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MEGARO HOTEL, BELGROVE STREET, LONDON, WC1

Technical Note

Acoustic Assessment Report

13th December 2012 Peter Clark

1. INTRODUCTION

1.1 A noise survey has been carried out adjacent to a property at the rear of the Megaro Hotel, Belgrove Street, London, WC1. The property adjacent is commercial/office space which has a rear elevation facing the rear of the hotel. The noise survey and assessment report is required to accompany a retrospective Planning Application for the installation of air conditioning equipment. The air conditioning units serving the Megaro Hotel are located in the rear lightwell/flat roof area (see attached drawing and photograph). Three units are installed. Nearby is an existing plant installation which includes kitchen ventilation and extract systems. The nearest neighbouring windows are in the first floor commercial/office space behind which is the rear elevation of properties in Argyle Street. Noise levels at adjacent hotel bedroom windows are also considered.

1.2 The measurements have shown that the current installation meets with the requirements of the London Borough of Camden (LBC) Environmental Noise Policy and <u>no additional noise attenuation measures will need to be incorporated</u> to comply with LBC noise thresholds. The site location and surroundings are given in Figure 1.0 below:

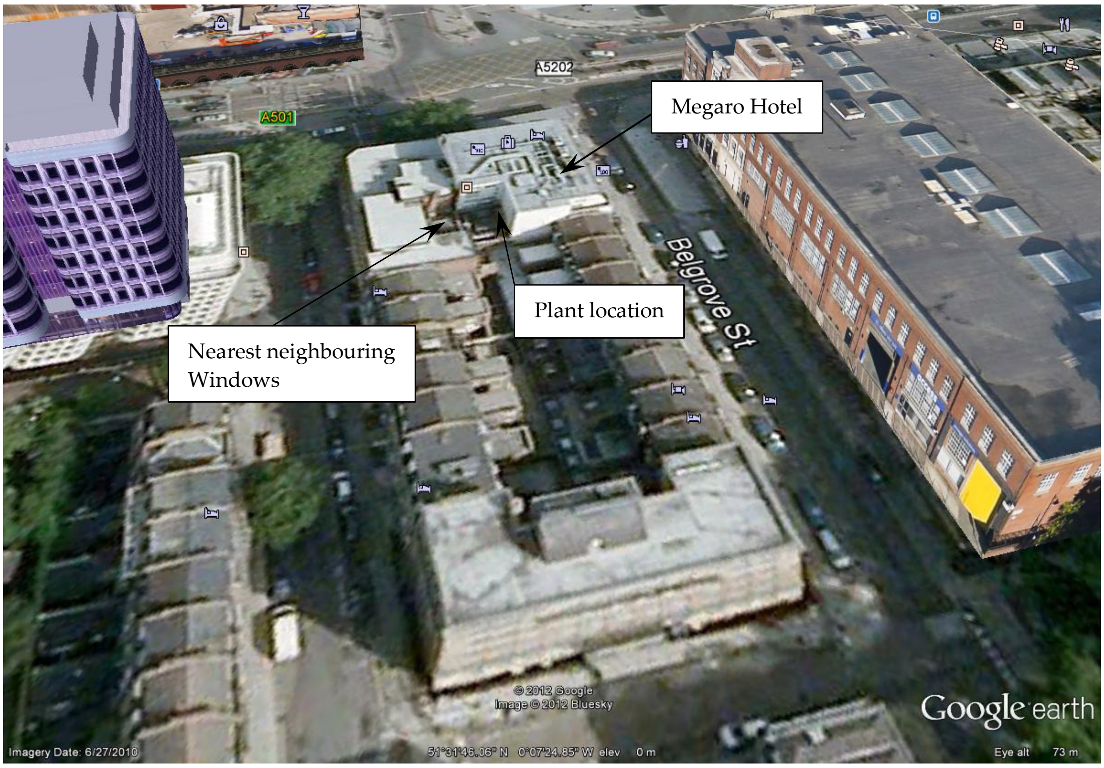


Figure 1: Site Location (© Google Maps)

2.0 NOISE MEASUREMENTS

2.1 Environmental noise measurements were carried out from approximately 11.20 a.m. Monday 14th May to 9.30 a.m. Monday 21st May 2012. Sound level measurement equipment was installed in the rear lightwell of the Megaro Hotel (near to the closest neighbouring property/window for assessment purposes) and used to log noise levels over the seven day period. The measurement equipment is listed below in Table 1.0.

