 0 -26 -6 3 3 3	61 0 -27 -8 3 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -28 3 3 3 3 3 26 57 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 -27 -12 3 3 26 59 0 -28 -12 3 3 26 59 0 -28 -12 3 3 26 59 -12 3 3 3 26 -12 3 3 3 -12 3 3 -12 -12 -12 -12 -12 -12 -12 -12	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0 -26 -14 3 3	42	9 Manufacturer's data 10 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL	51 76 0 -27 -5 3 3 50 73 0 -28 -5 -5 3 3 3 46 58 0 -28 -5 -5 3 3 3 3 3 3 3 3 3 3 3 3 3	48 73 0 -27 -5 3 3 47 72 0 -28 -5 3 3 45 -56 0 -28 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	46 72 0 -27 -6 3 3 3 45 71 0 -28 -6 -6 3 3 3 43 62 0 -28 -6 -6 3 3 3 3 3 43 62 0 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 3 43 62 0 -26 -6 3 3 3 3 43 62 0 -26 -3 3 3 3 3 43 62 0 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	61 0 -27 -8 3 3 3 32 64 0 -28 -8 3 3 3 4 62 0 -26 -8 3 3 3 3 4 62 0 0 -26 -8 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26 -12 3 3 25 55 3 25 55 3 25 55 55 56 56 57 57 57 57 57 57 57 57 57 57	0 -27 -14 3 3 18 54 0 -28 -14 3 18 50 0 -26 -14 3 3 18		9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Reflecting plane behind condensers Receiver façade correction Condenser Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Reflecting plane behind condensers Receiver laçade correction Cellar Condenser Resultant SPL Existing Heat Durny Lp	51 76 0 -27 -5 -3 3 50 -28 -5 -3 3 46 -58 0 -28 -5 -5 3 3 3 3 46 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	48 73 0 -27 -5 -3 3 47 72 0 -20 -5 3 3 45 -5 -5 -5 -5 -3 3 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	46 72 0 -27 -6 3 3 45 71 0 -28 -6 3 3 3 43 62 0 -28 -6 3 3 3 3 43	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43 62 0 -26 -6 3 3 3 43	61 0 -27 -8 3 3 3 32 64 0 -28 -8 3 3 3 3 4 62 0 -26 -8 3 3 3 3 3 3 4 6 2 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -9 3 3 3 26 3 3 3 26 3 3 3 3 26 3 3 3 3 3	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0 -26 -12 3 3 3 25 55 0 -26 -27 3 3 3 25 5 3 3 25 5 5 5 5 5 5 5 5 5 5 5	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0 -26 -14 3 3 18	42	9 Manufacturer's data 10 Manufacturer's data
Condenser B Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Resultant SPL Cellar Condenser C Resultant SPL Cellar Condenser C Resultant SPL Cellar Condenser Resultant SPL Existing plane behind condensers Receiver laçade correction Cellar Condenser Resultant SPL Existing Heat Dump Lp 2no. units	51 76 0 -27 -5 3 3 50 73 0 -28 -5 3 3 46 58 0 -28 -5 3 3 3 3 3 3 5 5 5 6 7 3 3 3 3 5 6 7 3 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8	48 73 0 -27 -5 -3 3 47 72 0 -28 -5 -5 3 3 3 45 -5 -5 -3 3 3 3 47 72 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	46 72 0 -27 -6 -3 3 45 71 0 -28 -6 -3 3 3 43 62 0 -28 -6 -6 3 3 3 43 43 43 43 43 44 45 47 47 48 48 48 48 48 48 48 48 48 48	43 69 0 -27 -6 3 3 42 71 0 -28 -6 3 3 43 62 0 -26 -6 3 3 3 43	61 0 -27 -8 3 3 3 2 64 0 -28 -8 3 3 3 3 4 62 0 -26 -8 3 3 3 3 4 4 62 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 3 26 60 0 -26 -9 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26 -12 3 3 3 25 55 59 0 -26 -3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	0 -27 -14 3 3 18 54 0 -28 -14 3 3 18 50 