El Macho, 103 Portland Street, Manchester

Plant Noise Assessment

Report 13/4342/R01-2

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13/4342/SP1
Site plan showing noise measurement position

13/4342/TH01
Tim history showing attended noise measurement results

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Plant noise schedule

13/4342/SS1
Silencer Schedule

Glossary of Acoustic Terms

1 Introduction

1.1 It is proposed to install new kitchen supply and extract fans at El Macho, Ground Floor 103 Portland Street, Manchester.

1.2 Cole Jarman have been appointed to conduct an assessment of the mechanical services noise in order to meet the noise requirements set by the local planning authority.

1.3 This report presents the existing noise levels at the site and sets out plant noise limits to which the units will need to adhere in order to meet the local planning authority's noise requirements.

1.4 This report also provides details of an assessment of the proposed extract and supply fans and compares the results to the noise limits set, proposing mitigation measures as necessary.

2 Site Description

2.1 General

2.1.1 103 Portland Street is a seven storey building with a restaurant located at ground floor level and residential elements above. The building is located at the corner of Portland Street and Princess Street which are located to the north west and north east of the building respectively.

2.1.2 Attached to the south west and south east of the site are more seven storey buildings with a mixture of residential and commercial uses.

2.2 Proposed Installation

2.2.1 It is proposed to install a new kitchen extract fan and supply fan within a plant room in the new restaurant demise.

2.2.2 The new extract system will terminate at high level towards the rear of the restaurant. The supply system will terminate at low level within an existing light well within the middle of the building.

2.3 Noise Sensitive Receptors

2.3.1 The nearest noise sensitive receiver to the proposed extract termination is located on the top floor of 103, Portland Street, overlooking Princess Street.

2.3.2 The nearest noise sensitive receiver to the proposed supply termination is located within the existing light well. It is understood that this is at least 5m away from the supply termination.

3 Noise Survey Methodology and Instrumentation

3.1 An unattended noise survey was undertaken between Friday 10th and Monday 13th January 2014.

3.2 The noise monitoring equipment was setup at one position on the roof of 103 Portland Street.

3.3 Noise levels at the measurement position were dominated by road traffic noise from Princess Street . Road traffic noise from Princess Street will be the dominant noise source at the nearest windows to the extract the plant noise limits from this measurement position have been used to set noise limits for the extract system. This is expected to be a worst case assessment for the low level extract system.

3.4 The measurement location is shown on attached site plan 13/4342/SP1 and described below:

- MP1, façade measurement position located on the roof of 103 Portland Street. The microphone was located approximately 1.5m above roof level.

3.5 Measurements of the L_{Amax}, L_{Aeq} and L_{A90} indices were made over 10 minute periods (see the Glossary of Acoustic Terms for an explanation of the noise units used).

Noise measurements were made the equipment listed in table T1 below.

Item	Manufacturer	Type
Sound level analyser (class 1)	Norsonic	118
Acoustic calibrator	Norsonic	1251

T1 Equipment used during attended noise survey.

3.6 The microphone was fitted with a weatherproof windshield and was calibrated before and after the survey to ensure that a consistent and acceptable level of accuracy was maintained throughout.

3.7 The weather conditions when setting up the equipment were wet and cold with a slight northerly breeze. The noise monitoring equipment was setup over the full weekend period and it is understood that the weather conditions were dry from the Saturday morning onwards. Weather conditions when picking up the equipment were dry with clear skies and no wind.

4 Noise Survey Results

4.1 The results of the attended noise measurements are shown in the attached schedule 13/4342/TH01.

4.2 The schedule shows that the minimum measured L_{A90} before 2300 hours was 48 dB(A). The minimum measured L_{A90} measured after 2300 hours was 46 dB(A).

