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Field Test of Acoustic Performance of Proposed Arcade

Site: 82-84, Montague Street, Worthing, BN11 3HF

Client: Slots Trading Limited

Report by: Martin Loft BSc, AMIoA

Date: 25th November 2025

Ref: Q10894

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1.0 Summary

1.1 Details of Sound Insulation Tests

The tests detailed in this report were carried out on 25th November 2025 to ascertain the acoustic performance of the proposed Aracde.

The field tests of Reverberation Time (RT) and Insertion Loss in this report have been carried out in full accordance with ISO140-4 [1] and Environmental Noise (England) Regulations of 2006.

1.2 The following test types were carried out:

Test Type:	**No. of Tests**
Reverberation times within Arcade Area	2
Ambient background noise within Arcade Area	1 (dB_{LaeqT5})
Arcade Noise Level with Noise Sources Operating	Taken from Previous Test Data of Similar Arcade within the Slots Trading Ltd Group.

2.0 Test Report

2.1 General

Client Name:	Slots Trading Limited
Address:	82-84, Montague Street, Worthing, West Sussex, BN11 3HF
Site (if different from above):	N/A
Type of Room:	Proposed Arcade
Test conducted by:	Martin Loft BSc, AMIoA Acoustic Advice Ltd. 18 Mallings Drive Bearsted Kent ME14 4HE
Date of tests:	25th November 2025

2.2 Room Dimensions & Element Construction

Room Dimensions: 16286mm(l) x 7071mm(w) x 2700mm(h)

Construction:	Walls:	Slotted Rack Panelling
	Ceiling:	Grid Ceiling with Knauff Acoustic Grid Tiles
	Floor:	Carpet on Underlay

2.3 Test Method

Before any measurements were taken, the meter was calibrated. The calibration procedure was repeated at the end of the tests to check for any calibration 'drift'. No significant drift occurred.

It was agreed at time of survey that the operational sound levels would be taken from a previous report produced for the Maidstone arcade where sound levels were taken with all machines operating and background music being played.

3.0 Reverberation Time

3.1 Definition of the Problem:

Reverberation Time (or RT) is defined as the amount of time an impulse sound takes to decay by 60dB. High RTs occur when the surfaces of a room or space are of a reflective nature. This allows sound waves to "bounce" off of the walls, floors and ceilings. Occasionally these sound waves will coincide creating an amplification effect which makes the room feel very noisy, and in turn creates speech intelligibility problems. When this occurs, it is referred to as a "build-up of reverberant noise".

3.2 Why RT is important in terms noise leakage:

RT is a fundamental element with regards to how sound propagates within a space and how it can leak into surrounding areas.

3.3 Room Modes:

Room Modes occur at frequencies which correspond directly to the physical dimensions of the room. If a frequency has a wavelength which relates to ¼ of the overall length of the room a standing wave is created which will have the effect of amplifying the overall sound level, promoting higher levels of noise within the space and therefore giving a greater chance of sound leaking from the room.

The build up of reverberant noise can be nullified in a number of ways, most commonly by the use of acoustic absorption panels within the space to prevent reflections or internal soft furnishings.

It was noted at the time of survey that the arcade will have an acoustic ceiling installed in the form of a 600mm x 600mm grid ceiling with a measured absorption coefficient of **Sα 0.40** and be carpeted throughout on a thick underlay.

The measured Reverberation Time in the arcade area was as detailed below:

Area	Reverberation Time (RT) in Seconds
Centre of Arcade	0.72
Adjacent to the Front Door	0.70

Please Note: The slight discrepancy in readings at different locations is to be expected due to different levels of absorption in each location.

These readings were averaged out logarithmically to determine a global RT for the entire space:

$RT = Log_{10}(10^{\wedge(0.0.72/10)} + 10^{\wedge(0.70/10)}) =$ **0.71 seconds**

Measured readings averaged logarithmically to give an accurate base level.

Although there are no direct regulations governing what RTs should be in any given space, there is an advisory document governing acoustics in public spaces, which suggests that RTs in a gaming area should be <= 0.6 seconds

The proposed finishes (carpet, underlay and acoustic ceiling) are currently being installed with the RT in the arcade predicted to be as follows:

We take absorption coefficients for each surface as documented in building regulations and calculate the average amount of current absorption in the room. This returned results as shown below:

Plane	Details	α (Abs. Coefficient)	S (Surface Area)	A (α x S)
Wall L1	Slotted Rack Panelling	0.03	43.93m^2	1.32m^2
Wall W1	Slotted Rack Panelling / Glass	0.02	18.51m^2	0.37m^2
Wall W2	Slotted Rack Panelling	0.03	18.51m^2	0.56m^2
Wall L2	Slotted Rack Panelling	0.03	43.93m^2	1.32m^2
Floor	Thick Carpet on Underlay	0.45	50.19m^2	50.19m^2
Ceiling	Acoustic Tiles in Grid Ceiling	0.40	44.61m^2	44.61m^2
			Total area of absorption =	**98.36m^2**

Therefore: T = 0.16 x V/A
T = 0.16 x (301.13 / 98.36)
T = 0.16 x 3.06
T = 0.45 seconds *(Predicted Reverberation Time)*

How Does RT Affect Ambient Noise?

As described above, if the RT in a space is lowered, there are fewer opportunities for the sound waves to coincide and create the "Reverberant Noise" problem. The effect that lowering the RT will have on the ambient noise in a room or space can be predicted, based on the current measured or predicted RT and factoring in the current Sound Level (dB). For example:

Typically, if you increase the amount of absorption in a room by 100% there will be a 5dB reduction in the ambient noise in the room.

