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# 1-6 Field Street and 14-16 Leeke Street London

**Planning Compliance Report**
**Report 22784.PCR.01 Rev B**

**PPF Real Estate Nominee 1 Ltd and PPF Real Estate Nominee 2 Ltd**
**c/o CBRE Global Investors**
**One New Change**
**London**
**EC4M 9AF**

| Report 22784.PCR.01<br>Revision History | | | |
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| First Issue Date: 11/05/2022 | | | |
| A | 18/05/2022<br>Changes following client comments | D | |
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| Written by: | Checked by: | Approved by: |
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KP acoustics

## Contents



**List of Attachments**

# 1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by PPF Real Estate Nominee 1 Ltd and PPF Real Estate Nominee 2 Ltd, c/o CBRE Global Investors, One New Change, London EC4M 9AF, to undertake a noise impact assessment of a proposed plant unit installation serving the building at 1-6 Field Street and 14-16 Leeke Street, London.

A 24-hour environmental noise survey has been undertaken on site in order to prepare a noise impact assessment in accordance with BS4142:2014 '*Method for rating and assessing industrial and commercial sound'* as part of the planning requirements of The London Borough of Camden.

This report presents the methodology and results from the environmental survey, followed by calculations in accordance with BS4142 to provide an indication as to the likelihood of the noise emissions from the proposed plant unit installation having an adverse impact on the closest noise sensitive receiver. Mitigation measures will be outlined as appropriate.

# 2.0 SITE SURVEYS

## 2.1 Site Description

As shown in Figure 2.1, the site is bounded by residential properties to the north, to the west and to the south, and London Underground railway tracks to the east.

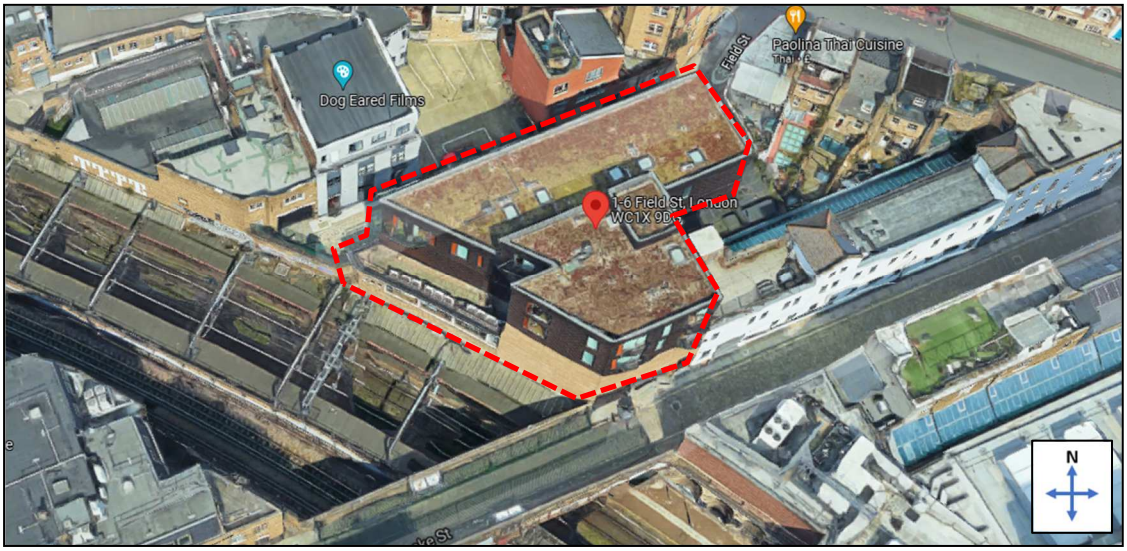


**Figure 2.1 Site Location Plan (Image Source: Google Maps)**

At the time of the survey, the background noise climate was dominated by road and rail traffic noise from King's Cross Road and the neighbouring London Underground railway tracks.

## 2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 11:55 on 11/06/2021 and 12:03 on 14/06/2021.

The environmental noise measurement position, proposed plant installation locations, and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figures 2.2 and 2.7.

| Icon | Descriptor | Location Description |
|---|---|---|
| | Noise Measurement Position 1 | The meter was installed on the rooftop of the East façade, in direct line of sight with the railway's services in-free field conditions. |
| | Noise Sensitive Receiver 1 | Southeast façade. 1st Floor window. Residential house to the Northwest at 29 Field St, London WC1X 9DA |
| | Noise Sensitive Receiver 2 | 1-6 Field St, Flat 25 Living Room |
| | Noise Sensitive Receiver 3 | 14-16 Leeke St, Flat 22 Living Room |
| | Noise Sensitive Receiver 4 | 14-16 Leeke St, Flat 23 Bedroom |
| | Noise Sensitive Receiver 5 | 1-6 Field St, Flat 23 Living Room |
| | Noise Sensitive Receiver 6 | 1-6 Field St, Flat 31 Living Room |
| | Noise Sensitive Receiver 7 | 1-6 Field St, Flat 33 Living Room |
| | Noise Sensitive Receiver 8 | 1-6 Field St, Flat 34 Bedroom |
| | Noise Sensitive Receiver 9 | 1-6 Field St, Flat 34 Living Room |
| | Proposed Plant Installation Locations | Proposed plant installations are outlined in Section 5.1 |