Table 1.0 Environmental Noise Measurement Instrumentation

No.	Description
1.	Larson Davis Model 812 Sound Level Meter.
2.	Larson Davis Model 2541 1/2" Diameter Condenser Microphone.
3.	Bruel & Kjaer Type 4231 Sound Level Meter Calibrator.

2.2 All acoustic equipment conforms to the relevant parts of BS EN 60651:1994 (equivalent to BS 5969:1981) for the requirements of Type 1 acoustic accuracy. Additionally, the relevant equipment conforms to the specifications contained within BS EN 60804:1994 (equivalent to BS 6698:1976) for integrating sound level meters.

2.3 In order to verify the correct operation of the equipment on site, an acoustic calibrator was applied during the course of the measurements. A maximum change of 0.1 dB(A) was noted, this can be considered as an insignificant change. The calibrator complies with the specifications of IEC 942:2003.

2.4 Fast meter response was used for all measurements carried out during the course of the survey.

2.5 Noise levels are expressed in terms of continuous equivalent noise levels (L_{Aeq}) over an appropriate time period. The use of L_{Aeq} allows non-steady and non-continuous noise to be assessed and compared to the existing noise climate. L_{Aeq} is referred to as the ambient noise level. In addition to this background noise levels have also been measured and are expressed as L_{A90}. A full explanation of terminology commonly used in the measurement and assessment of noise levels is given in Appendix 2.0 at the end of this report.

3.0 RESULTS

3.1 Noise level measurements were carried out at 5 minute intervals during the survey period. Ambient (L_{Aeq}) and background (L_{A90}) noise levels were measured. Minimum noise levels for the day-time (07:00 to 19:00 hrs), evening time period (19:00 to 23:00 hrs) and night time period (23:00 to 07:00 hrs) have been determined.

Table 2: Summary Results

	Day	Evening	Night
L_{A90}	60.8	65.9(58.4)+	54.8(51.2)*
L_{Aeq}	68.5	69.6	58.3

+/*Note: the lowest evening background noise level measured was 58.4 dB(A) at 10pm on Sunday 20th May. The lowest night time background noise level measured during the survey period was 51.2 dB(A) and occurred at 2.40am on Wednesday 16th May 2012.

3.2 A full listing of 5 minute interval data for the period is given in the graph at the end of this report (Figure A1).

3.3 Noise level data for the units installed in the rear lightwell of the Megaro Hotel are given as 29 dB(A) at 10m (See attached data sheet shown in Figure A2 – J&E Hall Fusion JEH2-0050-M-1).

3.4 The nearest property/windows (i.e. not served by the unit itself) to the installation are the first and second floor rear windows of the adjacent commercial/office properties in Argyle Street. These windows do not have a direct line of sight to the installation, as they are obscured by the existing plant installation. Noise levels from the new plant have alos been calculated for the nearest hotel bedroom windows. A layout drawing is shown in Figure A3. Calculated noise levels are as follows:

Rear Windows – Argyle Street

- Unit S.P.L. at 10m: 29 dB(A) – see data sheet
- Correction for S.P.L. at 1m: +20 dB(A)
- 3 off units installed: + 5 dB(A)
- Distance correction (8m): - 18.1 dB(A)
- Partial barrier effect from existing plant installation: -5 dB(A)
- Resultant predicted noise level: 30.9 dB(A)

Nearest Hotel Bedroom Window (2 units are obscured by existing plant)

- Unit S.P.L. at 10m: 29 dB(A) – see data sheet
- Correction for S.P.L. at 1m: +20 dB(A)
- 1 off unit (no barrier, 3m distance): 39.5 dB(A)
- 2 off units (barrier effect (-10 dB(A), and 3m distance): 32.5 dB(A)
- Resultant predicted noise level: 40.3 dB(A)

3.5 The London Borough of Camden Development Policy DP28 Noise and vibration, paragraph 28.4; Table E "Noise levels from plant and machinery at which planning permission will not be granted" is listed below.