Example:

Existing Sound Level: 100dB
Existing Area of Absorption: $50m^2$

If we Increase Absorption to: $100m^2$

$$\frac{100}{50} \quad X \quad 100 = \underline{\mathbf{200\%}}$$

Therefore, an increase in absorption of 200% will represent a doubling in the increase of absorption so:

Reduction (R) = R = 2 x 5dB = 10dB
R = 100dB – 10dB = **90dB** - *New Predicted Sound Level*

General Perceptions and Regulations Relating to Noise and Noise reduction:

- As a general rule a reduction of between 1dB and 4dB will be largely imperceptible
- A reduction of between 5db and 9dB will be significantly noticeable
- A change of 10dB is generally perceived as a doubling or a halving of noise respectively
- For commercial purposes, 80dB is considered the level where ear protection is recommended for continuous exposure of >= 10minutes. At 85dB ear protection becomes mandatory for continuous exposure of >= 10minutes for all employees and visitors.

Typical Sound Levels and How they Are perceived:

Sound Source	Typical sound Level (dB)	Classification
House (Lounge, Silent)	30 – 50	Quiet
Normal Conversation	50 – 65	Normal
TV (Normal Volume)	65 – 70	Normal
Busy Restaurant	80 – 95	Noisy
Manual Machines / Hand Tools	80 – 95	Noisy
Busy Machine Shop	80 – 95	Noisy
Rock Concert	95 – 120	Very Noisy
Jet Taking Off (at 100m)	110 – 120	Very Noisy

4.0 Internal ambient noise levels

Before the potential sound leakage from the Arcade can be determined it is important to know what the ambient background noise level is within the Arcade.

Testing within the arcade has been carried out in full accordance with ISO140-4 [1] with a single measurement taken in the centre of the arcade with no extraneous noise sources operating. Only the author was present in the arcade for the duration of the test to ensure an accurate background reading.

A dB_{LaeqT5} measurement was taken. This is an averaged level taken over a period of 5mins (dB_{T5}) automatically averaged (Laeq) by the test meter.

Having undertaken this test measurement, we have recorded a level of: **38.4dB$_{LaeqT5}$.**

This is a subjectively low level and can largely be attributed to the internal build and the finishes in the construction of the arcade and the previously measured reverberation time.

4.1 Internal Noise Levels from Previous Test Report

Information taken from the previous chart with the following readings

Readings	SPL dB
Reading 1	67dB(A)
Reading 2	68dB(A)
Reading 3	65dB(A)

SPL = $Log_{10}(10^{\wedge(67/10)} + 10^{\wedge(68/10)} + 10^{\wedge(65/10)})$ = **66.6dB**

5.0 Potential Sound Leakage to Surrounding Areas

Deducting the background ambient noise from the above value to give a maximum potential sound leakage from the arcade of:

66.6dB – 38.4dB = 28.2dB (*Maximum*)

As can be seen above, with the proposed mitigating measures in place, there is no significant leakage from the arcade area.

From local authority guidelines and environmental health regulations, the following observations are made:

> *Guidelines for noise from neighbours states that a level of 45dB or 15dB above ambient background level is an advisory limit between the hours of 7pm and 7am, with a level of 55dB or 20dB above ambient background level is an advisory limit between the hours of 7am and 7pm. It should also be noted that these are $dB_{LaeqT30}$ values, which means they need to be an average level over a 30min period tested between these hours.*
>
> *Should levels at the boundary of the adjoining property exceed 60dB for prolonged periods this can be considered as a noise nuisance.*

As can be seen from the data above there is no breach of local authority or environmental health regulations and as such no submission will need to be made by Acoustic Advice Ltd. or the client to the local Council for additional action relating to the findings of this report.

6.0 – Additional Observations / Conclusions

In addition to the tests undertaken in this report to satisfy the requirements of the local authority guidelines and environmental health regulations, an additional "sweep" test was made of the arcade to ascertain if there were any acoustically "weak" areas, with extraneous sound leaking into the arcade as this can affect the leakage out of the arcade: No such sources were identified.

6.1 – Additional Mitigating Measures in Place

At the time of the acoustic survey there were a number of additional mitigating measures that have been put in place during the fitout of the arcade:

1. The inclusion of an "Air-lock" style entrance lobby, with consecutive double doors, will create a buffer zone that will further limit any potential sound leakage from the arcade to the street outside.

2. The grid ceiling which has now been installed is a flat (not "tegular") grid system. This means that the proposed acoustic ceiling tiles are tight to the grid with no tegular blocks on the edge trim. This allows the entire ceiling to sit flat on the grid with no potential gaps which could allow sound to leak into the ceiling Void.

3. It was also noted that there are buffer zones to the rear of the arcade (fire exit and stairs lobby) and above in the form of a proposed storage area, which will significantly add to the acoustic integrity of the arcade.

In conclusion, no further action or remedial works are necessary or advised resulting from the tests undertaken within this report, assuming the mitigating measures noted herein are maintained throughout the operation of the arcade.



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7.0 Glossary of Terms

Decibel dB	*Unit for expressing the ratio between two amounts of acoustic power or for measuring the relative loudness of sounds. it is* defined *as ten times the logarithm of the value in base 10.*
SPL	*Sound pressure level (*SPL*) is the pressure level of a sound, measured in decibels (dB). It is equal to 20 x the* Log^{10} *of the ratio of the route Mean Square (RMS) of sound pressure to the reference of sound pressure*.
RT	*Reverberation Time, measured in seconds is the time an impulse sound takes to decay by 60dB.*
$LaeqT_5$	*Normalised averaged equivalent sound level measured in Decibels, taken over a 5-minute period.*