**Table 2.1 Measurement position and description**

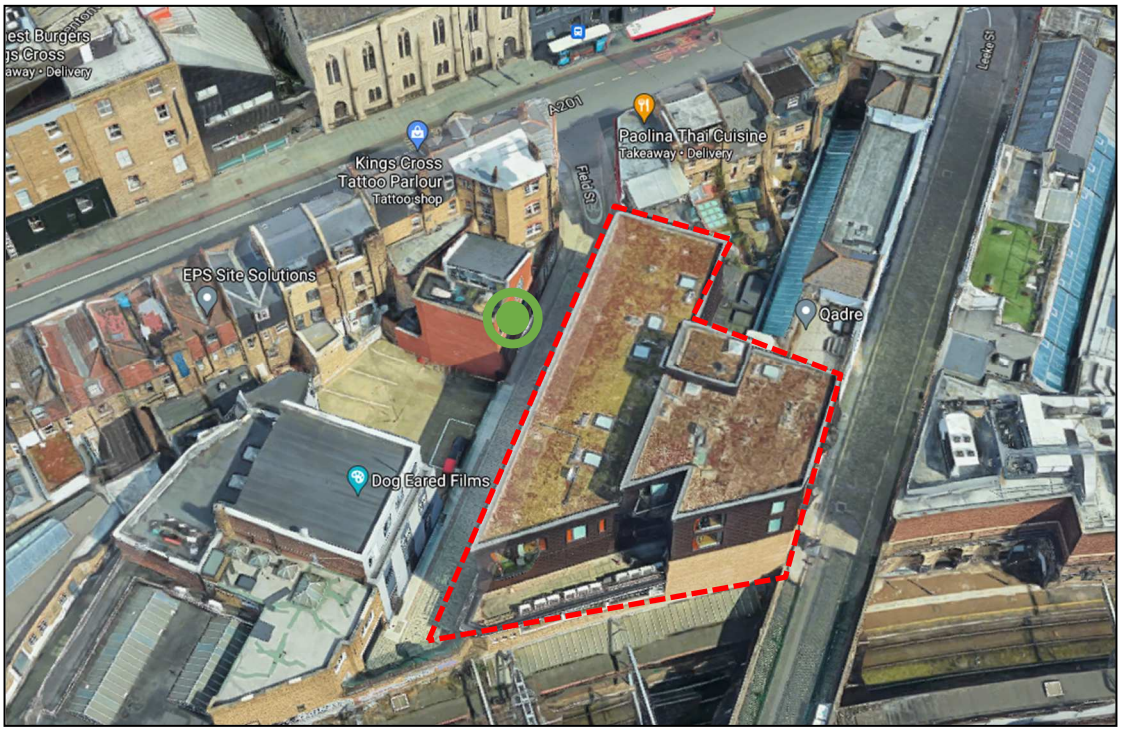


**Figure 2.2 Identified receivers and proposed plant unit installation (Image Source: FHP ESS)**

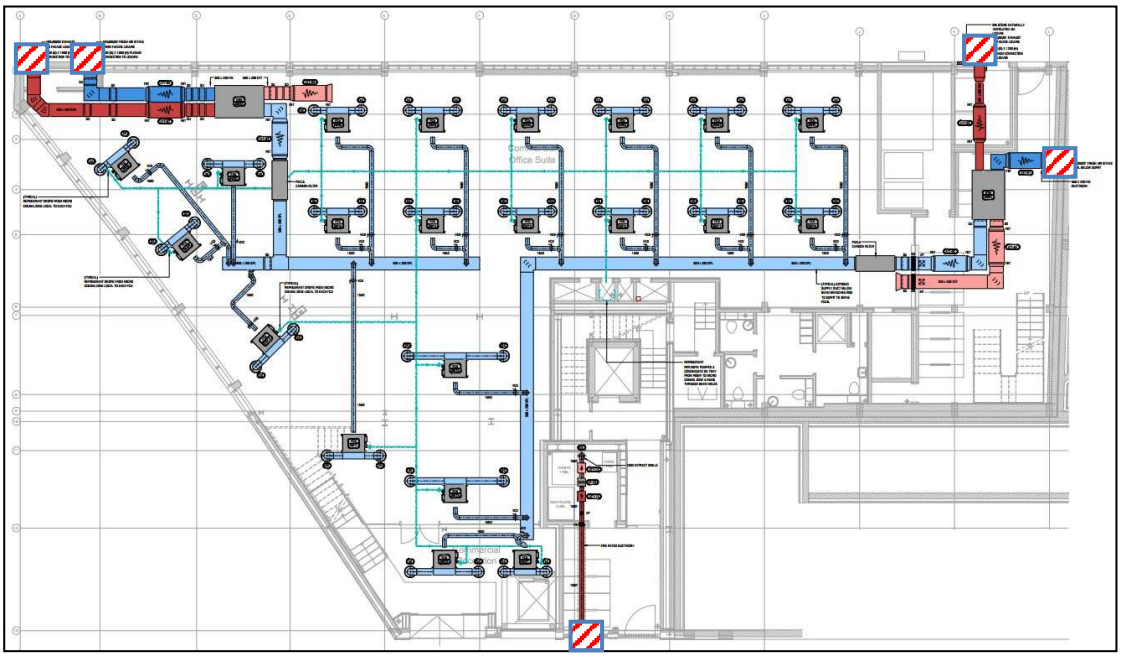

**Figure 2.3 Proposed plant unit installation – Ground Floor (Image Source: QuinnRoss)**

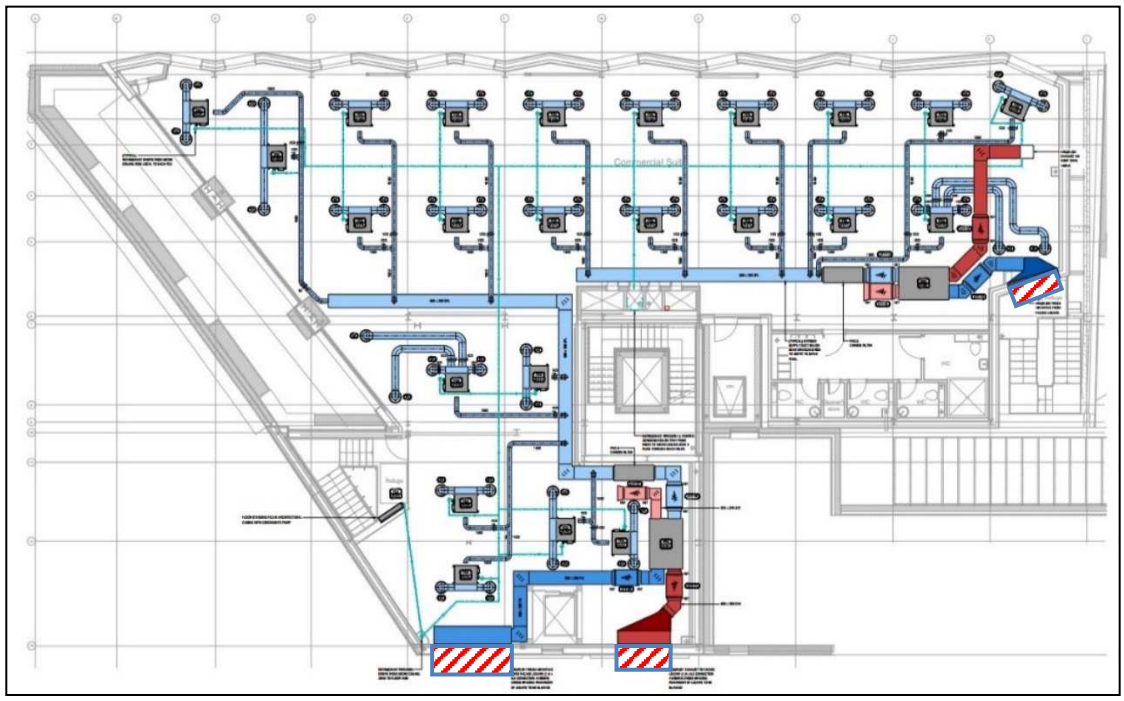

**Figure 2.4 Proposed plant unit installation – First Floor (Image Source: QuinnRoss)**

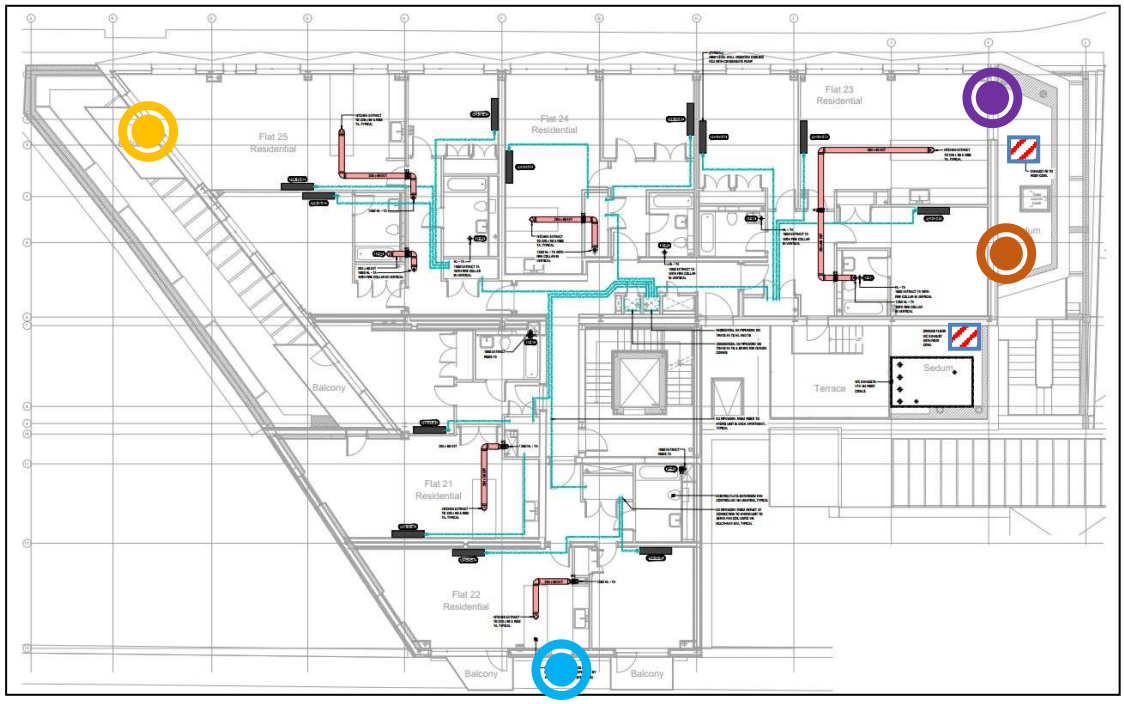


**Figure 2.5 Identified receivers and proposed plant unit installation (Image Source: QuinnRoss)**

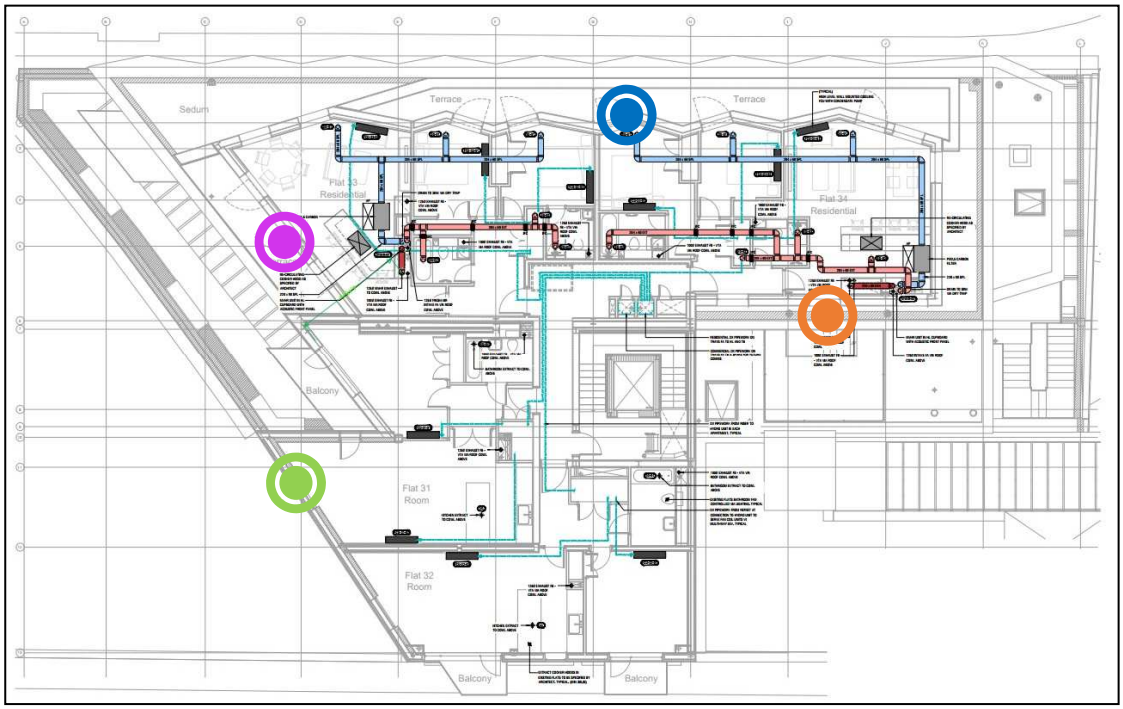


**Figure 2.6 Identified receivers and proposed plant unit installation (Image Source: QuinnRoss)**

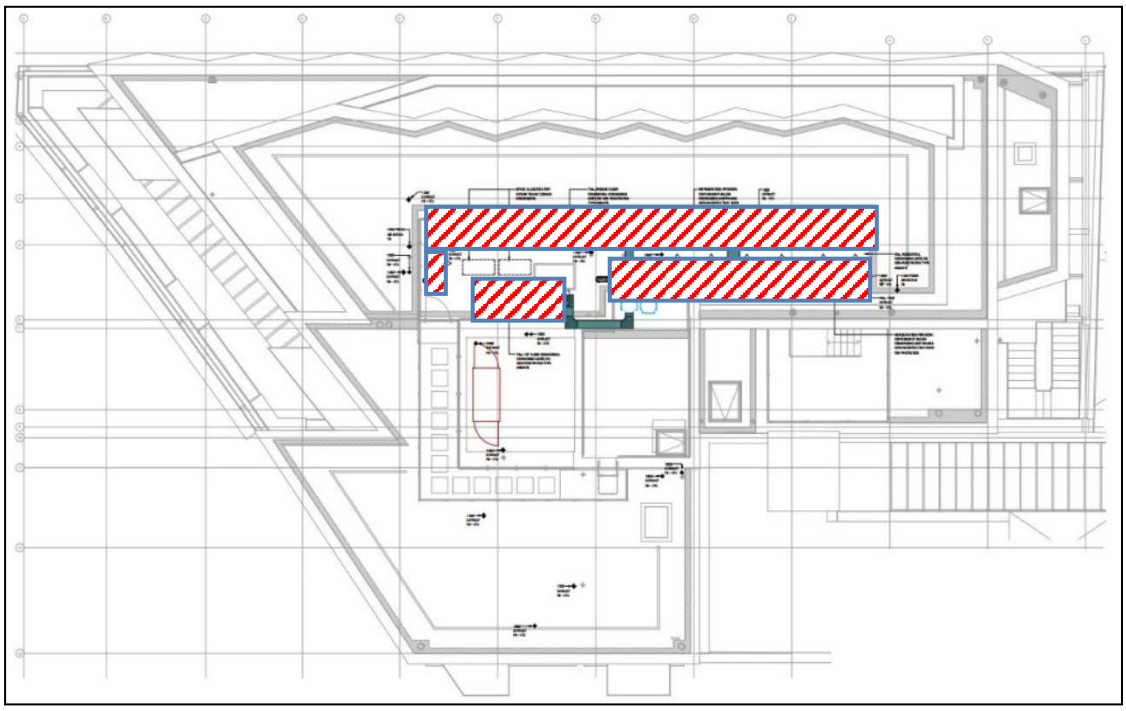

**Figure 2.7 Proposed plant unit installation (Image Source: QuinnRoss)**

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver relative to the proposed plant installation.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

## 2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

| Measurement instrumentation | | Serial no. | Date | Cert no. |
|---|---|---|---|---|
| Noise Kit 3 | Svantek Type 977 Class 1 Sound Level Meter | 34104 | 12/03/2020 | 14015015-2 |
| | Free-field microphone Aco Pacific 7052E | 66830 | | |
| | Preamp Svantek 2v12L | 17293 | | |
| | Svantek External windshield | - | - | - |
| Larson Davis CAL200 Class 1 Calibrator | | 17148 | 27/04/2021 | 05223/1 |

**Table 2.2 Measurement instrumentation**

# 3.0 RESULTS

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 22784.TH1.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey undertaken on site, as shown in 22784.Daytime.LA90 and 22784.Night-time.LA90attached.

| Time Period | Representative background noise level $L_{A90}$ dB(A) |
|---|---|
| Daytime (07:00-23:00) | 50 |
| Night-time (23:00-07:00) | 45 |

**Table 3.1 Representative background noise levels**

# 4.0 NOISE ASSESSMENT GUIDANCE

## 4.1 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

British Standard BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*' describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an $L_{A90}$ when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq,\ Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – '*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible'*
- **Impulsivity** – '*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible'*
- **Intermittency** – '*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*

- **Other sound characteristics** – '*Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied*'

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5 dB could 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 there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

*NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.*

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

