

Acoustic Associates Sussex Ltd

Noise Assessment for Planning and Change of use

Site: **6 Ockley Road, Bognor Regis, West Sussex.P021 2HW**
Client: **Speedy Tyres**

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Issue 1



Sound Insulation Testing - Acoustic Design of Buildings - BS4142 - PPG24 - Schools Acoustics BB93 -
Vibration - Expert Witness Testimony - Noise at Work - Air Tightness Testing - Auditorium Acoustics

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Contents

1	Introduction	- 3 -
2	Context, Noise Criteria & Noise Assessment Methodology	- 4 -
2.1	Context	- 4 -
2.2	Location	- 4 -
2.3	Soundscape.....	- 6 -
2.4	Process and Plant	- 6 -
2.5	Frequency of Operations.....	- 7 -
2.6	Applicable Assessment Criteria	- 7 -
2.7	Scope and Methodology	- 8 -
3	Measured Background Sound Levels	- 8 -
4	Measured Activity Levels	- 9 -
4.1	Simultaneous Measurements and Ontime Correction	- 9 -
4.2	BS4142:2014+A1:2019 Rating Level, $L_{Ar,Tr}$	- 10 -
5	BS4142:2014+A1:2019 Assessment of Activities	- 10 -
5.1	Handheld Wrench	- 11 -
5.2	Tyre Separator	- 11 -
5.3	Compressor	- 12 -
5.4	All Mobile Plant Operated within the same hour.....	- 12 -
6	Discussion	- 12 -
7	Uncertainty	- 13 -
8	Conclusion	- 13 -

Tables and Figures

Table 1. Description of Plant Measured at Source	- 9 -
Table 2. Simultaneous Measurement.....	- 9 -
Figure 1. Aerial Image of the site with the site shown in red	- 4 -
Figure 2. Location and Context Photograph	- 5 -
Figure 3. Inside the Commercial Premises	- 5 -
Figure 4. Hand Held Electric Nut Gun (Left) and Tyre Separator (Right)	- 7 -
Figure 5. Background Measurement Position 1, adjacent to 7 Ockley Road opposite.	- 8 -
Figure 6. Spectral Profile of the plant at the receive location	- 10 -
Figure 7. BS4142:2014+A1:2019 Assessment of Handheld Wrench	- 11 -
Figure 8. BS4142:2014+A1:2019 Assessment of Tyre Separator	- 11 -
Figure 9. BS4142:2014+A1:2019 Assessment of Compressor	- 12 -

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Issue 1	31/10/2019	Original Issue
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1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment relating to a retrospective change of use from retail to a tyre fitting premises at 6 Ockley Road, Bognor.

Noise levels have been assessed in terms of and following the guidelines of the following documents:

- BS4142:2014 +A1:2019 - Methods for rating and assessing industrial and commercial sound
- Sussex Planning Guidance - Noise 2015

To support a planning application for a retrospective change of use from the sales of car parts to a tyre fitting premises, an acoustic survey has been carried out on site to measure equipment at source, as well as measurements made at distance, equivalent to the location of the nearest residential receptor.

Speedy Tyres operates during the daytime only and the soundscape is dominated by road traffic noise from Argyle Road, as well as passing traffic at Ockley Road and the neighbouring commercial premises of Arfur's Yard and the Magic Garage opposite.

Using BS4142:2014+A1:2019, a worst-case hour/reference period has been considered with the small amount of plant that might be utilised inside Speedy Tyres. Wheels are removed for the purposes of changing tyres as well as replacing brakes, although the latter, might only be carried out once or twice a week. No air tools are used and vehicles are manually jacked up, with no single operation reported to last longer than 30 minutes.

However, in practice, tyres were seen to be changed much faster and within minimal impact to the surrounding soundscape.

With each of the tools considered using a BS4142:2014+A1:2019 approach, these were all below the measured background sound levels and evidenced as no to low impact, depending on context. Given that the sounds generated from the site are not continuous, the site and its tyre fitting operation presents a low impact risk.

In summary, the retrospective planning application should not be withheld on noise grounds.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

The report supports a change of use from a car spares retail site to a tyre fitting premises. It is understood that Speedy Tyres have been present on site since January 2019.

It was reported that the local planning authority has recently expressed concerns over a change of use and potential noise impacts from the tyre fitting premises. Accordingly, an acoustic survey has been carried out to determine the impact on the nearest residential property.