4.3 The octave band noise data for the minimum measured background noise levels are shown in the table below

	Measured L_{90} Background Levels Octave Band Centred Frequency (Hz)								
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Minimum noise level before 2300	59	51	49	45	44	39	23	18	48
Minimum 24hr noise level	56	49	47	44	41	36	26	15	46

T2 Minimum measured noise spectrum

5 Guidance

5.1 Council Guidance

5.1.1 Plant noise limits for all new mechanical services plant items to be installed at the development need to meet the noise requirement of Manchester City Council NSE6, as shown below;

"NSE6

Noise – External Equipment Insulation

Externally mounted ancillary plant, equipment and servicing shall be acoustically treated in accordance with a scheme designed so as to achieve a noise level of 5dB below the existing background (L_{A90}) in each octave band at the nearest noise sensitive location.

Reason – To safeguard the amenities of the occupiers of nearby residential accommodation."

5.1.2 Noise limits for the proposed extract system will be based on the noise levels measured during the survey period and the guidance provided by the council above.

5.2 Light Well Noise Limits

5.2.1 During the noise survey it wasn't possible to conduct a noise measurement within the existing light well so it is not possible to set noise limits based on the existing background noise level as required by the council above.

5.2.2 Noise levels within the light well are expected to be dominated by the same road traffic noise sources as at the measurement position but the existing noise levels within the light well expected to be lower than those measured on the roof.

5.2.3 To safeguard the amenities of the occupiers of nearby residential accommodation from noise generated by the supply fan plant noise limits of NR 25dB are proposed at the nearest residential window located within the light well. The plant noise limits based on the NR 25 curve are shown in the table below:

Plant noise limits at the nearest residential facade	**Noise Emission Limit Octave Band Centred Frequency (Hz)**								
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Light well plant noise limits (24h)	55	44	35	29	25	22	19	18	30

T3 Noise limits within the light well

5.2.4 The noise limits shown in the table below are deemed suitable as they considered to be "very low" by BS4142 as detailed in the quote below.

"For the purposes of this standard, background noise levels below about 30dB(A) and rating levels below about 35dB(A) are considered to be very low"

5.2.5 Recommended internal noise limits are provided within BS8233: 2014 and are repeated in the table below:

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

T4 Table 4 of BS 8233:2014

5.2.6 A partially open window is expected to provide between 10-15 dB(A) reduction so noise levels from the fan would be below 20 dB(A) within any habitable rooms with the window open and significantly lower with the window closed. This is below the recommended internal noise level of 30 dB(A) at night and so is acceptable.

6 Plant Noise Limits

6.1 Plant noise limits for all new mechanical services plant items to be installed at the development need to meet the noise requirement of Manchester City Council NSE6 as detailed in section 2.3.1 above.

6.2 The plant noise limits during the day and night time periods for the extract system have been calculated based on the guidance give in section 5 above and are shown in the table below:

Plant noise limits at the nearest residential facade	**Noise Emission Limit Octave Band Centred Frequency (Hz)**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Extract Fan								
Limits between 0900-2300	54	46	44	40	39	34	24	13
24hr noise limits	51	44	42	39	36	31	21	10
Supply Fan								
24hr noise limits	55	44	35	29	25	22	19	18

T5 Plant Noise Limits

7 Plant Noise Assessment

7.1 Plant Details

7.1.1 It is proposed to install 1 supply and 1 extract fan on the site. Details of the fans are provided below:

- Kitchen Extract – MUB 062 630D4 IE 2 Multi-box Fan
- Kitchen Supply – RS 70-40L1

7.1.2 Details of the fans being installed on site have been taken from the Combi Vent report titled "Proposed Ventilation System At: 103 Portland Street, Manchester, M1 6DF".

7.1.3 Noise data for the fans have been provided by the manufacturer and are shown in attached plant noise schedule 13/4342/PNS1. If the fans are changed then we will need to update our assessment.

7.2 Assessment

7.2.1 The current plans show the kitchen extract system terminating at roof to the rear of the restaurant demise. The supply system terminates at low level within a light well in the middle of the building.