### 4.2 Local Authority Guidance

The guidance provided by The London Borough of Camden for noise emissions of new plant in this instance is as follows:

*The noise criteria, as per the Local Plan 2017 of London Borough of Camden, British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' should be considered as the main reference document for the assessment. The resultant 'Rating Level' would be considered as follows:*

| Period | Assessment Location | Rating Level Acceptability Range | | |
|---|---|---|---|---|
| | | **Green:** noise is considered to be at an acceptable level | **Amber:** noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development | **Red:** noise is observed to have a significant adverse effect. |
| Daytime (7:00-23:00) | Garden used for main amenity (free field) and Outside living or dining or Bedroom window (façade) | 10dB below background | 9 dB below and 5dB above background | 5dB above background |
| Night-time (23:00-7:00) | Outside bedroom window (façade) | 10dB below background and no events exceeding 57dB $L_{Amax}$ | 9db below and 5dB above background or noise events between 57dB and 88dB $L_{Amax}$ | 5dB above background and/or events exceeding 88dB $L_{Amax}$ |

**Table 4.1 Camden noise criteria for plant and machinery**

## 4.3 Noise Emissions Criterion

It is understood only the residential systems would have the propensity to run at any time throughout the day and nigh and commercial HVAC systems would not be operational between 23:00 and 07:00.

Therefore 2 assessment have been undertaken, one running all plant during day time and the second only running residential plant during night time.

The criteria have been set as shown in Table 4.2 in order to comply with the above requirements.

| Time Period | Noise Criterion at Nearest Residential Receiver |
|---|---|
| Daytime (07:00 to 23:00) | 40dB(A) |
| Night-time (23:00 to 07:00) | 35dB(A) |

**Table 4.2 Proposed noise emissions criteria**

# 5.0 NOISE IMPACT ASSESSMENT

## 5.1 Proposed Plant Installations

It is understood that the proposed plant installation is comprised of the following units:

- 5 No. Samsung VRF AM40NXMDGR Air Conditioning Unit
- 6 No. Samsung VRF AM50NXMDGR Air Conditioning Unit
- 4 No. Samsung VRF AM60NXMDGR Air Conditioning Unit
- 5 No. Samsung VRF AE90MXTPEH Air Conditioning Unit
- 4 No. Samsung VRF AE120MXTPEH Air Conditioning Unit
- 2 No. Vent Axia MVHR - Sentinel Kinetic FH Right 408167 Heat Recovery Units
- 4 No. . Vent Axia HRU – XBC45-H-NES Heat Recovery Units
- 1 No Vent Axia Twin Fans - Slimpac EC SLPT200EC WC Extract Fan
- 1 No Vent Axia In-Line Fans - Slimpac EC SLP150EC Residential Bin Store Extract Fan
- 6 No. Vent Axia Low Carbon Silent Fans VASF100TV WC Commercial Single Extract Fan
- 9 No. Vent Axia Low Carbon Silent Fans VASF100TV WC Residential Single Extract Fan

The proposed installation location for the above proposed units will be located throughout the development, as shown in Figure 2.3 to 2.7 above.

