

The Dunes Sandfields



**Planning Compliance Report
Report 24479.PCR.01.Rev.B**

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Altrincham
WA14 1ES**

Report 24479.PCR.01					
Revision History					
First Issue Date: 14/06/2022					
A	10/08/2022 BS4142 assessment was amended based on the latest manual noise measurements carried out by KP Acoustics, following remedial measures taken to reduce noise from the launderette’s exhaust.		D		
B	16/12/2022 Amendment to location of self-service laundrette in section 5.0.		E		
C			F		
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KP Acoustics Ltd. 2022					

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24479. TH1	Environmental Noise Time History
24479.Daytime.LA90	Statistical analysis for representative daytime L_{A90}
24479.Night-time.LA90	Statistical analysis for representative night-time L_{A90}
Appendix A	Glossary of Acoustics Terminology
Appendix B	Acoustic Calculations

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Plande Planning Consultants, Kennedy House, 31 Stamford St, Altrincham WA14 1ES, to undertake a noise impact assessment of an existing plant unit installation serving the building at The Dunes, Wyvern Avenue, Sandfields, SA12 7ER.

A 24-hour environmental noise survey and manual noise measurements have 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*'.

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 Revolution Self-Service Laundrette Machine comprising of one large washing machine, one smaller washing machine and one drier, 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 buildings to the north, Wyvern Avenue the east, the Dunes pub to the west, and commercial and residential buildings to the south. Entrance to site is on Wyvern Avenue.



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

Initial inspection of the site revealed that the background noise profile at the monitoring location was typical of an urban cityscape environment, with the dominant source being road traffic noise from the surrounding roads.

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 15:30 on 26/05/2022 and 15:30 on 27/05/2022.

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

Icon	Descriptor	Location Description
	Noise Measurement Position	The microphone was installed on the First-Floor window at The Dunes.
	Closest Noise Sensitive Receiver	Front façade. First Floor window. Residential house to the west
	Existing Plant Location	Existing plant installations are outlined in Section 5.1

Table 2.1 Measurement position and description



Figure 2.2 Site measurement position, identified receiver and plant unit installation location (Image Source: Google Maps)

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 existing 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 2.3

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 1	Svantek Type 957 Class 1 Sound Level Meter	12399	23/03/2022	1502092-2
	Free-field microphone PCB 377B02	164905		
	Preamp PCB 378M07	125282		
	Svantek External windshield	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	24/05/2022	UCRT22/1581

Table 2.3 Environmental Measurement instrumentation

Instrument	Manufacturer and Type	Serial Number
SLM1 Precision integrating sound level meter & analyser	NTi Audio, XL2-TA Calibration No: UCRT22/1279, 1280 & 1281 Calibration Date: 23/02/2022 Calibration Due: 22/02/2024	A2A-09521-E0
CAL1 Calibrator 1	Larson Davis CAL200 Calibration No: UCRT22/1397 Calibration Date: 18/03/2022 Calibration Due: 17/03/2023	17148

Table 2.4 Manual Measurement instrumentation

3.0 RESULTS

3.1 Environmental Noise Survey

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 24479.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 24479.Daytime.LA90 and 24479.Night-time.LA90 attached.

Time Period	Representative background noise level L_{A90} dB(A)
Daytime (07:00-23:00)	44
Night-time (23:00-07:00)	36

Table 3.1 Representative background noise levels.

3.2 Manual Noise Measurements

The two washing machines and the drier machine were operated simultaneously and measured in order to ensure worst case noise levels were captured of the most intensive program mode. The washing cycle lasts up to 45 minutes and the drier cycle can last up to 1 hour. However, the noisiest part of the cycle would be during the spinning, which can last up to 10 minutes for the small machine and up to 8 minutes for the large machine. During the spinning cycle the washing machines slow down every circa one minute and change rotational direction. Two 30 second measurements were taken at 1 meter from the launderette machine, with both washing machines operating a full spinning cycle and the drier also in operation. Consequentially the logarithmic average was calculated. The results from measurements are presented in Table 3.2 below.

Location	Revolution Self-Service Launderette Machine Operation
	$L_{Aeq, 30 \text{ second}} \text{ dB(A)}$
1m from the laundry machine and drier	64

Table 3.2 Manual noise measurements of launderette machine activity

Furthermore, at the bottom the left-hand-side of the machine is installed an exhaust to provide ventilation to the machine. This would be in operation throughout the whole duration of the washing and drying cycles which can last up to 1 hour. For this reason, no 'on-time' correction will be applied in calculations of noise emissions from the exhaust. Two 30 second measurements were taken at 1 meter from the exhaust in order to consider this in the assessment. The logarithmic average was then calculated. The results are presented in Table 3.3.