0 -26 -14 3 3 16 31 34	42	9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw  Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Reflecting plane behind condensers Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL Existing plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL Existing Heat Dump Lp 2no. units Reflecting plane behind heat dumps	51 76 0 -27 -5 -3 3 50 -28 -5 -5 3 3 46 58 0 -28 -5 -5 3 3 3 3 3 3 3 3 3 3 3 3 3	48 73 0 -27 -5 3 3 47 72 0 -20 -5 3 3 45 58 0 -20 -5 3 3 3 3 45 -5 -5 -5 -5 -5 -5 -5 -5 -5 -	46 72 0 -27 -6 3 3 45 -71 0 -20 -6 3 3 43 62 0 -20 -6 3 3 3 43 62 0 2 3 43 62 0 3 43 62 0 43 0 43 0 43 0 43 0 43 0 43 0 43 0 4	43 69 0 -27 -6 3 3 42 42 -6 -6 3 3 3 43 62 0 -26 -6 3 3 3 43 62 0 2 3 3 43 62 0 43 1 43 1 43 1 43 1 43 1 43 1 43 1 43	61 0 -27 -8 3 3 3 3 2 64 0 -28 -8 3 3 3 3 4 62 0 -26 -8 3 3 3 3 4 4 4 4 4 7 3 3 4 4 4 4 4 4 4 4	56 0 -27 -9 3 3 26 57 0 -28 -9 3 3 3 26 60 0 -28 -9 3 3 3 4 4 45 3	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0 -26 -12 3 3 3 25 55 9 0 -26 -27 3 3 3 25 5 5 9 1 2 5 5 9 1 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 -27 -14 -3 -3 -18 -50 -28 -14 -3 -3 -16 -31 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3	42	9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL Existing Head Courte Condensers Receiver Taçade correction Cellar Condenser Resultant SPL Existing Head During Lp 2no. units Receiver Taçade correction Reflecting plane behind heat dumps Receiver Taçade correction	51 76 0 -27 -5 3 3 50 -28 -5 -5 3 3 46 -5 -5 3 3 46 -5 -5 3 3 3 46 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	48 73 0 -27 -5 3 3 47 72 0 -28 -5 -5 3 3 45 -5 -5 -5 -3 3 3 45 -5 -5 -5 -5 -5 -5 -5 -5 -5 -	46 72 0 -27 -6 3 3 45 -71 0 -28 -6 3 3 3 43 62 0 -26 -6 3 3 3 43 7 4 7 4 7 4 7 4 7 7 8 7 8 7 8 7 8 7 8 7	43 69 0 -27 -6 3 3 42 -71 0 -26 -6 3 3 3 43 62 0 -26 -6 3 3 3 43 62 0 2 43 0 43 0 44 0 43 0 44 0 45 0 45 0 45 0	61 0 -27 -8 3 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8 3 3 3 4 4 4 4 4 7 3 3 3 3 3 3 3 3 3 3 3	56 0 -27 -9 3 3 3 26 57 0 -28 -9 3 3 3 26 60 0 0 -28 -9 3 3 3 3 26 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0 0 -26 -27 3 3 25 55 0 0 25 12 3 3 3 25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 -27 -14 -14 -3 -3 -16 -31 -16 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3	42	9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser B Resultant SPL  Condenser C Lw  Enclosure reduction  Distance attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Zno. units  Reflecting plane behind heat dumps  Reflecting plane behind heat dumps  Receiver façade correction  Heat Dumps Resultant SPL	51 76 0 -27 -5 3 3 50 -28 -5 3 3 46 68 -5 3 3 3 46 59 -5 3 3 46 59 -5 59 -5 59 59 59 59 59 59 59 59 59 5	48 73 0 -27 -5 3 3 47 72 0 -20 -5 3 3 45 58 0 -20 -5 3 3 3 3 45 -5 -5 -5 -5 -5 -5 -5 -5 -5 -	46 72 0 -27 -6 3 3 45 71 0 -28 -6 -3 3 43 62 -6 3 3 3 43 62 -6 3 3 43 62 -6 43 -6 4 -6 4	43 69 0 -27 -6 3 3 42 -71 0 -28 -6 3 3 43 62 -6 3 3 3 43 62 -3 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	61 0 -277 -8 3 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8 3 3 3 3 4 4 4 4 4 4 7 7 7 8 7 8 7 8 7 8 8 7 8 8 8 8	56 0 -27 -9 3 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -9 3 3 3 4 4 4 4 5 4 4 4 5 7 4 4 4 5 7 4 