The noise emission levels as provided by the manufacturer for the units are shown in Table 5.1.

| Unit | Descriptor | Octave Frequency Band (Hz) | | | | | | | | Overall (dBA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Samsung VRF AM40NXMDGR Air Conditioning Unit | SPL@1m (dB) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Samsung VRF AM50NXMDGR Air Conditioning Unit | SPL@1m (dB) | 51 | 51 | 50 | 46 | 45 | 43 | 36 | 25 | 50 |
| Samsung VRF AM60NXMDGR Air Conditioning Unit | SPL@1m (dB) | 53 | 53 | 52 | 48 | 46 | 40 | 36 | 24 | 51 |

| Unit | Descriptor | Octave Frequency Band (Hz) | | | | | | | | Overall (dBA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Samsung VRF AE90MXTPEH Air Conditioning Unit | SPL@1m (dB) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Samsung VRF AE120MXTPEH Air Conditioning Unit | SPL@1m (dB) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Vent Axia MVHR - Sentinel Kinetic FH Right Heat Recovery Units<br>Supply | SWL (dB) | 59 | 55 | 50 | 47 | 39 | 28 | 20 | 25 | 48 |
| Vent Axia MVHR - Sentinel Kinetic FH Right Heat Recovery Units<br>Extract | SWL (dB) | 66 | 64 | 60 | 53 | 46 | 38 | 27 | 26 | 56 |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(84.4%)<br>Intake | SWL (dB) | 79 | 71 | 71 | 60 | 60 | 58 | 50 | 41 | 67 |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(84.4%)<br>Extract | SWL (dB) | 80 | 71 | 72 | 59 | 60 | 59 | 49 | 40 | 67 |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(70.6%)<br>Intake | SWL (dB) | 75 | 67 | 67 | 56 | 56 | 54 | 46 | 37 | 63 |

| Unit | Descriptor | Octave Frequency Band (Hz) | | | | | | | | Overall (dBA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(70.6%)<br>Extract | SWL (dB) | 76 | 67 | 68 | 55 | 56 | 55 | 45 | 36 | 63 |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(76.9%)<br>Intake | SWL (dB) | 77 | 69 | 69 | 58 | 58 | 56 | 48 | 39 | 65 |
| Vent Axia HRU – XBC45-H-NES Heat Recovery Units<br>To required duty<br>(76.9%)<br>Extract | SWL (dB) | 78 | 69 | 70 | 57 | 58 | 57 | 47 | 38 | 65 |
| Vent Axia SLPT200EC WC Twin Extract Fan<br>Outlet | SWL (dB) | 55 | 59 | 48 | 54 | 46 | 48 | 39 | 42 | 55 |
| Vent Axia SLP150EC Residential Bin Store Single Extract Fan<br>Outlet | SWL (dB) | 47 | 52 | 51 | 48 | 45 | 42 | 34 | 36 | 50 |

**Table 5.1 Plant Units Noise Emission Levels as provided by the manufacturer**

**Please note the Silent Fans VASF100TV units are rated below 20dBA and therefore have not been assessed as part of this report due to a level of 20dBA being non-significant.**

## 5.2 Closest Noise Sensitive Receiver

The closest noise sensitive receivers to the proposed installation location have been identified as being residential windows of 1-6 Field Street, 14-16 Leeke Street and the neighbouring property 29 Leeke Street, located within and around the proposed development from the proposed plant installation location, as shown in Figures 2.3 to 2.7.

It should be noted the proposed plant unit would be out of line of site of the receiving window due to screening from the building envelope.

### 5.3 Calculations

The 'Rating Level' of each plant unit installation has been calculated at 1m from the closest receiver using the noise levels shown in Table 5.1, and corrected due to different acoustic propagation features such as distance, reflective surfaces, screening elements, etc.

Detailed calculations for each plant unit installation are shown in Appendix B. Predicted noise level and criterion at nearest noise sensitive location during night-time are shown in Table 5.2.

Predicted noise level and criterion at nearest noise sensitive location during daytime are shown in Table 5.3.

| Receiver | Criterion | Noise Level at 1m From the Closest Noise Sensitive Window |
|---|---|---|
| 1-6 Field St, Flat 23 Living Room | 35dB(A) | 28dB(A) |
| 1-6 Field St, Flat 31 Living Room | 35dB(A) | 31dB(A) |
| 1-6 Field St, Flat 34 Living Room | 35dB(A) | 35dB(A) |

**Table 5.2 Predicted noise level and criterion at nearest noise sensitive location during night-time**

| Receiver | Criterion | Noise Level at 1m From the Closest Noise Sensitive Window |
|---|---|---|
| Southeast façade. 1st Floor window. Residential house to the Northwest at 29 Field St, London WC1X 9DA | 40dB(A) | 39dB(A) |
| 1-6 Field St, Flat 25 Living Room | 40dB(A) | 35dB(A) |
| 14-16 Leeke St, Flat 22 Living Room | 40dB(A) | 39dB(A) |
| 14-16 Leeke St, Flat 23 Bedroom | 40dB(A) | 31dB(A) |
| 1-6 Field St, Flat 23 Living Room | 40dB(A) | 40dB(A) |
| 1-6 Field St, Flat 31 Living Room | 40dB(A) | 31dB(A) |
| 1-6 Field St, Flat 33 Living Room | 40dB(A) | 40dB(A) |

| Receiver | Criterion | Noise Level at 1m From the Closest Noise Sensitive Window |
|---|---|---|
| 1-6 Field St, Flat 34 Bedroom | 40dB(A) | 39dB(A) |
| 1-6 Field St, Flat 34 Living Room | 40dB(A) | 35dB(A) |

**Table 5.3 Predicted noise level and criterion at nearest noise sensitive location during daytime**

As shown in Appendix B, Table 5.2 and Table 5.3, transmission of noise to the nearest sensitive windows due to the effects of the unit installation satisfies the emissions criterion of The London Borough of Camden, providing that the mitigation measures outlined in Section 6 are implemented.

## 6.0 NOISE CONTROL MEASURES

In order to achieve the specific sound level and subsequent rating level shown in the assessment above, the following noise control strategy should be adopted.

### 6.1 Internal Ventilation System

In order to control the noise emissions from the internal ventilation system, acoustic silencers should be installed providing the minimum insertion loss values outlined in Table 6.1 below.

| Unit | Insertion Loss Levels (dB) in each Octave Frequency Band | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| HRU/00/01 XBC-45-H-NES Extract - Silencer - 50% open area, 8m/s, 900mm Extract | 2 | 4 | 9 | 15 | 17 | 14 | 10 | 8 |
| HRU/00/01 XBC-45-H-NES Intake - Silencer - 50% open area, 8m/s, 900mm Intake | 2 | 4 | 9 | 15 | 17 | 14 | 10 | 8 |
| HRU/00/02 XBC-45-H-NES Extract - Silencer - 50% open area, 8m/s, 900mm Extract | 2 | 4 | 9 | 15 | 17 | 14 | 10 | 8 |

| Unit | Insertion Loss Levels (dB) in each Octave Frequency Band | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| HRU/00/02 XBC-45-H-NES Extract Silencer - 50% open area, 8m/s, 900mm Intake | 2 | 4 | 9 | 15 | 17 | 14 | 10 | 8 |
| HRU/01/01 XBC-45-H-NES Extract - Silencer - 45% open area, 7m/s, 900mm Extract | 2 | 5 | 11 | 17 | 20 | 19 | 12 | 10 |
| HRU/01/01 XBC-45-H-NES Extract Silencer - 45% open area, 7m/s, 900mm Intake | 2 | 5 | 11 | 17 | 20 | 19 | 12 | 10 |
| HRU/01/02 XBC-45-H-NES Extract - Silencer - 40% open area, 6m/s, 1800mm Extract | 6 | 13 | 25 | 37 | 44 | 43 | 30 | 20 |
| HRU/01/02 XBC-45-H-NES Extract Silencer - 40% open area, 6m/s, 1800mm Intake | 6 | 13 | 25 | 37 | 44 | 43 | 30 | 20 |

**Table 6.1 Insertion loss figures to be provided by acoustic silencer**

## 6.2 Condenser Units Installed within the Rooftop plant level

In order to control the noise emissions from condenser units installed within the rooftop plant level, we would recommend that a rooftop plant enclosure is installed which should provide the minimum insertion loss levels shown in Table 6.2.