Location	Revolution Self-Service Launderette Machine Exhaust`
	$L_{Aeq, 30 \text{ second}} \text{ dB(A)}$
1m from the exhaust	59

Table 3.3 Manual noise measurements of the launderette machine exhaust while in operation

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, T_r}), 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.

We would suggest that the following rating level acceptability range is followed, taking into account the context of the environment with which the plant installation will be installed.

	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.
1m Outside living or dining or Bedroom window (façade)	10dB below background	9 dB below and 5dB above background	5dB above background

Table 4.1 Noise criteria for plant and machinery

5.0 BS4142 ASSESSMENT

The self-service launderette is currently installed in the front parking lot of the Dunes Public House. Further to discussions with the maintenance engineer of the Revolution Self-Service Laundrette Machine, it is understood that the launderette operates 24h, although less users are expected during night-time. The use of the launderette varies throughout the year, as this is mainly used by the guests at The Dunes Public House. Generally, the laundrette machine can be used no more than 30 times a day should it be used constantly, although this event is

unlikely to happen. In order to create a realistic assessment scenario, we would expect no more than 1 washing cycle within any one-hour period.

Table 5.1 shows the results of the predictions for the laundrette to the closest noise sensitive receiver, based on a 15-minute assessment period for night-time as per BS4142:2014.

5.1 Calculations

The ‘Specific Sound Level’ of the laundrette machine 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 B1.

The ‘Rating Level’ of the laundrette machine installation has been assessed following the guidelines of BS4142 for the night-time period when the plant would be operational, with a subsequent conclusion taking into consideration the above context. The full BS4142 assessment is presented in Table 5.1.

BS4142 Assessment		
Source:	Revolution Self-Service Laundrette Machine	
Operating Period:	Night-time	
Reference time interval (T_r):	15 minutes	
Receiver:	The Dunes, Wyvern Avenue, Sandfields, SA12 7ER	
Element	Level (dB)	Comment
Measured ambient sound level $L_a = L_{Aeq, T}$	$L_{Aeq, 30 \text{ second}}$ 64dB	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound including residual sound and specific sound
Residual sound level $L_r = L_{Aeq, T}$	$L_{Aeq, 15 \text{ minute}}$ 59dB	Ambient sound remaining at the assessment location when the specific sound source is non-operational
The total on time during reference interval is 9 minutes	$10\log(9/15) = -2\text{dB}$	The spinning cycle is on for 9 minutes during the reference time interval of 15 min. Time in total is less than the night-time reference time period. Therefore, an on-time correction is applied as in Equation 1
Specific Sound Level $L_s = L_{Aeq, T_r}$	29dB	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

		In this case, the specific sound levels take into consideration published noise data from the manufacturers, with appropriate corrections for attenuation due to distance, reflections, and any screening or proposed mitigation
Acoustic Feature Correction	+3dB	3dB acoustic feature correction were added due to the impulsive nature of the noise when shoes or boots are being washed.
Rating Level	32dB	Rating Level = Specific Sound Level + Acoustic Feature Corrections
Representative Background Noise Level $L_{A90, T}$	36dB	Sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T . Derived using the most common occurring levels $L_{A90, 5min}$ during the environmental noise survey undertaken on site
Excess of rating over background sound level	-4dB	
Assessment Indication		
Noise from the launderette machine operation would be 4dB below the background sound level at 1m from the façade of the closest residential dwelling, which is expected to have a low probability of causing an adverse impact on the closest sensitive receiver.		

Table 5.1 BS4142 assessment

As shown in Table 5.1, the existing Revolution Self-Service Launderette Machine would be expected to have a low probability of adverse impact on the amenity of the nearby noise sensitive receivers.

6.0 CONCLUSION

An environmental noise survey, manual noise measurements and a BS4142 assessment have been carried out for the existing Revolution Self-Service Launderette Machine at The Dunes, Wyvern Avenue, Sandfields, SA12 7ER.

Current calculations have shown that noise emissions of the self-service launderette would be indicative of a very low likelihood of adverse impact on nearby receivers which should be deemed acceptable.