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26 -12 3 3 3 25 3 3 3 3 3 3 3 3 3 3 3 3 3	0 -27 -14 -3 -3 -18 -54 -0 -20 -14 -3 -3 -18 -50 -14 -3 -3 -16 -31 -34 -3 -3 -4 -0 -3 -4 -0 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -1 -4 -3 -3 -3 -4 -1 -	42 38 57	9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser B Resultant SPL Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL Existing Head Courte Condensers Receiver Taçade correction Cellar Condenser Resultant SPL Existing Head During Lp 2no. units Receiver Taçade correction Reflecting plane behind heat dumps Receiver Taçade correction	51 76 0 -27 -5 3 3 50 -28 -5 -5 3 3 46 -5 -5 3 3 46 -5 -5 3 3 3 46 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5	48 73 0 -27 -5 3 3 47 72 0 -28 -5 -5 3 3 45 -5 -5 -5 -3 3 3 45 -5 -5 -5 -5 -5 -5 -5 -5 -5 -	46 72 0 -27 -6 3 3 45 -71 0 -28 -6 3 3 3 43 62 0 -26 -6 3 3 3 43 7 4 7 4 7 4 7 4 7 7 8 7 8 7 8 7 8 7 8 7	43 69 0 -27 -6 3 3 42 -71 0 -26 -6 3 3 3 43 62 0 -26 -6 3 3 3 43 62 0 2 43 0 43 0 44 0 43 0 44 0 45 0 45 0 45 0	61 0 -27 -8 3 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8 3 3 3 4 4 4 4 4 7 3 3 3 3 3 3 3 3 3 3 3	56 0 -27 -9 3 3 3 26 57 0 -28 -9 3 3 3 26 60 0 0 -28 -9 3 3 3 3 26 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 55 0 0 -26 -27 3 3 25 55 0 0 25 12 3 3 3 25 5 5 5 5 5 5 6 6 7 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0 -27 -14 -14 -3 -3 -16 -31 -14 -3 -3 -3 -16 -31 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3	42	9 Manufacturer's data 10 Manufacturer's data 8
Condenser B Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser B Resultant SPL  Condenser C Lw  Enclosure reduction  Distance attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Zno. units  Reflecting plane behind heat dumps  Reflecting plane behind heat dumps  Receiver façade correction  Heat Dumps Resultant SPL	51 76 0 -27 -5 3 3 50 -28 -5 3 3 46 68 -5 3 3 3 46 59 -5 3 3 46 59 -5 59 -5 59 59 59 59 59 59 59 59 59 5	48 73 0 -27 -5 3 3 47 72 0 -20 -5 3 3 45 56 0 -28 -5 3 3 45 56 -5 3 3 45 47 47 47 47 47 47 47 47 47 47	46 72 0 -27 -6 3 3 45 71 0 -28 -6 -3 3 43 62 -6 3 3 3 43 62 -6 3 3 43 62 -6 43 -6 4 -6 4	43 69 0 -27 -6 3 3 42 -71 0 -28 -6 3 3 43 62 -6 3 3 3 43 62 -3 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	61 0 -277 -8 3 3 3 32 64 0 -28 -8 3 3 34 62 0 -26 -8 3 3 3 3 4 4 4 4 4 4 7 7 7 8 7 8 7 8 7 8 8 7 8 8 8 8	56 0 -27 -9 3 3 3 26 57 0 -28 -9 3 3 26 60 0 -26 -9 3 3 3 4 4 4 4 5 4 4 4 5 7 4 4 4 5 7 4 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	0 -27 -12 3 3 26 59 0 -28 -12 3 3 25 56 0 -26 -12 3 3 3 25 3 3 3 3 3 3 3 3 3 3 3 3 3	0 -27 -14 -3 -3 -18 -54 -0 -20 -14 -3 -3 -18 -50 -14 -3 -3 -16 -31 -34 -3 -3 -4 -0 -3 -4 -0 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -0 -4 -1 -4 -3 -3 -3 -4 -1 -4 -3 -3 -3 -4 -1 -	42 38 57	9 Manufacturer's data 10 Manufacturer's data 8

# With noise mitigation

Description		125	250	500	1k	2k	4k	8k	dB(A)	Comments		
New Kitchen Outlet Lw	<b>63</b>	69	73	75	74	71	66	59	GB(A)	Manufacturer's data		
Duct attenuator	-1	-7	-15	-30	-33	-22	-17	-14		Manufacturer's data		
Duct losses	0	0	0	0	0	0	0	0		Negligible		
Outlet area	2	2	2	2	2	2	2	2		regigible		
End reflections	-4	-1	0	0	0	0	0	0		Woods Practical Guide to Noise Control, Fig 5.7		