| Unit | Insertion Loss Levels (dB) in each Octave Frequency Band | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| ACC/00/02 AM50NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/00/03 AM40NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/00/04 AM40NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |

| Unit | Insertion Loss Levels (dB) in each Octave Frequency Band | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| ACC/00/05 AM40NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/00/06 AM60NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/00/07 AM50NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/00/08 AM40NXMDGR | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/01/06 AM50NXMDGR | 4 | 4 | 6 | 8 | 10 | 11 | 11 | 10 |
| ACC/21 AE90MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/22 AE120MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/23 AE90MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/24 AE90MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/25 AE120MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/31 AE90MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/32 AE120MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/33 AE120MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |
| ACC/34 AE90MXTPEH | 7 | 8 | 12 | 21 | 28 | 30 | 28 | 27 |

**Table 6.2 Insertion loss figures to be provided by acoustic enclosure**

We would recommend the following suppliers of the aforementioned enclosure/silencers:

- Environmental Equipment Corporation
- Noico Ltd
- Waterloo Acoustics
- Allaway Acoustics
- Wakefield Acoustics
- Caice

- Environ

### 6.3 Anti-Vibration Mounting Strategy

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for the installation.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

## 7.0 CONCLUSION

An environmental noise survey has been undertaken at 1-6 Field Street and 14-16 Leeke Street, London, by KP Acoustics Ltd between 11:55 on 11/06/2021 and 12:03 on 14/06/2021. The results of the survey have enabled a representative background noise level to be set.

Manufacturer’s noise data of proposed plant units has been used to obtain Specific and Rated Noise Level at the nearest noise sensitive receiver in accordance with British Standard BS4142:2014 for compliance with The London Borough of Camden requirements.

The rating level was compared with the representative background noise level to assess the likelihood of impact considering the environmental noise context of the area as per the requirements of BS4142:2014.

It has been concluded that noise emissions from the proposed plant units would not have an adverse impact on the nearest residential receivers provided that the noise control strategy presented in Section 6 is followed.

Rooftop level, facing Leeke Street
Environmental Noise Time History
From 11 June 2021 To 14 June 2021

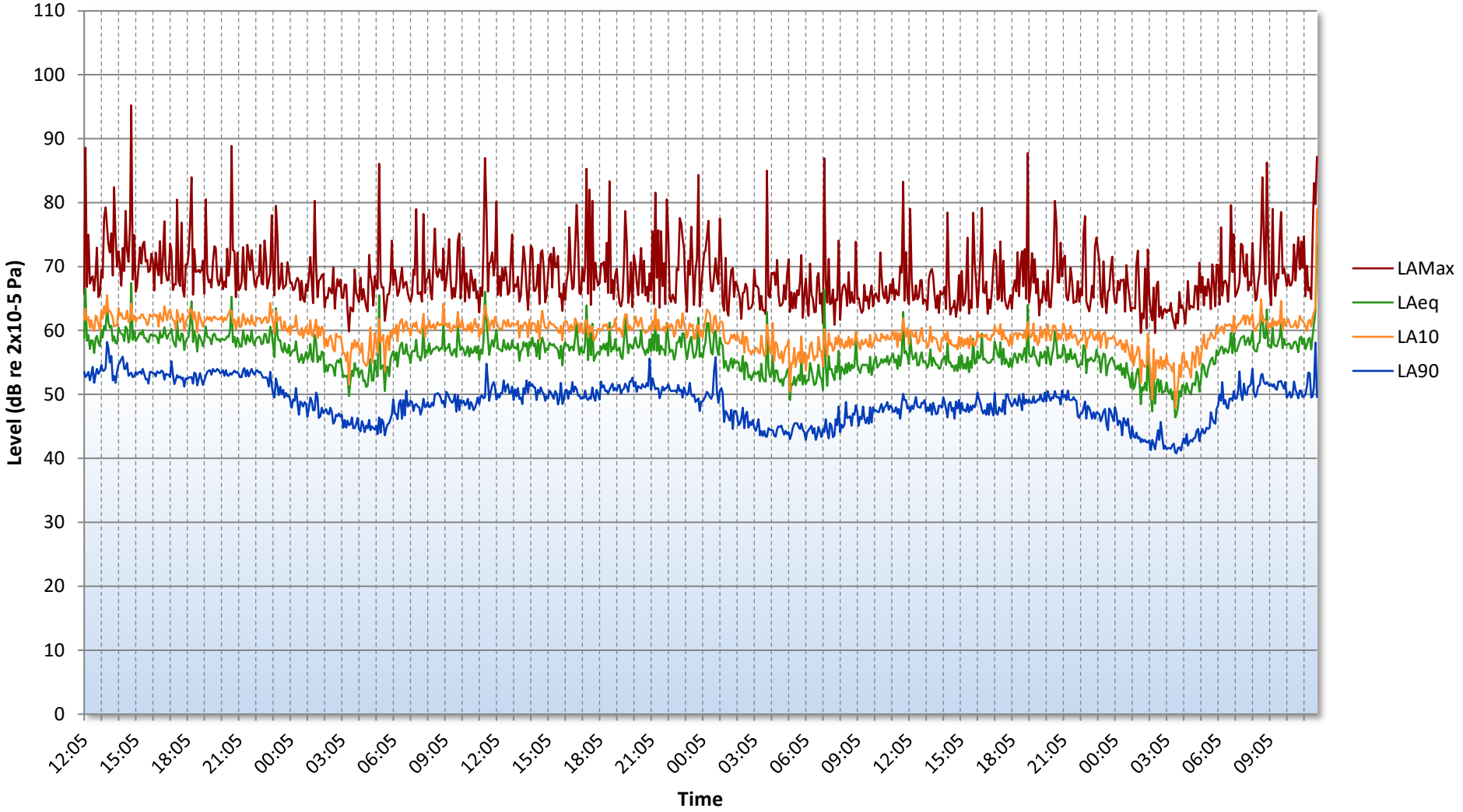


**Figure 22784.TH1**

Rooftop level, facing Leeke Street
Representative Daytime Background Noise Level
From 11 June 2021 To 14 June 2021