Noise description and location of measurement	Period	Time	Noise Level
Noise at 1 metre external to noise sensitive façade	Day, evening & night	0000-2400	5dB(A)<L_{A90}
Noise that has a distinguishable discrete continuous note	Day, evening & night	0000-2400	10dB(A)<L_{A90}

Noise that has distinct impulses	Day, evening & night	0000-2400	10dB(A)<L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60dB	Day, evening & night	0000-2400	55dB L_{Aeq}

3.6 The proposed air conditioning equipment does not attract the + 5 dB(A) correction referred to in *" paragraph 8 of BS4142"* (i.e. contains no distinguishable discrete continuous note or distinct impulses).

3.7 It therefore follows that the criterion to meet is 46.2 dB(A) (i.e 5 dB(A) less than the lowest night time noise level measured).

3.8 A photograph of the area showing the location of the noise monitoring equipment is shown in the Figure 4 of Appendix A of this report.

4.0 CONCLUSION

4.1 A noise measurement survey and assessment has been carried out on the external air conditioning condensing plant installed in the rear lightwell of the Megaro Hotel, Belgrove Street, London.

4.2 The current installation has been shown to meet with the London Borough of Camden's acoustic criteria. Additional attenuation measures are not required.

APPENDIX A: GRAPHS AND FIGURES.