7.2.2 We have calculated the noise level generated by the proposed new plant items at the nearest residential facades.

7.2.3 Our assessments have taken account of radiation, distance losses, directivity, end reflection, façade correction and reverberation within the light well when appropriate.

7.2.4 Our calculations have shown that in order to meet the proposed plant noise limits it will be necessary to install atmospheric side silencers on both the supply and extract systems. The required insertion losses for the silencers are provided within silencer schedule 13/4342/SS1.

7.2.5 With the silencers in place the calculated noise levels at the assessment positions are shown in the table below along with the plant noise limits:

	Noise Emission Limit Octave Band Centred Frequency (Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Supply								
Calculated Noise Level	39	39	35	16	11	12	10	18
Limits between 0900-2300	**55**	**44**	**35**	**29**	**25**	**22**	**19**	**18**
Extract								
Calculated Noise Level	47	43	26	10	5	0	0	0
Limits between 0900-2300	**54**	**46**	**44**	**40**	**39**	**34**	**24**	**13**

T6 Calculated Noise Levels

7.2.6 Table T6 above shows that the predicted noise levels at the nearest residential façades with the recommended silencers in place will meet the plant noise limits in each octave band and so are considered acceptable.

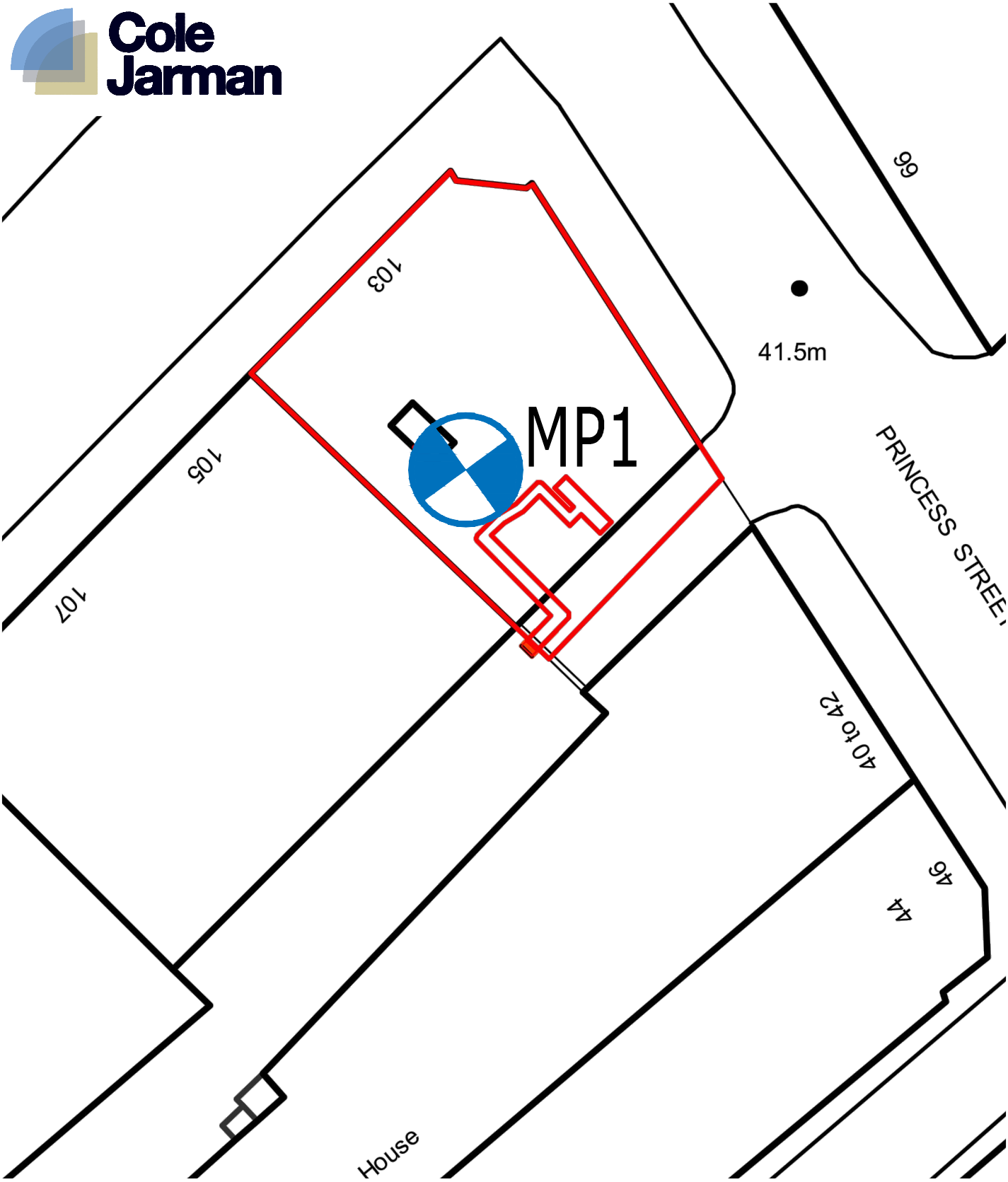
8 Conclusion

8.1 It is proposed to install new kitchen supply and extract fans at El Macho, Ground Floor 103 Portland Street, Manchester.

8.2 Plant noise limits for the proposed fan have been provided within this report. These are based on the results of a noise survey conducted at a location representative of the nearest residential façade and the requirements of the local council.

8.3 Our assessment has shown that with the required silencers in place the plant noise limits will be achieved at the nearest residential facades.

End of Section



Title: Site Plan Showing Noise Measurement Position

Figure 13/4342/SP1

Project: El Macho, 103 Portland Street

Date: February 2014 Revision: -

Scale: Not to scale

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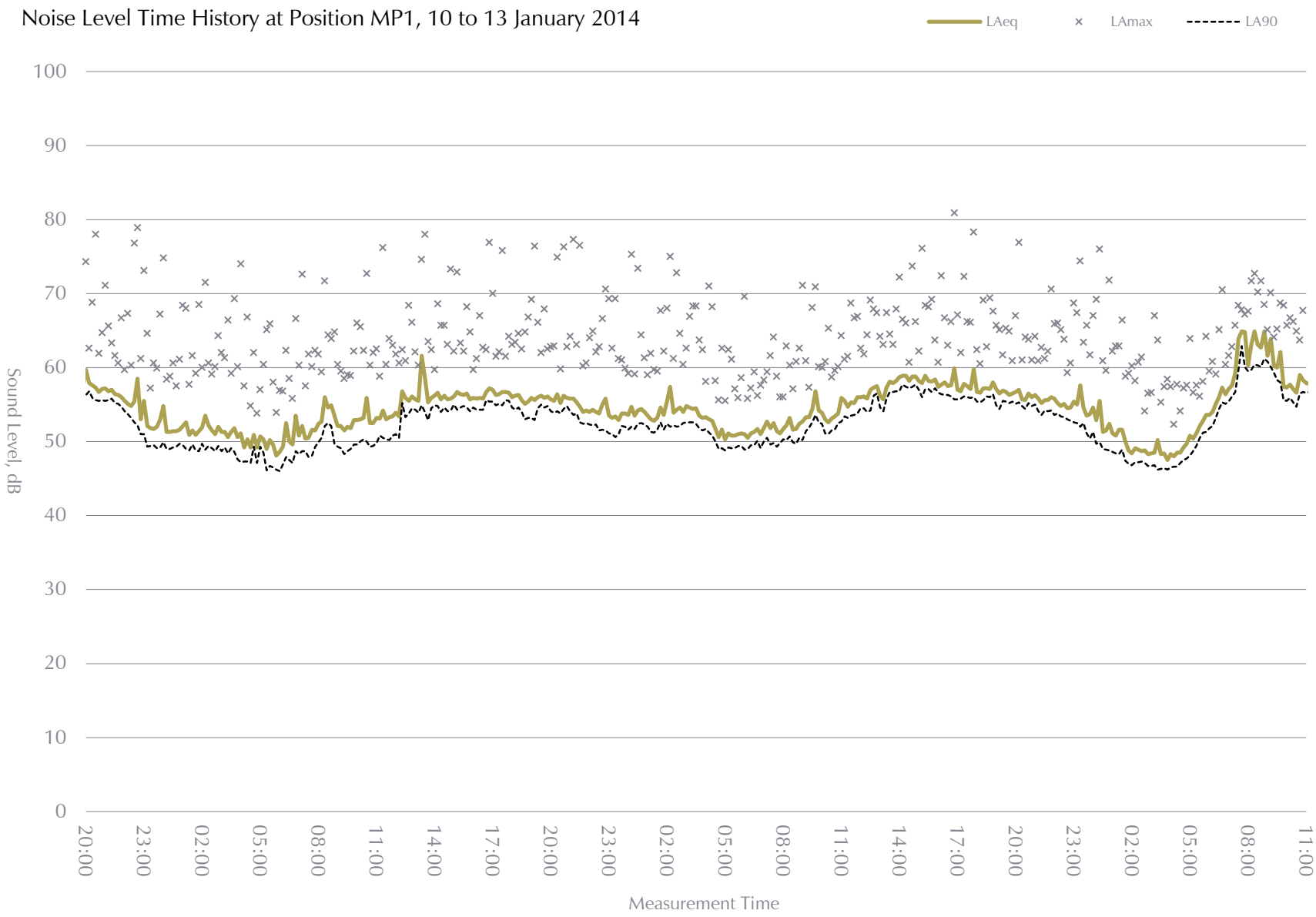