Outlet directivity	1	1	1	0.5	-0.5	-2	-15	-15		SRL Noise Control in Building Services, Fig 11.2		
Distance attenuation	-28	-28	-28	-28	-28	-28	-28	-28		10		
Receiver façade correction	3	3	3	3	3	3	3	3				
Resulting SPL from duct outlet	40	39	36	23	18	24	11	7	31			
New Kitchen Inlet Lw	65	67	71	73	72	69	64	57		Manufacturer's data		
Duct attenuator	-1	-7	-15	-30	-33	-22	-17	-14		Walland Cold		
Duct losses	0	0	0	0	0	0	0	0		Negligible		
Outlet area	2	2	2	2	2	2	2	2		,		
End reflections	-4	-1	0	0	0	0	0	0		Woods Practical Guide to Noise Control, Fig 5.7		
Outlet directivity	1.5	1.5	1.5	1.5	1	1	0	0		SRL Noise Control in Building Services, Fig 11.2		
Distance attenuation	-28	-28	-28	-28	-28	-28	-28	-28		10		
Receiver façade correction	3	3	3	3	3	3	3	3				
Resulting SPL from duct inlet	39	38	35	22	17	25	24	20	32			
New Kitchen supply fan case breakout Lw	50	51	56	58	57	54	49	42		Manufacturer's data		
New Kitchen extract fan case breakout Lw	50	51	56	58	57	54	49	42		Manufacturer's data		
Total kitchen fan case breakout Lw	53	54	59	61	60	57	52	45				
Roof attenuation	-7	-11	-16	-23	-23	-24	-24	-27		Measured data for tiled slate roof		
Distance attenuation	-30	-30	-30	-30	-30	-30	-30	-30		12		
Receiver façade correction	3	3	3	3	3	3	3	3				
Resulting SPL from case breakout	19	16	16	11	10	6	1	-9	15			
Total new kitchen ventilation SPL	42	41	38	25	21	28	24	20	34			
Existing kitchen outlet Lp	57	59	63	65	64	61	56	49		Measured noise levels @ 2 metres		
New duct attenuator	-3	-13	-20	-30	-33	-27	-17	-14		and the second		
Duct losses	0	0	0	0	0	0	0	0		Negligible		
Outlet directivity	1	1	1	0.5	-0.5	-2	-15	-15		SRL Noise Control in Building Services, Fig 11.2		
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12		8		
Receiver façade correction	3	3	3	3	3	3	3	3				
Resulting SPL from duct outlet	46	38	35	27	22	23	15	11	31			
Existing kitchen supply fan case breakout Lp	47	48	54	55	54	51	46	38	58	Measured SPL @ 2 metres		
Enclosure reduction	-11	-11	-21	-21	-26	-32	-33	-29		Manufacturer's data		
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12		8		
Receiver façade correction	3	3	3	3	3	3	3	3				
Resulting SPL from case breakout	27	28	24	25	19	10	4	0	25			
Total existing kitchen ventilation SPL w/ mitigation	46	38	35	29	23	23	15	11	36			
Condenser A Lw	76	73	72	69	61	56	59	53		Manufacturer's data		
Enclosure reduction	-11	-11	-21	-21	-26	-32	-33	-29		Manufacturer's data		
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26		8		
Barrier attenuation	-6	-7	-9	-11	-13	-16	-19	-22				
Reflecting plane behind condensers	3	3	3	3	3	3	3	3				
Receiver façade correction	3	3	3	3	3	3	3	3				
Condenser A Resultant SPL	39	35	22	17	2	-12	-13	-18	22			
Condenser B Lw	76	73	72	69	61	56	59	53		Manufacturer's data		
Enclosure reduction	-11	-11	-21	-21	-26	-32	-33	-29		Manufacturer's data		
Distance attenuation	-27	-27	-27	-27	-27	-27	-27	-27		9		
Barrier attenuation	-5	-5	-6	-6	-8	-9	-12	-14				
Reflecting plane behind condensers	3	3	3	3	3	3	3	3				
Receiver façade correction	3	3	3	3	3	3	3	3				
				21			-7	-11	23			
Condenser B Resultant SPL	39	36	24	21	6	-6	_					
Condenser B Resultant SPL Condenser C Lw	39 73	36 72	71	71	64	-b 57	59	54		Manufacturer's data		
								54 -29		Manufacturer's data Manufacturer's data		
Condenser C Lw	73	72	71	71	64	57	59					