Figure A1: Environmental Noise Measurement Data – Megaro Hotel, London WC1

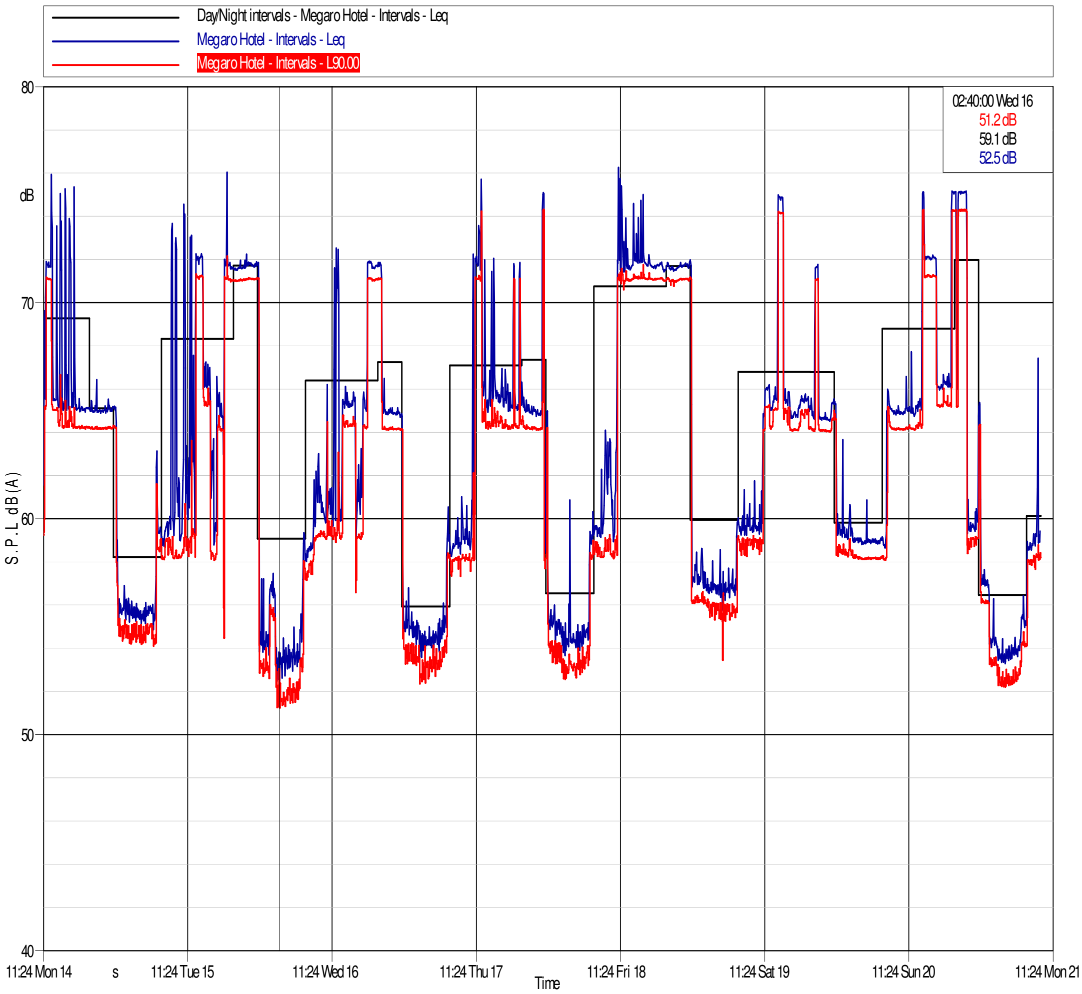


Figure A2: Equipment Noise Data

J&E Hall International

Specifications

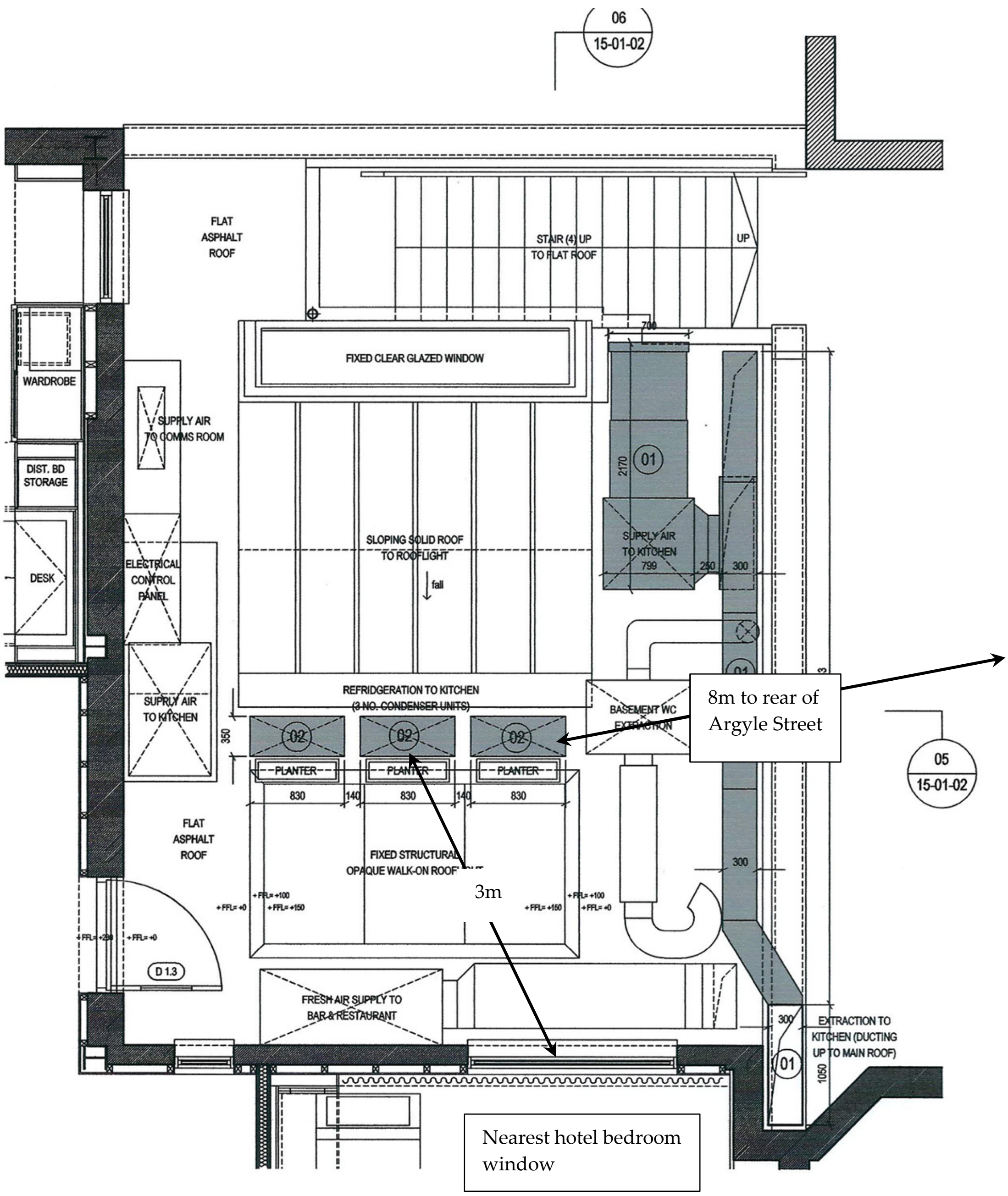
Unit Data

Model	Compressor			Coil Vol.	Airflow	Fan Motors		Connections		Receiver	Dry Weight	Noise Level
	Type	MCC (A)	LRC (A)	Litres	m^3/hr	No.	FLC (A)	Suction	Liquid	Litres	Kgs	Db(A) *
JEH2-0050-M-1	SC10 MLX	4.7	18.4	1.9	1910	1	0.6	3/8	1/4	1.2	46	29
JEH2-0088-M-1	SC18 MLX	6.6	23.4	1.9	1910	1	0.6	3/8	1/4	1.2	46	29
JEH2-0150-M-1	MTZ18-5VM	10.0	40.0	1.5	3040	1	0.6	1/2	3/8	4.6	82	37
JEH2-0150-M-3	MTZ18-4VM	5.0	20.0	1.5	3040	1	0.6	1/2	3/8	4.6	82	37
JEH2-0225-M-1	MTZ28-5VM	20.0	51.0	3.1	2620	1	0.6	1/2	3/8	4.6	89	36
JEH2-0225-M-3	MTZ28-4VM	7.5	23.0	3.1	2620	1	0.6	1/2	3/8	4.6	89	36
JEH2-0300-M-1	MTZ36-5VM	22.0	60.0	3.1	2620	1	0.6	5/8	3/8	4.6	89	37
JEH2-0300-M-3	MTZ36-4VM	9.0	30.0	3.1	2620	1	0.6	5/8	3/8	4.6	89	37
JEH2-0400-M-3	MTZ50-4VM	12.0	42.0	4.7	6050	1	1.1	7/8	1/2	7.6	120	37
JEH2-0500-M-3	MTZ64-4VM	15.0	67.0	4.7	6050	1	1.1	7/8	1/2	7.6	120	40