The premises operate between 08:00-18:00 Monday through to Saturday without any working on either Sundays or bank/public holidays.

2.2 Location

The application site can be seen in Figures 1 to 3 below and showing the positioning of the site (Figure 1) as well as closer photographs of the front and side of the site (Figure 2), as well as inside the premises (Figure 3).



Figure 1. Aerial Image of the site with the site shown in red



Figure 2. Location and Context Photograph

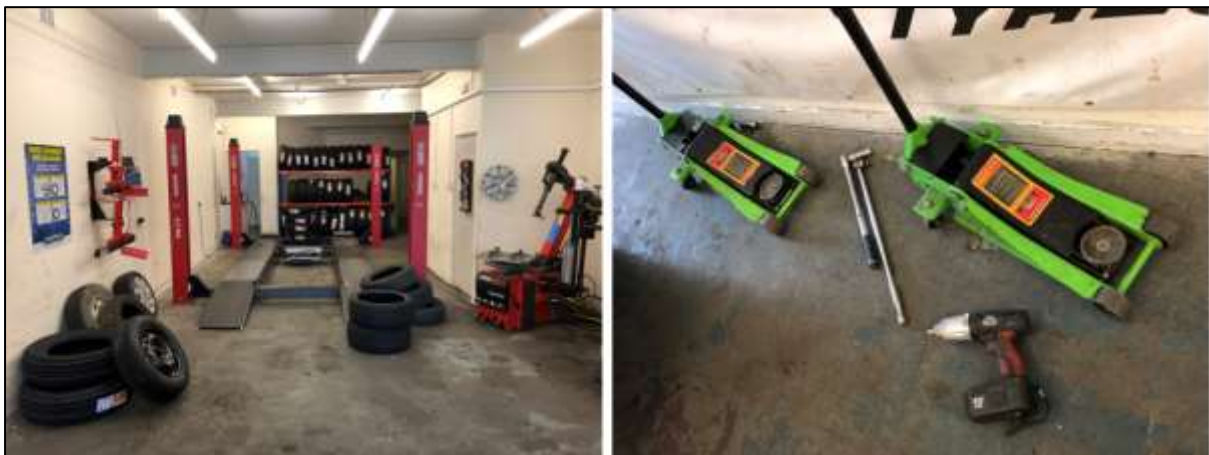


Figure 3. Inside the Commercial Premises

Speedy Tyres is located inside a long two storey building which runs East to West. At the Eastern end of the building, as can be seen in Figure 1 above is a roller shutter door used to secure the premises, however it remained open whilst present on site and whilst operations to change wheels etc occurred internally. At the very rear of the building, racks of new tyres in assorted sizes are stored. Recent new build residential development has occurred in the Mews to the North West of the site.

To the immediate South of the site is an open plan Salvage site specialising in windows and doors, where customers would typically park up, load and depart. To the East of the site across the road was a car sales yard called Magic Garage, where vehicles are bought and sold.

Opposite the site, the closest residential property at approximately 10m was number 7 Ockley Road, which at the time of the visit was reported to be empty, yet in the process of being refurbished.

Above the site is another commercial use. Attempts to access the space above to test the performance of the separating floor was not possible at the time of the site visit due to access.

2.3 Soundscape

The dominant noises heard whilst on site were passing traffic, couriers, bird song, aviation noise, vehicle idling, loading and unloading and passing pedestrians

2.4 Process and Plant

Whilst a Tyre Fitting premises, it was reported that brakes may also be fitted. Typically, appointments are not required and customers may wait whilst works to their vehicles are carried out. It was reported that typically, no job will last longer than 30 minutes, however, in practice, tyres were seen to be changed a lot quicker than 30 minutes.

Air tools are not used and wheel nuts are first loosened by hand leverage. An electric operated hand wrench is seen in Figure 4 and was measured removing a number of wheels/tyres. On average, it took approximately eight seconds to remove wheel nuts using the electric gun.

Tyres are changed by simply manually jacking up the side of the vehicle and removing the tyre for inspection. Air is released from the valve prior to it being placed onto the tyre separator.

The tyre separator then separates the outer rubber tyre from the metal core/rim, which makes a characteristic pop as the rubber is separated. The machine is seen in Figure 4 below (right hand image).

A new tyre may then be added to the metal rim where inflation using an air line occurs. The tyre is then placed back onto the vehicle and the nuts retightened, with manual tightening occurring.