The Dunes, Port Talbot
Environmental Noise Time History
From 26 May 2022 To 17 May 2022

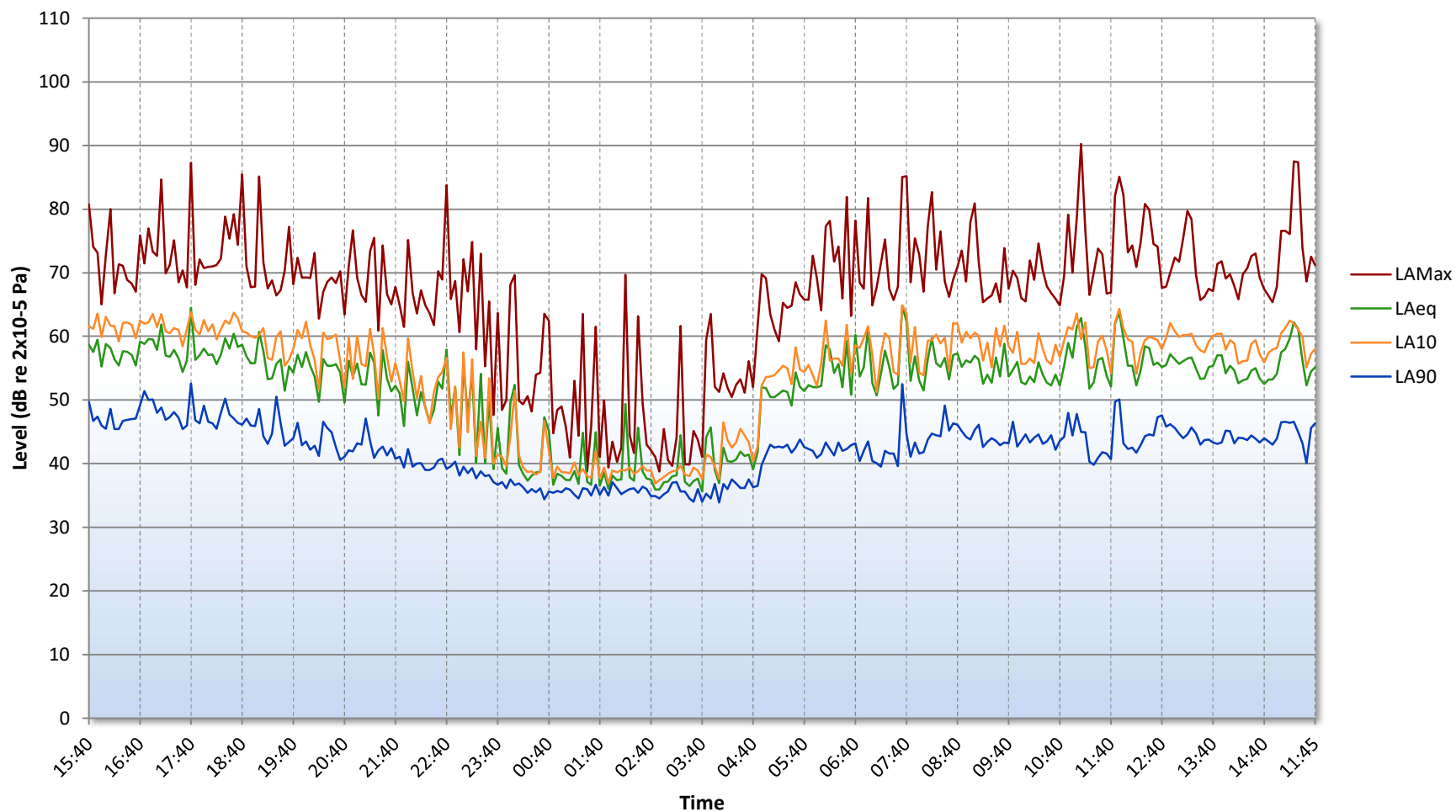


Figure 24479.TH1

The Dunes, Port Talbot
Representative Daytime Background Noise Level
From 26 May 2022 To 17 May 2022