Condenser C Lw Enclosure reduction	73 -11	72 -11	71 -21	71 -21	64 -26	57 -32	59 -33	-29		Manufacturer's data		
Condenser C Lw Enclosure reduction Distance attenuation	73 -11 -28	72 -11 -28	71 -21 -28	71 -21 -28	-26 -28	-32 -28	-33 -28	-29 -28		Manufacturer's data		
Condenser C Lw Enclosure reduction Distance attenuation Barrier attenuation	73 -11 -28 -5	72 -11 -28 -5	71 -21 -28 -6	71 -21 -28 -6 3	-26 -28 -7	-32 -28 -9	-33 -28 -11	-29 -28 -14		Manufacturer's data		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers	73 -11 -28 -5 3	72 -11 -28 -5 3	71 -21 -28 -6 3	71 -21 -28 -6 3	-26 -28 -7 3	-32 -28 -9 3	-33 -28 -11 3	-29 -28 -14 3	22	Manufacturer's data		
Condenser C Lw  Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction	73 -11 -28 -5 3	72 -11 -28 -5 3	71 -21 -28 -6 3	71 -21 -28 -6 3	-26 -28 -7 3	-32 -28 -9 3	-33 -28 -11 3	-29 -28 -14 3	22	Manufacturer's data		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL	73 -11 -28 -5 3 3	72 -11 -28 -5 3 3	71 -21 -28 -6 3 3	71 -21 -28 -6 3 3	64 -26 -28 -7 3 9	-32 -28 -9 3 3 -6	59 -33 -28 -11 3 3 -7	-29 -28 -14 3 3 -11	22	Manufacturer's data 10		
Condenser C Lw  Enclosure reduction Distance attenuation Barrier attenuation  Berlier attenuation  Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL  Cellar Condenser Lw	73 -11 -28 -5 3 3 35 58	72 -11 -28 -5 3 3 34 56	71 -21 -28 -6 3 3 22 62	71 -21 -28 -6 3 3 22 62	64 -26 -28 -7 3 3 9	57 -32 -28 -9 3 3 -6	59 -33 -28 -11 3 3 -7 55	-29 -28 -14 3 3 -11 50	22	Manufacturer's data 10  Manufacturer's data		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Barrier attenuation  Retlecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction	73 -11 -28 -5 3 3 35 58 -11	72 -11 -28 -5 3 3 34 56 -11	71 -21 -28 -6 3 3 22 62 -21	71 -21 -28 -6 3 3 22 62 -21	64 -26 -28 -7 3 3 9 62 -26	-32 -28 -9 3 3 -6 60 -32	59 -33 -28 -11 3 3 -7 55 -33	-29 -28 -14 3 3 -11 50 -29	22	Manufacturer's data 10  Manufacturer's data Manufacturer's data		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation	73 -11 -28 -5 3 3 35 58 -11 -26	72 -11 -28 -5 3 3 34 -56 -11 -26	71 -21 -28 -6 3 3 22 62 -21 -26	71 -21 -28 -6 3 3 22 62 -21 -26	64 -26 -28 -7 3 3 9 62 -26	-32 -28 -9 3 3 -6 60 -32 -26	59 -33 -28 -11 3 3 -7 55 -33 -26	-29 -28 -14 3 3 -11 50 -29 -26	22	Manufacturer's data 10  Manufacturer's data Manufacturer's data		
Condenser C Lw  Enclosure reduction Distance attenuation Barrier attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Barrier attenuation	73 -11 -28 -5 3 3 35 58 -11 -26	72 -11 -28 -5 3 3 34 -56 -11 -26	71 -21 -28 -6 3 3 22 62 -21 -26 -8	71 -21 -28 -6 3 3 22 62 -21 -26 -11	64 -26 -28 -7 3 3 9 62 -26 -26 -12	57 -32 -28 -9 3 3 -6 60 -32 -26 -15	59 -33 -28 -11 3 3 -7 55 -33 -26 -18	-29 -28 -14 3 3 -11 50 -29 -26 -21	22	Manufacturer's data 10  Manufacturer's data Manufacturer's data		
Condenser C Lw  Enclosure reduction Distance attenuation Barrier attenuation Berrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers	73 -11 -28 -5 3 35 58 -11 -26 -6 3	72 -11 -28 -5 3 3 34 -56 -11 -26 -7 3	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3	64 -26 -28 -7 3 3 9 62 -26 -26 -12 3	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3	59 -33 -28 -11 3 3 -7 55 -33 -26 -18 3	-29 -28 -14 3 3 -11 50 -29 -26 -21 3	22	Manufacturer's data 10  Manufacturer's data Manufacturer's data		