JEH2-0600-M-3	MTZ72-4VM	15.5	80.0	7.6	5180	1	1.1	7/8	1/2	7.6	126	40
JEH2-0675-M-3	MTZ81-4VM	19.0	80.0	7.6	5180	1	1.1	1 1/8	1/2	7.6	126	42
JEH2-0825-M-3	MTZ100-4VM	22.0	90.0	6.9	6770	2	1.6	1 1/8	1/2	14	205	42
JEH2-1000-M-3	MTZ125-4VM	27.0	105.0	6.9	6770	2	1.6	1 1/8	1/2	14	205	42
JEH2-0075-L-1	SC18 CLX	5.9	23.5	1.9	1910	1	0.6	3/8	1/4	1.2	46	30
JEH2-0175-L-1	NTZ48-5VM	11.0	37.0	1.5	3040	1	0.6	5/8	3/8	4.6	86	35
JEH2-0175-L-3	NTZ48-4VM	4.8	16.0	1.5	3040	1	0.6	5/8	3/8	4.6	86	35
JEH2-0225-L-1	NTZ68-5VM	17.0	53.0	3.1	2620	1	0.6	5/8	3/8	4.6	92	38
JEH2-0225-L-3	NTZ68-4VM	8.4	25.0	3.1	2620	1	0.6	5/8	3/8	4.6	92	38
JEH2-0350-L-3	NTZ96-4VM	10.1	32.0	5.0	6050	1	1.1	7/8	1/2	7.6	125	38
JEH2-0400-L-3	NTZ136-4VM	14.3	51.0	5.0	6050	1	1.1	1 1/8	1/2	7.6	125	38
JEH2-0725-L-3	NTZ215-4VM	22.3	74.0	6.9	6770	2	1.6	1 1/8	1/2	14	203	41
JEH2-0825-L-3	NTZ271-4VM	27.0	96.0	6.9	6770	2	1.6	1 1/8	1/2	14	203	40

* Sound pressure levels @10m free field at (-10/+32°C) MT & (-25/+32°C) LT conditions. Alternative conditions may produce different results.