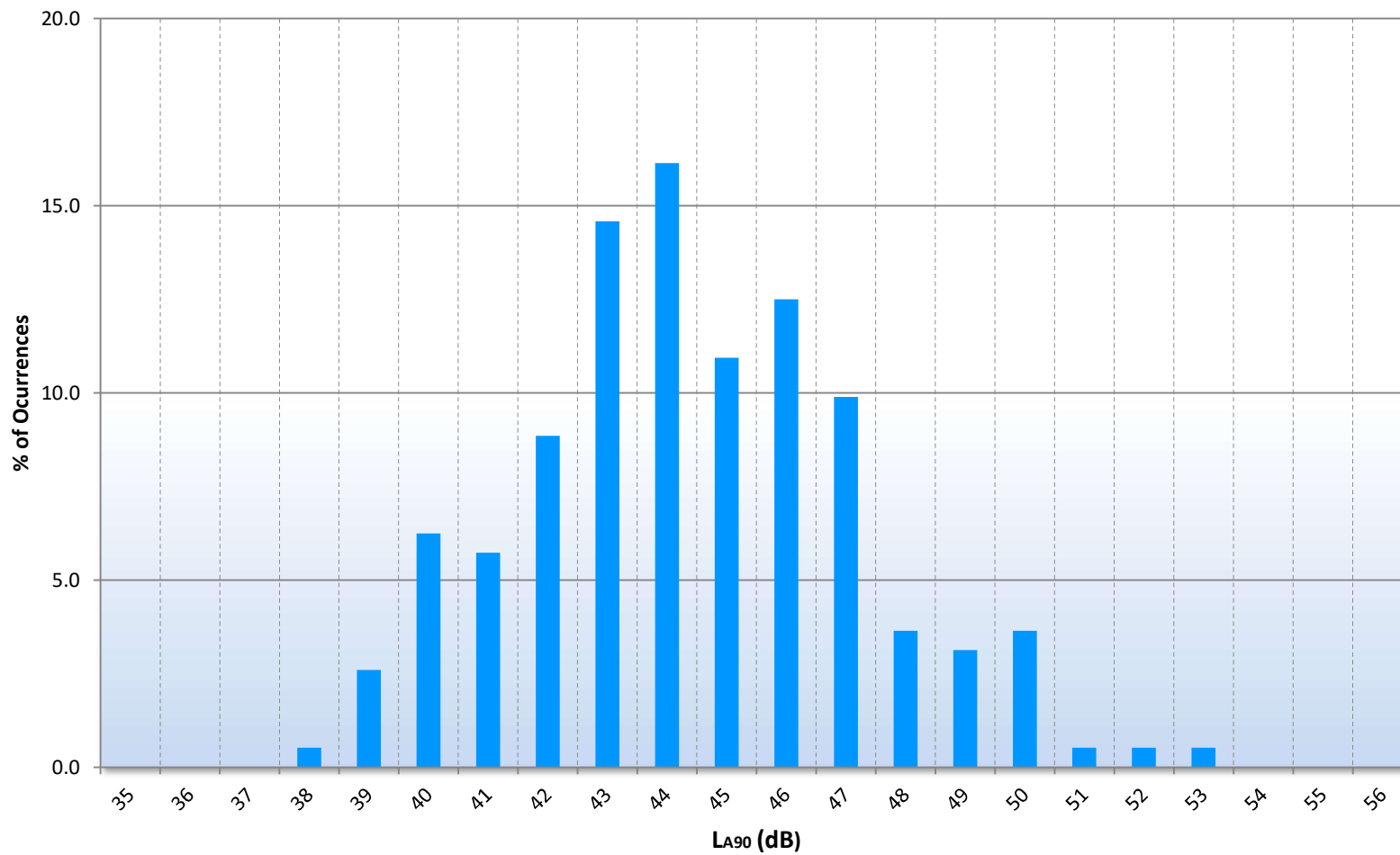


Figure 24479.L90

The Dunes, Port Talbot
Representative Night-time Background Noise Level
From 26 May 2022 To 17 May 2022