Condenser C Lw  Enclosure reduction Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction	73 -11 -28 -5 3 3 35 58 -11 -26 -6 3	72 -11 -28 -5 3 3 34 -56 -11 -26 -7 3 3	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 3	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 3	64 -26 -28 -7 3 3 9 62 -26 -12 3 3	-32 -28 -9 3 3 -6 60 -32 -26 -15 3	59 -33 -28 -11 3 3 -7 55 -33 -26 -18 3 3	-29 -28 -14 3 3 -11 50 -29 -26 -21 3		Manufacturer's data  10  Manufacturer's data  Manufacturer's data		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Enclosure reduction	73 -11 -28 -5 3 3 35 58 -11 -26 -6 3 3	72 -11 -28 -5 3 3 34 56 -11 -26 -7 3 3	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 3	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 3 10	64 -26 -28 -7 3 3 9 62 -26 -26 -12 3 3 4	-32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7	59 -33 -28 -11 -3 -7 -55 -33 -26 -18 -3 -16	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20	11	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8		
Condenser C Lw  Enclosure reduction Distance attenuation Barrier attenuation Berrier attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL  Cellar Condenser Lw Enclosure reduction Distance attenuation Barrier attenuation Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL	73 -11 -28 -5 3 35 58 -11 -26 -6 3 3 21	72 -11 -28 -5 3 3 34 56 -11 -26 -7 3 3 18	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 3 13	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 3 10	64 -26 -28 -7 3 3 9 62 -26 -12 3 3 4	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7 42	59 -33 -28 -11 3 3 -7 -55 -33 -26 -18 3 3 -16 35	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31	11	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barner attenuation  Barner attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Enclosure reduction	73 -11 -28 -5 3 35 58 -11 -26 -6 3 21 35 -11	72 -11 -28 -5 3 34 56 -11 -26 -7 3 3 18 37 -11	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 13 37 -21	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 10 39 -21	64 -26 -28 -7 3 3 9 62 -26 -26 -12 3 3 4 44 -26	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7 42	59 -33 -28 -11 3 3 -7 -55 -33 -26 -18 3 -16 35 -33	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31	11	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		
Condenser C Liv  Enclosure reduction Distance attenuation Barner attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Condenser C Resultant SPL Cellar Condenser Liv Enclosure reduction Distance attenuation Barner attenuation Reflecting plane behind condensers Receiver façade correction Cellar Condenser Resultant SPL Existing plane Department SPL Existing plane Department SPL Existing Heaf Dump Lp Enclosure reduction Zolur Condenser Resultant SPL Existing Heaf Dump Lp Enclosure reduction Zolur units	73 -11 -28 -5 3 3 35 58 -11 -26 -6 3 3 21 35 -11 27	72 -11 -28 -5 3 34 56 -11 -26 -7 3 3 18 37 -11	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 13 37 -21	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 10 39 -21	64 -26 -28 -7 3 3 9 62 -26 -26 -12 3 4 44 -26 21	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7 42 -32 13	59 -33 -28 -11 3 3 -7 -55 -33 -26 -18 3 -16 35 -33 -5	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31 -29 5	11	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Berrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Enclosure reduction  Deno units  Reflecting plane behind heat dumps  Reflecting plane behind heat dumps	73 -11 -28 -5 3 3 35 58 -11 -26 -6 3 3 21 35 -11 27	72 -11 -28 -5 3 3 34 58 -11 -26 -7 3 18 37 -11 29 3	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 3 13 37 -21	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 10 39 -21 21 3	64 -26 -28 -7 3 3 9 62 -26 -12 3 3 4 44 -26 21 3	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7 42 -32 13 3	59 -33 -28 -111 -3 -7 -55 -33 -26 -18 -3 -16 -35 -33 -5 -33 -35 -33 -35 -33	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31 -29 5	11	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		
Condenser C Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Lw  Enclosure reduction  Distance attenuation  Barrier attenuation  Berrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Enclosure reduction  Zno. units  Reflecting plane behind heat dumps  Receiver façade correction	73 -11 -28 -5 3 3 35 -58 -11 -26 -6 3 3 21 35 -11 27 3 3	72 -11 -28 -5 3 3 4 56 -11 -26 -7 3 18 37 -11 29 3	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 13 37 -21 19	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 10 39 -21 21 3 3	64 -26 -28 -7 3 3 9 62 -26 -12 3 3 4 44 -26 21 3 3	57 -32 -28 -9 3 -6 60 -32 -26 -15 3 3 -7 42 -32 13 3 3	59 -33 -28 -111 -3 -7 -55 -33 -26 -18 -3 -16 -35 -33 -5 -33 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31 -29 5 3 3	11 48	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		
Condenser C Liv  Enclosure reduction  Distance attenuation  Barrier attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Condenser C Resultant SPL  Cellar Condenser Liv  Enclosure reduction  Distance attenuation  Barrier attenuation  Reflecting plane behind condensers  Receiver façade correction  Cellar Condenser Resultant SPL  Existing Heat Dump Lp  Enclosure reduction  7.00. units  Reflecting plane behind heat dumps  Receiver façade correction  Reflecting plane behind heat dumps  Receiver façade correction  Heat Dumps Resultant SPL	73 -11 -28 -5 3 3 35 -58 -11 -26 -6 3 3 21 35 -11 27 3 3 33	72 -11 -28 -5 3 3 34 -56 -11 -26 -7 3 3 18 37 -11 29 3 35	71 -21 -28 -6 3 3 22 62 -21 -26 -8 3 3 13 37 -21 19 3 25	71 -21 -28 -6 3 3 22 62 -21 -26 -11 3 3 10 39 -21 21 3 3 27	64 -26 -27 3 3 9 62 -26 -26 -12 3 3 4 44 -26 21 3 3 27	57 -32 -28 -9 3 3 -6 60 -32 -26 -15 3 3 -7 42 -32 -32 -32 -32 -33 -7 -7 -9 -32 -32 -32 -32 -32 -32 -32 -32	59 -33 -28 -11 3 3 -7 55 -33 -26 -18 3 3 -16 35 -33 -5 3 3 11	-29 -28 -14 3 3 -11 50 -29 -26 -21 3 3 -20 31 -29 5 3 3 -11	11 48	Manufacturer's data 10  Manufacturer's data Manufacturer's data 8  SPL @ 5 metres		

# Barrier calculation parameters

<b>Barrier Attenuation Data</b>	d (S-B)	d (B-R)	d (S-B-R)	d (SBR)	d (SR)	a	b	C	Path Diff
h Source = 7.6m (0.6m above roof level)	9 =	A							
h Receiver = 10.0m									
h Barrier = 1.5m									
Condenser A	1.1	8.1	9.1	9.6	9.4	1.4	8.2	9.4	0.2
Condenser B	2.4	7.4	9.8	10.1	10.1	2.5	7.6	10.1	0.0
Condenser C	2.7	8.1	10.7	11.0	11.0	2.8	8.2	11.0	0.0
Freezer Condenser	1.2	7.4	8.6	9.1	8.9	1.5	7.6	8.9	0.1