Model	Overall Dimensions (mm)			Mounting Dimensions (mm)	
	W	D	H	W	D
JEH2-0050-M-1	887	430	489	545	400
JEH2-0088-M-1	887	430	489	545	400
JEH2-0150-M-1	1109	478	649	707	448
JEH2-0150-M-3	1109	478	649	707	448
JEH2-0225-M-1	1109	478	649	707	448
JEH2-0225-M-3	1109	478	649	707	448
JEH2-0300-M-1	1109	478	649	707	448
JEH2-0300-M-3	1109	478	649	707	448
JEH2-0400-M-3	1335	529	884	946	500
JEH2-0500-M-3	1335	529	884	946	500
JEH2-0600-M-3	1335	529	884	946	500
JEH2-0675-M-3	1335	529	884	946	500
JEH2-0825-M-3	1258	590	1436	812	560
JEH2-1000-M-3	1258	590	1436	812	560
JEH2-0075-L-1	887	430	489	545	400
JEH2-0175-L-1	1109	478	649	707	448
JEH2-0175-L-3	1109	478	649	707	448
JEH2-0225-L-1	1109	478	649	707	448
JEH2-0225-L-3	1109	478	649	707	448
JEH2-0350-L-3	1335	529	884	946	500
JEH2-0400-L-3	1335	529	884	946	500
JEH2-0725-L-3	1258	590	1436	812	560

Figure A3: Layout Drawing



04 PART FIRST FLOOR (FLAT ROOF): DETAILED PLANT EQUIPMENT LAYOUT PLAN 04

Scale 1:50 (@A3 SIZE)

Figure A4: Noise Monitoring Equipment in the rear lightwell

APPENDIX B: GLOSSARY OF NOISE TERMS AND UNITS.

1.0 Noise

1.1 The sounds that we hear are as a result of successive air pressure changes. These air pressure changes are generated by vibrating sources, such as train engines or wheels, and they travel to a receiver, i.e. the human ear, as air pressure waves.

1.2. The human ear is capable of detecting a vast range of air pressures, from the lowest sound intensity that the normal ear can detect (about 10^{-12} watts/m^2) to the highest that can be withstood without physical pain (about 10 watts/m^2). If we were to use a linear scale to represent this range of human sensitivity it would encompass more than a billion units. Clearly this would be an unmanageable scale yielding unwieldy numbers.

1.3. The scale can be compressed by converting it to a logarithmic or Bel scale, the number of Bels being the logarithm to the base 10 of one value to another (as applied by Alexander Graham Bell to measure the intensity of electric currents). The Bel scale gives a compressed range of 0 to 12 units which in practice is a little too compressed. A more practical operating range of 0 to 120 is obtained by multiplying by 10, ie. 10 x Bel, which produces the scale units known as decibels or dB.

1.4. Examples of typical sound intensity levels within the decibel range of 0 to 120 dB are listed below:

Commercial four-engine jet aircraft at 100m	120dB
Riveting of steel plate at 10m	105dB
Pneumatic drill at 10m	90dB
Circular wood saw at 10m	80dB
Heavy road traffic at 10m	75dB
Male speech, average, at 10m	50dB
Whisper at 10m	25dB
Threshold of hearing, 1000Hz	0dB

1.5. Due to this logarithmic scale noise levels have to be combined logarithmically rather than arithmetically. For example, two equal sound sources of 70 dB each, when operated simultaneously, do not produce a combined level of 140 dB but instead result in a level of 73 dB, ie. A rise of 3dB for each doubling of sound intensity. Subjectively, a 3dB change does not represent a doubling or halving of loudness; to make a sound appear twice as loud requires an increase in sound pressure level of about 10dB.

1.6. The subjective loudness of noise can be measured by applying a filter or weighting which equates to the frequency response of the human ear. This is referred to as an A-weighting and when applied results in noise levels expressed as dB(A).

1.7. dB(A) noise levels can be measured using a variety of noise indices. The index which correlates best with human response due to machinery noise is the L_{Aeq} this is the A-weighted L_{eq} which is referred to as the 'equivalent continuous noise level' and is a measure of the total sound energy generated by a fluctuating sound signal within a given time period.