It is also apparent that brakes may be replaced on site. This follows the same process of removing the wheel to access the brakes and then using a screwdriver to lever out the calliper arms without any need for banging or crashing. The only different operation for the replacement of brakes is that the vehicle is typically raised using a hydraulic ramp, which was again measured on site.

The only noisy plant operated inside the premises is restricted to the following:

1. Hand held electric nut gun (Sealey 24V ½" Cordless Impact Wrench)
2. Hydraulic ramp/lift for access to brake callipers
3. Compressor located in a separate room to the rear of the premises which was marked with a Sound Power Level (LWA) Marking Label of 96dB(A).
4. Tyre Separator.

It is relevant to note that not all of the plant will operate at any one time, and as reported above, the instances of use can be short lived. For example, the nuts being removed from a wheel took on average, 8 seconds.



Figure 4. Hand Held Electric Nut Gun (Left) and Tyre Separator (Right)

There was no external plant which supported the Tyre Fitting Unit.

2.5 Frequency of Operations

It was reported by the site manager that 8 tyres may be changed in a typical day, and one or two brakes replaced in a week. It was also reported that the compressor would not typically run for more than three times in an average day, to replace air in the unit as it is discharged.

2.6 Applicable Assessment Criteria

2.6.1 BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BS4142:2014+A1:2019 provides a means of assessing the impact of industrial or commercial sound upon nearby noise-sensitive receptors, including residential properties.

It does this by comparing the Rating Level of the noise from the industrial or commercial source with the pre-existent L_{90} background noise level affecting the same noise-sensitive premises. The Standard provides guidance that:

- a) Typically, the greater the difference, the greater the magnitude of the impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact, depending on the context.

2.7 Scope and Methodology

Measurements were made of sound pressure levels close to activities as they occurred inside the premises. Measurements were made with a Class 1 Norsonic 118 (A) sound level meter. During the time on site, only two vehicles were seen as customers.

A sound level meter (Norsonic 118 (C)) was left running in front of the premises in line with the façade of 7 Ockley Road to determine background sound levels without garage activities occurring. The sound level meter was tripod mounted at 1.5m high and behind a chain link fence to assist with security and minimise any trip hazards to the frequent pedestrian traffic. The internal time clocks of the two sound levels were synced to allow a comparison of times and sound pressure levels.

A second background position was also measured for thirty minutes at the junction of Gainsboro Road and Ockley Road, without any influence of vehicles loading, idling etc for the adjacent commercial premises.

Simultaneous measurements were deemed to be the most accurate method of assessment from both the garage as well as adjacent to 7 Ockley Road. With the sound levels meter clocks synced it was appropriate to compare measurements.

3 Measured Background Sound Levels

As discussed above, measurements were made in front of the business premises in line with the nearest residential property at 7 Ockley Road, at position 1, and additionally, at the Gainsboro and Ockley Road junction, Position 2, the results of which were relatively consistent. Position 1 is shown below in Figure 4

Position 1 was noted to be, 47dB $L_{A90,15\text{minutes}}$ (ranged from 47dB $L_{A90,15\text{ minutes}}$ to 49dB $L_{A90,15\text{ minutes}}$)

Position 2 was noted to be, 44dB $L_{A90,15\text{minutes}}$ (0.1dB change)

The soundscape at position 1 was increased, as it received a contribution from faster moving traffic at Argyle Road, as well as vehicles loading and unloading at the adjacent Artur's yard and Magic Garage lot opposite. Position 1 is therefore considered to be representative and used in the assessment of background sound levels.



Figure 5. Background Measurement Position 1, adjacent to 7 Ockley Road opposite.

4 Measured Activity Levels

As referenced above, the most accurate method to determine the impact of the various tools being used is the simultaneous assessment. As detailed above, it is relevant to note that the operations are not continuous and as such an ontime correction may be applied.

Within BS4142:2014+A1:2019, the reference period is in fact 1 hour. It is assumed that 2 tyres are changed in an hour, two periods of tyre separation (ie 2 minutes) and one compressor release for consideration during an hour reference period.

Plant Measured at Source					
Plant	Time (seconds)	Measured $L_{Aeq,T}$	Seconds in one Hour	On time correction to be applied $10 \cdot \log(64/3600)$	Corrected $L_{Aeq,1hour}$
Electric Nut Gun	64 (8x8)	75dB $L_{Aeq,T}$	3600	-23.5	51.5 dB
Tyre Separator	120	77dB $L_{Aeq,T}$	3600	-14.8	62.2 dB
Compressor	90 (3x30)	90.2 dB $L_{Aeq,T}$	3600	-16	74 dB

Table 1. Description of Plant Measured at Source

4.1 Simultaneous Measurements and Ontime Correction

As the name suggests, measurements were made both at the source as well as at the 7 Ockley Road façade.