Figure 13/4342/TH01

Schedule of Mechanical Services Equipment Noise Levels, dB

System Ref	Details	Duty[1]	Data Type[2]	Octave Band Centre Frequency, Hz							
				63	125	250	500	1k	2k	4k	8k
KEF1 MUB 062 630D4 IE2 Multibox Fan	Kitchen Extract	-	Mfr - Lw	75	77	81	83	82	79	74	67
SF RS 70-40L1	Kitchen Supply	-	Mfr - Lw	62	66	75	74	74	72	65	56

Notes

[1] Duty in flow velocity (m^3/s) @ system pressure (Pa) unless otherwise stated
[2] Mfr refers to data supplied by the equipment manufacturer, Emp refers to data calculated using empirical formulae. Lw indicates noise data is in the form of Sound Power Levels, and Lp, Sound Pressure Levels at specified distance.

Schedule of Silencers.

Ref[1]	System/ Location	m^3/s [2]	Pa [3]	Dimensions (mm) [4]			Insertion Loss, dB[5] @ Octave Band Centre Frequency, Hz							
				H	W	L	63	125	250	500	1k	2k	4k	8k
SS1	Extract Silencer	-	>40	Vel < 5 m/s		-	4	8	14	21	27	27	21	16
SS2	Supply Silencer	-	>40	Vel < 5 m/s		2100	9	18	32	48	50	49	44	26

Notes

[1] RS, CT, AS and AL notation refers to Room Side, Cross Talk, Atmospheric Side and Acoustic Louvre respectively.
[2] Volume flow rate through silencer, m^3/s
[3] Maximum pressure drop, Pa
[4] Where "Vel < m/s" is stated instead of height and width dimension, silencers should be sized such that the stated air velocity (in m/s) is not exceeded. Air velocity is evaluated by dividing the flow rate by the entire cross-sectional area of the silencer, not just the open or free area.
[5] To be read in conjunction with specification 13/4342/SPC01

Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_{n}.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

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