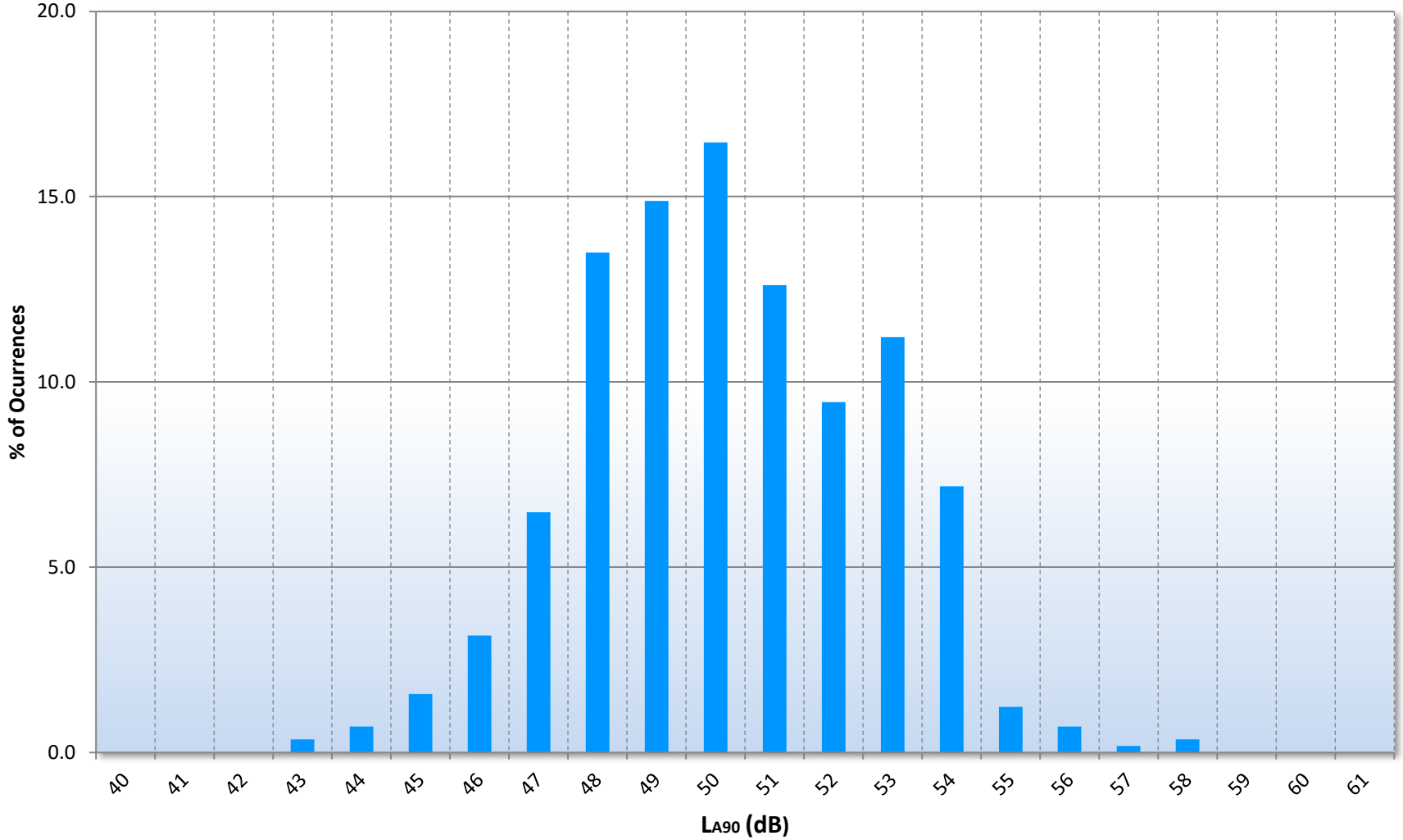


**Figure 22784.L90**

Rooftop level, facing Leeke Street
Representative Night-time Background Noise Level
From 11 June 2021 To 14 June 2021

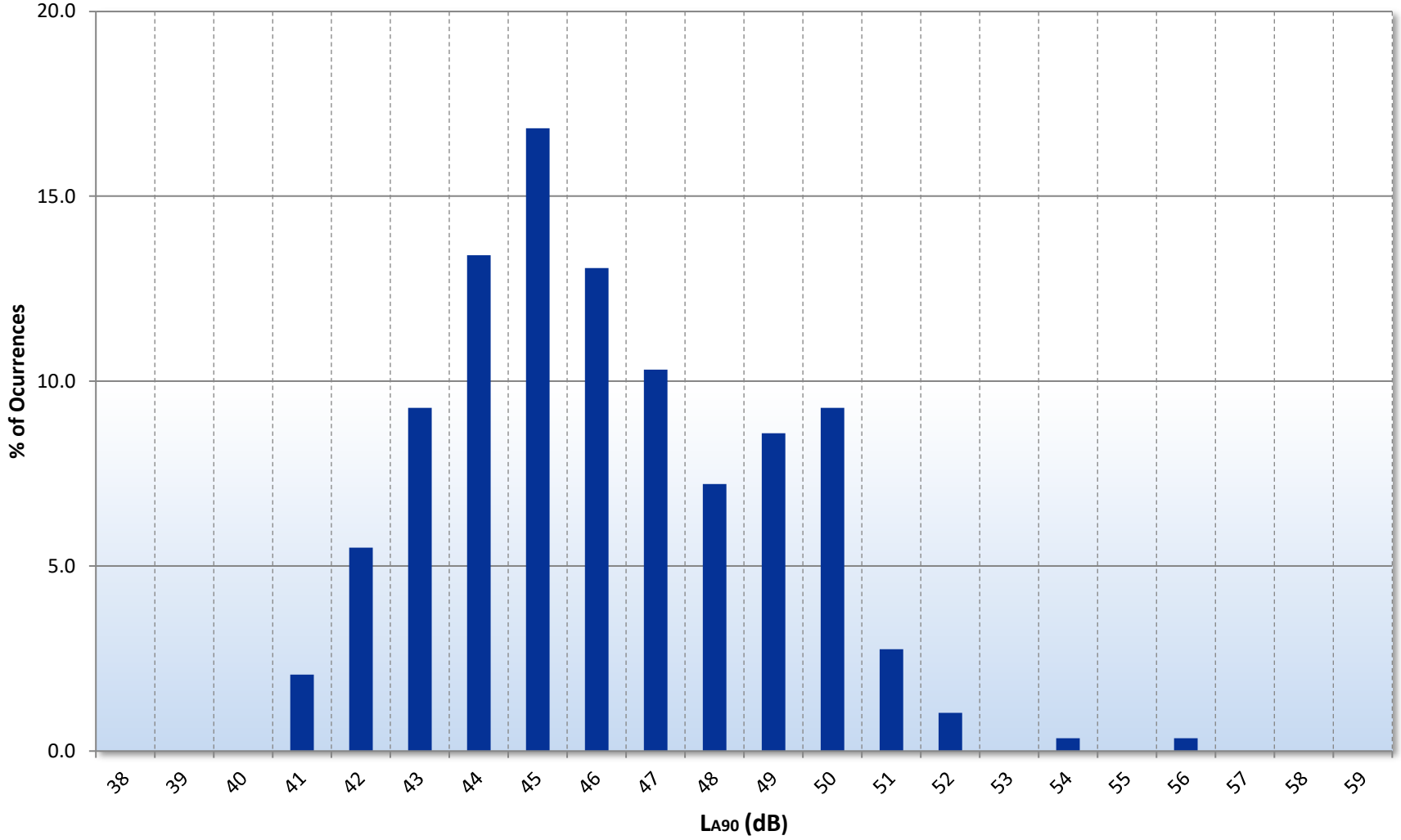


**Figure 22784.L90**

# APPENDIX A

## GENERAL ACOUSTIC TERMINOLOGY

### Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of $10^{13}$ units, that only a logarithmic scale is the sensible solution for displaying such a range.

### Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

**$L_{eq}$**

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level $L_{eq}$. The $L_{eq}$ is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

**$L_{10}$**

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

**$L_{90}$**

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

**$L_{max}$**

This is the maximum sound pressure level that has been measured over a period.

### Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

# APPENDIX A

## APPLIED ACOUSTIC TERMINOLOGY

### Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

### Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

### Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

| Change in sound level (dB) | Change in perceived loudness |
|---|---|
| 1 | Imperceptible |
| 3 | Just barely perceptible |
| 6 | Clearly noticeable |
| 10 | About twice as loud |

### Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

### Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

### Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

# APPENDIX B

## The Joint, Field and Leeke Street
### PLANT NOISE EMISSIONS CALCULATIONS DURING NIGHT-TIME

| Source: AC units rooftop level 4<br>Receiver: 1-6 Field St, Flat 34 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| ACC-24 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2m), dB | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **42** | **42** | **31** | **17** | **11** | **1** | **-1** | **0** | **28** |
| ACC/23 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2m), dB | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **42** | **42** | **31** | **17** | **11** | **1** | **-1** | **0** | **28** |
| ACC/25 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3m), dB | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **38** | **35** | **31** | **17** | **6** | **1** | **-3** | **0** | **25** |
| ACC/21 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2.5m), dB | -8 | -8 | -8 | -8 | -8 | -8 | -8 | -8 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **40** | **40** | **29** | **15** | **9** | **-1** | **-3** | **0** | **26** |
| ACC/22 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **36** | **33** | **29** | **15** | **4** | **-1** | **-5** | **0** | **23** |
| ACC/00/08 AM40NXMDGR (SPL@1m) | **Not running during night-time** | | | | | | | | |
| ACC/34 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **37** | **26** | **12** | **6** | **-4** | **-6** | **0** | **23** |
| ACC/33 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **34** | **30** | **16** | **5** | **0** | **-4** | **0** | **24** |
| ACC/31 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **37** | **26** | **12** | **6** | **-4** | **-6** | **0** | **23** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ACC/32 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **36** | **33** | **29** | **15** | **4** | **-1** | **-5** | **0** | **23** |
| ACC/00/07 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **49** | **48** | **39** | **25** | **17** | **9** | **6** | **10** | **35** |