Equipment	Received Specific Level- $L_{Aeq, 1minute}$	Residual Sound Level $L_{Aeq, 1minute}$	Specific Sound Level	Ontime Correction	Specific Sound level
Wrench	57.7	55.1	54.2	-23.5	30.7
Tyre Separator	58.7	55.1	56.2	-14.8	41.4
Compressor	59.1	55.1	56.9	-20.8	36.1

Table 2. Simultaneous Measurement

55.1dB L_{Aeq} , as seen in Table 2 above, was the lowest residual measurement recorded during the time the activities were assessed.

4.2 BS4142:2014+A1:2019 Rating Level, $L_{Ar,Tr}$

Whilst the specific sound is that produced by the particular piece of machinery in question, BS4142:2014+A1:2019 uses a methodology whereby character corrections may be applied where the sound in question contains characteristics which would make it more noticeable. For example, character corrections may be applied for tonality, and how it is perceived at the residential receptor location. Similarly, corrections may be applied for onset rate, where there is a particular bang or percussive element to the sound. A 3dB “other” correction is also available within the British Standard.

Where a character correction is added to the specific sound level, it becomes a Rating Level or $L_{Ar,Tr}$.

To check for tonality, the linear 1/3 octave spectral profiles at the receive location were run through a tonality checker for the wrench, the tyre separator and the compressor running. None were identified as tonal. For completeness the modified A weighted profile can be seen below in Figure 4.

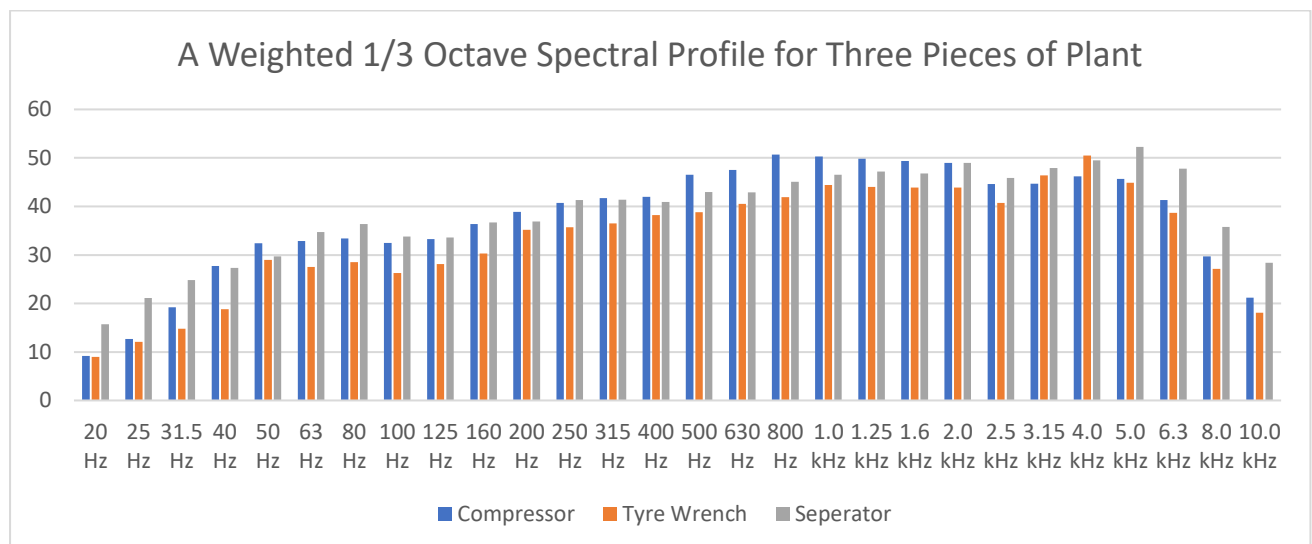


Figure 6. Spectral Profile of the plant at the receive location

With the fact that tonality and and/or crashing type activities were *not witnessed* with the two vehicles which had wheels changed, character corrections are not deemed necessary. However, for the sake of a robust report, a 3dB “other” character correction has been applied.

5 BS4142:2014+A1:2019 Assessment of Activities

The individual assessments are seen in 5.1 to 5.3 below and a worst-case combined hour has been considered in 5.4.