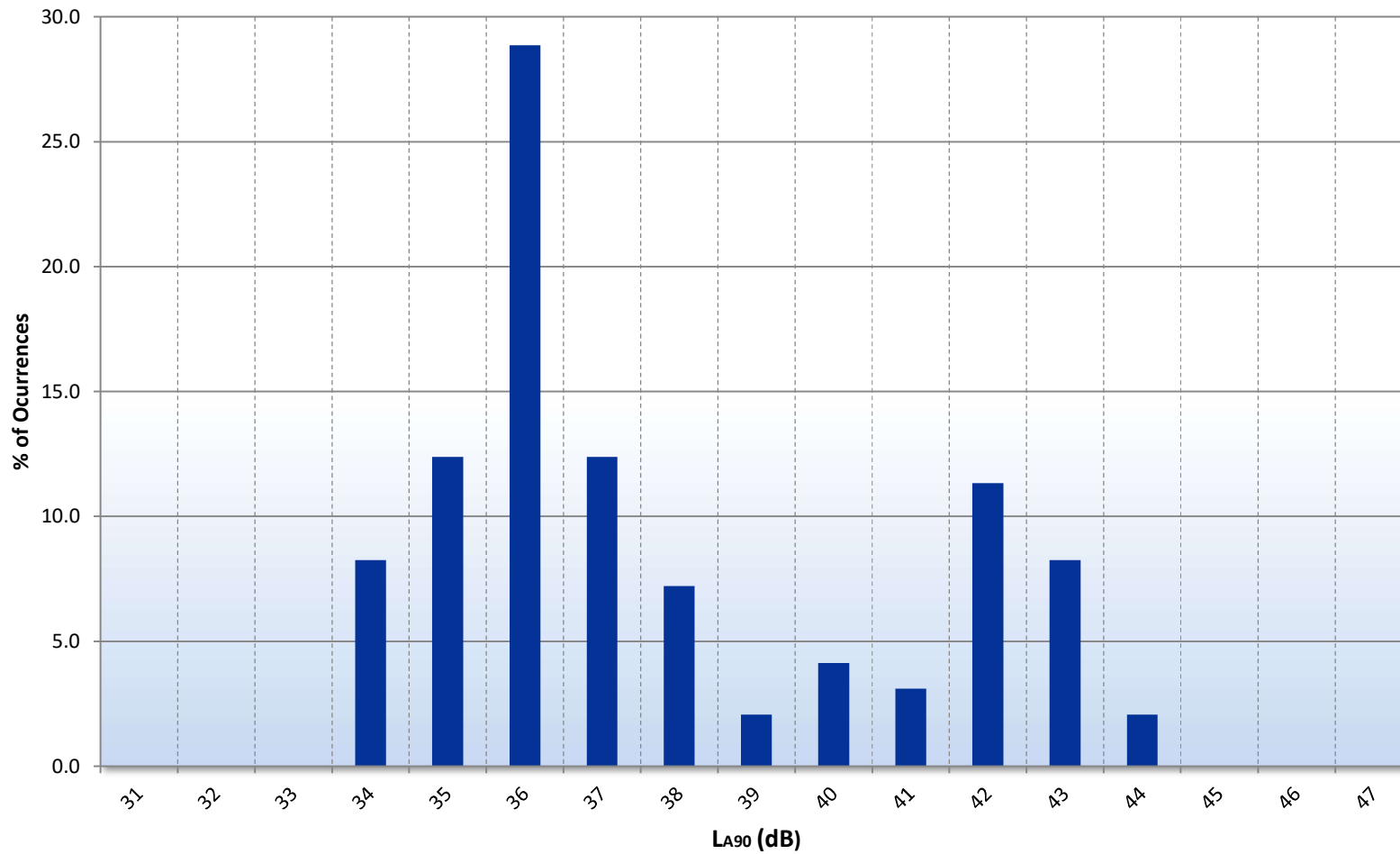


Figure 24479.L90

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*.

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 Dunes, Wyvern Avenue, Sandfields

PLANT NOISE EMISSIONS CALCULATIONS

Source: Revolution Self-Service Laundrette Machine Receiver: First Floor residential window to the east	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Spinning cycle & Drying (Sound Pressure Level @1m)	65	65	65	60	58	54	50	45	64
Minimum attenuation provided by distance (15m), dB	-24	-24	-24	-24	-24	-24	-24	-24	
Minimum attenuation provided by on-time correction (9min), dB	-2	-2	-2	-2	-2	-2	-2	-2	
Minimum attenuation provided by directivity, dB	2	0	-3	-9	-11	-11	-11	-11	
Minimum attenuation provided by building envelope, dB	-8	-10	-12	-15	-17	-20	-23	-26	19
Total Specific Level at Receiver	33	30	25	11	4	-3	-10	-18	
Exhaust (Sound Pressure Level @1m)	63	61	58	55	53	51	47	42	59
Minimum attenuation provided by distance (15m), dB	-24	-24	-24	-24	-24	-24	-24	-24	
Minimum attenuation provided by directivity, dB	2	0	-3	-9	-11	-11	-11	-11	
Total Specific Level at Receiver	41	37	32	23	19	17	13	8	
Total Specific Level of all Plant Unit Installations at Receiver	41	38	33	23	19	17	13	8	29
BS4142 Acoustic Feature Corrections									
Impulsivity	3	3	3	3	3	3	3	3	32
Total Rating Noise Level of all Plant Unit Installations at Receiver	44	41	36	26	22	20	16	11	

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/m³) 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.