| | |
|---|---|
| **Design Criterion** | **35** |

| **Source: AC units rooftop level 4**<br>**Receiver: 1-6 Field St, Flat 34 Bedroom** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| ACC/00/06 AM60NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/00/05 AM40NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/06 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/00/04 AM40NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/00/03 AM40NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/00/02 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/07 AM60NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/05 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/04 AM60NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| **Source: AC units rooftop level 4**<br>**Receiver: 1-6 Field St, Flat 33 Living Room** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| ACC/01/01 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/02 AM60NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/00/01 AM40NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| ACC/01/03 AM50NXMDGR (SPL@1m) | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| **Source: HRU/00/01 Ground floor**<br>**Receiver: 29 Field St, London WC1X 9DA - First Floor window** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| HRU/00/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Extract | Not running during night-time | | | | | | | | |
| HRU/00/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Intake | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| **Source: HRU/00/02 Ground floor**<br>**Receiver: 1-6 Field St, Flat 25 Living Room** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| HRU/00/02 XBC-45-H-NES (SWL) to required duty (70.6%) - Extract | Not running during night-time | | | | | | | | |
| HRU/00/02 XBC-45-H-NES (SWL) to required duty (70.6%) - Intake | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| **Source: EF/02 Second Floor**<br>**Receiver: 14-16 Leeke St, Flat 23 Bedroom** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| EF/02 SLP150EC (SWL) - Outlet | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| Source: EF/03 Ground floor and HRU/01/01 First Floor<br>Receiver: 14-16 Leeke St, Flat 22 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| EF/03 SLP150EC (SWL) - Outlet | Not running during night-time | | | | | | | | |
| HRU/01/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Extract | Not running during night-time | | | | | | | | |
| HRU/01/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Intake | Not running during night-time | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

| | |
|---|---|
| **Design Criterion** | **35** |

| Source: HRU/01/02 First floor and MVHR/02<br>Receiver: 1-6 Field St, Flat 23 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| HRU/01/02 XBC-45-H-NES (SWL) to required duty (76.9%) - Extract | Not running during night-time | | | | | | | | |
| HRU/01/02 XBC-45-H-NES (SWL) to required duty (76.9%) - Intake | Not running during night-time | | | | | | | | |
| MVHR 02 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Outlet | 66 | 64 | 60 | 53 | 46 | 38 | 27 | 26 | 56 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **37** | **35** | **31** | **24** | **17** | **9** | **-2** | **0** | **27** |
| MVHR 02 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Inlet | 59 | 55 | 50 | 47 | 39 | 28 | 20 | 25 | 48 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **30** | **26** | **21** | **18** | **10** | **-1** | **-9** | **0** | **19** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **38** | **36** | **32** | **25** | **18** | **10** | **-1** | **3** | **28** |

| | |
|---|---|
| **Design Criterion** | **35** |

| Source: MVHR/01 Third floor<br>Receiver: 1-6 Field St, Flat 31 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| MVHR 01 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Outlet | 66 | 64 | 60 | 53 | 46 | 38 | 27 | 26 | 56 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **41** | **39** | **35** | **28** | **21** | **13** | **2** | **0** | **30** |
| MVHR 01 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Inlet | 59 | 55 | 50 | 47 | 39 | 28 | 20 | 25 | 48 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **34** | **30** | **25** | **22** | **14** | **3** | **-5** | **0** | **23** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **42** | **40** | **35** | **29** | **22** | **13** | **3** | **3** | **31** |

| | |
|---|---|
| **Design Criterion** | **35** |

# APPENDIX B

## The Joint, Field and Leeke Street
### PLANT NOISE EMISSIONS CALCULATIONS DURING DAYTIME

| Source: AC units rooftop level 4<br>Receiver: 1-6 Field St, Flat 34 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| ACC-24 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2m), dB | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **42** | **42** | **31** | **17** | **11** | **1** | **-1** | **0** | **28** |
| ACC/23 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2m), dB | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **42** | **42** | **31** | **17** | **11** | **1** | **-1** | **0** | **28** |
| ACC/25 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3m), dB | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **38** | **35** | **31** | **17** | **6** | **1** | **-3** | **0** | **25** |
| ACC/21 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2.5m), dB | -8 | -8 | -8 | -8 | -8 | -8 | -8 | -8 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **40** | **40** | **29** | **15** | **9** | **-1** | **-3** | **0** | **26** |
| ACC/22 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **36** | **33** | **29** | **15** | **4** | **-1** | **-5** | **0** | **23** |
| ACC/00/08 AM40NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **27** | **26** | **21** | **8** | **0** | **-3** | **-9** | **0** | **15** |
| ACC/34 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **37** | **26** | **12** | **6** | **-4** | **-6** | **0** | **23** |
| ACC/33 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **34** | **30** | **16** | **5** | **0** | **-4** | **0** | **24** |
| ACC/31 AE90MXTPEH (SPL@1m) | 57 | 58 | 51 | 46 | 47 | 39 | 35 | 23 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3.5m), dB | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **37** | **37** | **26** | **12** | **6** | **-4** | **-6** | **0** | **23** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ACC/32 AE120MXTPEH (SPL@1m) | 57 | 55 | 55 | 50 | 46 | 43 | 37 | 26 | 52 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -7 | -8 | -12 | -21 | -28 | -30 | -28 | -27 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **36** | **33** | **29** | **15** | **4** | **-1** | **-5** | **0** | **23** |
| | | | | | | | | | |
| ACC/00/07 AM50NXMDGR (SPL@1m) | 51 | 51 | 50 | 46 | 45 | 43 | 36 | 25 | 50 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **31** | **31** | **28** | **22** | **19** | **16** | **9** | **0** | **25** |
| | | | | | | | | | |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **49** | **48** | **40** | **27** | **21** | **17** | **11** | **10** | **35** |

| | |
|---|---|
| **Design Criterion** | **40** |

| **Source: AC units rooftop level 4**<br>**Receiver: 1-6 Field St, Flat 34 Bedroom** | ***Frequency, Hz***<br>***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| ACC/00/06 AM60NXMDGR (SPL@1m) | 53 | 53 | 52 | 48 | 46 | 40 | 36 | 24 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **33** | **33** | **30** | **24** | **20** | **13** | **9** | **0** | **27** |
| | | | | | | | | | |
| ACC/00/05 AM40NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **32** | **32** | **29** | **23** | **20** | **18** | **10** | **0** | **26** |
| | | | | | | | | | |
| ACC/01/06 AM50NXMDGR (SPL@1m) | 51 | 51 | 50 | 46 | 45 | 43 | 36 | 25 | 50 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **33** | **33** | **30** | **24** | **21** | **18** | **11** | **0** | **27** |
| | | | | | | | | | |
| ACC/00/04 AM40NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **32** | **32** | **29** | **23** | **20** | **18** | **10** | **0** | **26** |
| | | | | | | | | | |
| ACC/00/03 AM40NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **32** | **32** | **29** | **23** | **20** | **18** | **10** | **0** | **26** |
| | | | | | | | | | |
| ACC/00/02 AM50NXMDGR (SPL@1m) | 51 | 51 | 50 | 46 | 45 | 43 | 36 | 25 | 50 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Enclosure | -4 | -4 | -6 | -8 | -10 | -11 | -11 | -10 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **31** | **31** | **28** | **22** | **19** | **16** | **9** | **0** | **25** |
| | | | | | | | | | |
| ACC/01/07 AM60NXMDGR (SPL@1m) | 53 | 53 | 52 | 48 | 46 | 40 | 36 | 24 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **35** | **35** | **34** | **30** | **28** | **22** | **18** | **0** | **33** |
| | | | | | | | | | |
| ACC/01/05 AM50NXMDGR (SPL@1m) | 51 | 51 | 50 | 46 | 45 | 43 | 36 | 25 | 50 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (7m), dB | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **32** | **32** | **31** | **27** | **26** | **24** | **17** | **0** | **31** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ACC/01/04 AM60NXMDGR (SPL@1m) | 53 | 53 | 52 | 48 | 46 | 40 | 36 | 24 | 51 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (7m), dB | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **34** | **34** | **33** | **29** | **27** | **21** | **17** | **0** | **32** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **43** | **43** | **41** | **36** | **34** | **29** | **24** | **10** | **39** |

| | |
|---|---|
| **Design Criterion** | **40** |

| **Source: AC units rooftop level 4**<br>**Receiver: 1-6 Field St, Flat 33 Living Room** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| ACC/01/01 AM50NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **36** | **36** | **35** | **31** | **30** | **29** | **21** | **0** | **35** |
| ACC/01/02 AM60NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **34** | **34** | **33** | **29** | **28** | **27** | **19** | **0** | **33** |
| ACC/00/01 AM40NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (5m), dB | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **34** | **34** | **33** | **29** | **28** | **27** | **19** | **0** | **33** |
| ACC/01/03 AM50NXMDGR (SPL@1m) | 50 | 50 | 49 | 45 | 44 | 43 | 35 | 24 | 49 |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Samsung AHU Cooling Coil DX units** | **32** | **32** | **31** | **27** | **26** | **25** | **17** | **0** | **32** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **40** | **40** | **39** | **35** | **34** | **33** | **25** | **6** | **40** |

| | |
|---|---|
| **Design Criterion** | **40** |

| **Source: HRU/00/01 Ground floor**<br>**Receiver: 29 Field St, London WC1X 9DA - First Floor window** | ***Frequency, Hz*** | | | | | | | | ***dB(A)*** |
|---|---|---|---|---|---|---|---|---|---|
| | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | |
| HRU/00/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Extract | 80 | 71 | 72 | 59 | 60 | 59 | 49 | 40 | 67 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Silencer - 50% open area, 8m/s, 900mm | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **58** | **47** | **43** | **24** | **23** | **25** | **19** | **0** | **38** |
| HRU/00/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Intake | 79 | 71 | 71 | 60 | 60 | 58 | 50 | 41 | 67 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | ` | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (8m), dB | -18 | -18 | -18 | -18 | -18 | -18 | -18 | -18 | |
| Silencer - 50% open area, 8m/s, 900mm | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **51** | **41** | **36** | **16** | **17** | **18** | **14** | **0** | **31** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **59** | **48** | **44** | **25** | **24** | **26** | **20** | **3** | **39** |

| | |
|---|---|
| **Design Criterion** | **40** |

| Source: HRU/00/02 Ground floor<br>Receiver: 1-6 Field St, Flat 25 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| HRU/00/02 XBC-45-H-NES (SWL) to required duty (70.6%) - Extract | 76 | 67 | 68 | 55 | 56 | 55 | 45 | 36 | 63 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to directivity, dB | 3 | 3 | 3 | 3 | -3 | -11 | -11 | -11 | |
| Silencer - 50% open area, 8m/s, 900mm | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **53** | **42** | **38** | **19** | **13** | **6** | **0** | **0** | **33** |
| HRU/00/02 XBC-45-H-NES (SWL) to required duty (70.6%) - Intake | 75 | 67 | 67 | 56 | 56 | 54 | 46 | 37 | 63 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to directivity, dB | 3 | 3 | 3 | 3 | -3 | -11 | -11 | -11 | |
| Silencer - 50% open area, 8m/s, 900mm | -2 | -4 | -9 | -15 | -17 | -14 | -10 | -8 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **52** | **42** | **37** | **20** | **13** | **5** | **1** | **0** | **32** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **56** | **45** | **41** | **23** | **16** | **9** | **4** | **3** | **35** |

| | |
|---|---|
| **Design Criterion** | **40** |

| Source: EF/02 Second Floor<br>Receiver: 14-16 Leeke St, Flat 23 Bedroom | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| EF/02 SLP150EC (SWL) - Outlet | 47 | 52 | 51 | 48 | 45 | 42 | 34 | 36 | 50 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (2m), dB | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Extract Fan** | **28** | **33** | **32** | **29** | **26** | **23** | **15** | **17** | **31** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **28** | **33** | **32** | **29** | **26** | **23** | **15** | **17** | **31** |

| | |
|---|---|
| **Design Criterion** | **40** |

| Source: EF/03 Ground floor and HRU/01/01 First Floor<br>Receiver: 14-16 Leeke St, Flat 22 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| EF/03 SLP150EC (SWL) - Outlet | 47 | 52 | 51 | 48 | 45 | 42 | 34 | 36 | 50 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to directivity, dB | 3 | 2 | 1 | -4 | -11 | -11 | -11 | -11 | |
| **Total sound pressure level from Extract Fan** | **26** | **30** | **28** | **21** | **10** | **7** | **-1** | **0** | **23** |
| HRU/01/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Extract | 80 | 71 | 72 | 59 | 60 | 59 | 49 | 40 | 67 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to directivity, dB | 4 | 4 | 4 | 4 | -2 | -11 | -11 | -11 | |
| Silencer - 45% open area, 7m/s, 900mm | -2 | -5 | -11 | -17 | -20 | -19 | -12 | -10 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **58** | **46** | **41** | **22** | **14** | **5** | **2** | **0** | **37** |
| HRU/01/01 XBC-45-H-NES (SWL) to required duty (84.4%) - Intake | 79 | 71 | 71 | 60 | 60 | 58 | 50 | 41 | 67 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to directivity, dB | 4 | 4 | 4 | 4 | -2 | -11 | -11 | -11 | |
| Silencer - 45% open area, 7m/s, 900mm | -2 | -5 | -11 | -17 | -20 | -19 | -12 | -10 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **57** | **46** | **40** | **23** | **14** | **4** | **3** | **0** | **36** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **61** | **50** | **44** | **27** | **18** | **11** | **7** | **5** | **39** |

| | |
|---|---|
| **Design Criterion** | **40** |

| Source: HRU/01/02 First floor and MVHR/02<br>Receiver: 1-6 Field St, Flat 23 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| HRU/01/02 XBC-45-H-NES (SWL) to required duty (76.9%) - Extract | 78 | 69 | 70 | 57 | 58 | 57 | 47 | 38 | 65 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Silencer - 40% open area, 6m/s, 1800mm | -6 | -13 | -25 | -37 | -44 | -43 | -30 | -20 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **64** | **48** | **37** | **12** | **6** | **6** | **9** | **0** | **39** |
| HRU/01/02 XBC-45-H-NES (SWL) to required duty (76.9%) - Intake | 77 | 69 | 69 | 58 | 58 | 56 | 48 | 39 | 65 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (3m), dB | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| Correction due to directivity, dB | 4 | 4 | 4 | 4 | -2 | -11 | -11 | -11 | |
| Silencer - 40% open area, 6m/s, 1800mm | -6 | -13 | -25 | -37 | -44 | -43 | -30 | -20 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **57** | **42** | **30** | **7** | **-6** | **-16** | **-11** | **0** | **33** |
| MVHR 02 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Outlet | 66 | 64 | 60 | 53 | 46 | 38 | 27 | 26 | 56 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **37** | **35** | **31** | **24** | **17** | **9** | **-2** | **0** | **27** |
| MVHR 02 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Inlet | 59 | 55 | 50 | 47 | 39 | 28 | 20 | 25 | 48 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (6m), dB | -16 | -16 | -16 | -16 | -16 | -16 | -16 | -16 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **30** | **26** | **21** | **18** | **10** | **-1** | **-9** | **0** | **19** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **65** | **49** | **39** | **26** | **19** | **11** | **10** | **6** | **40** |

| | |
|---|---|
| **Design Criterion** | **40** |

| Source: MVHR/01 Third floor<br>Receiver: 1-6 Field St, Flat 31 Living Room | Frequency, Hz<br>63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| MVHR 01 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Outlet | 66 | 64 | 60 | 53 | 46 | 38 | 27 | 26 | 56 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Extract** | **41** | **39** | **35** | **28** | **21** | **13** | **2** | **0** | **30** |
| MVHR 01 Heat Recovery - Sentinel Kinetic FH Right (SWL) - Inlet | 59 | 55 | 50 | 47 | 39 | 28 | 20 | 25 | 48 |
| SWL to SPL | -11 | -11 | -11 | -11 | -11 | -11 | -11 | -11 | |
| Correction due to surface reflections (1), dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Minimum attenuation provided by distance (4m), dB | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | |
| Correction due to building envelope | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| **Total sound pressure level from Vent Axia HRU unit - Intake** | **34** | **30** | **25** | **22** | **14** | **3** | **-5** | **0** | **23** |
| **Total Rating Noise Level of all Plant Unit Installations at Receiver** | **42** | **40** | **35** | **29** | **22** | **13** | **3** | **3** | **31** |

| | |
|---|---|
| **Design Criterion** | **40** |

# APPENDIX C

## ANTI-VIBRATION MOUNTING SPECIFICATION REFERENCE DOCUMENT

**1.0 General**

1.1 All mountings shall provide the static deflection, under the equipment weight, shown in the schedules. Mounting selection should allow for any eccentric load distribution or torque reaction, so that the design deflection is achieved on all mountings under the equipment, under operating conditions.

1.2 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.3 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Service Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

**2.1 Type A Mounting (Caged Spring Type)**

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principle isolation elements, and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height, and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment as a result of vibration or accidental or unauthorised tampering.

**2.2 Type B Mounting (Open Spring Type)**

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements, and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

### 2.3 Type C Mounting (Rubber/Neoprene Type)

Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device, and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

## 3.0 Plant Bases

### 3.1 Type A Bases (A.V. Rails)

An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary should be checked by the Structural Engineer.

### 3.2 Type B Bases (Steel Plant Bases)

Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment, and fitted with isolator height saving brackets. The frame depth shall be approximately 1/10 of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

### 3.3 Type C Bases (Concrete Inertia Base: for use with steel springs)

These shall consist of an all-welded steel pouring frame-work with height saving brackets, and a frame depth of approximately 1/12 of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/$m^3$) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.