5.1 Handheld Wrench

Handheld Wrench - Daytime			
Results	Measurement Parameter		Relevant Clause
Specific sound level (corrected)	$L_{Aeq(T)}$	30.7	7.3.4
Acoustic feature correction	Other(+3)	3	9.2
Rating level	$L_{Ar,Tr}$	33.7	9.2
Background sound level	$L_{A90(T)}$	47	8
Excess of rating level over background sound level		-13.3	11
Assessment indicates a	Significantly below background		11
Uncertainty of the assessment	Discussed		10

Figure 7. BS4142:2014+A1:2019 Assessment of Handheld Wrench

The short-lived nature/use of the handheld electric wrench performs significantly below measured background sound levels.

5.2 Tyre Separator

Tyre Separator - Daytime			
Results	Measurement Parameter		Relevant Clause
Specific sound level (corrected)	$L_{Aeq(T)}$	41.4	7.3.4
Acoustic feature correction	Other(+3)	3	9.2
Rating level	$L_{Ar,Tr}$	44.4	9.2
Background sound level	$L_{A90(T)}$	47	8
Excess of rating level over background sound level		-2.6	11
Assessment indicates a	Below background		11
Uncertainty of the assessment	Discussed		10

Figure 8. BS4142:2014+A1:2019 Assessment of Tyre Separator

The tyre separator is also seen to be below measured background sound levels, suggesting a low impact, depending on context.

5.3 Compressor

Compressor - Daytime			
Results	Measurement Parameter		Relevant Clause
Specific sound level (corrected)	$L_{Aeq(T)}$	36.1	7.3.4
Acoustic feature correction	Other(+3)	3	9.2
Rating level	$L_{Ar,Tr}$	39.1	9.2
Background sound level	$L_{A90(T)}$	47	8
Excess of rating level over background sound level		-7.9	11
Assessment indicates a	Significantly below background		11
Uncertainty of the assessment	Discussed		10

Figure 9. BS4142:2014+A1:2019 Assessment of Compressor

The compressor is also seen to operate below measured background sound levels.

5.4 All Mobile Plant Operated within the same hour

Should an event occur, where the wrench, compressor and tyre separator were all used within the same hour, the specific sound levels have been logarithmically combined to produce 42.8dB as the combined total. Again, adding a 3dB “other” character correction will make a rating level of 45.8dB $L_{Ar,Tr}$ and still below the measured background sound level of 47dB $L_{A90, 15minutes}$.

6 Discussion

It is seen from the information presented above and the calculations made to determine the impact in line with BS4142:2014+A1:2019 that the activities of the tyre fitting premises are certainly not continuous and remain below measured background sound levels. It is relevant to note that the predicted worst-case hour with all examples applied, still remains below the measured background sound levels.

With the frequency of cars, customers and specifically, tyres being changed, the associated impact on the nearest residential receptor remains low and below measured background sound levels. However, impact must always be considered in relation to context.

Speedy Tyres is located at the commercial end of Ockley Road and its soundscape reflects the fact that it has neighbouring businesses. The Speedy Tyres site operates during the daytime only and the reality is that there will not be continuous sound levels generated. When cars did visit, tyres were changed incredibly quickly and without an obvious impact on the soundscape. No air tools are used and subjectively, the most audible sound was the discharge of the compressor.

However, it is noted that the compressor is currently housed within a partitioned area at the rear of the premises which is due to have a door placed back into the frame. The replacement door will significantly reduce the ability for the sound energy to spread through the commercial premises and out onto Ockley Road.

Aside from replacing the door to the compressor enclosure, mitigation measures are not deemed necessary for the particular operations carried out on site. Should new machinery be procured, it should be done so on the basis of its sound power level, (measured when in use) in order to make an informed judgement or comparison between items.

7 Uncertainty

It remains important to report any uncertainty in the survey and calculation process. The following steps were taken to limit uncertainty in both the data and the processing.

1. Both Class 1 sound level meters were calibrated before and after the survey without any drift noted. Additionally, the internal time clocks were synced for both units to ensure that like for like comparisons could be made between measurements.
2. The activities of tyre changing were witnessed and measured for two different vehicles, a Skoda Fabia and a Vauxhall Corsa.
3. All plant used was measured both close to source as well as at distance, adjacent to the nearest residential receptor at 7 Ockley Road to ensure a fair assessment.
4. Where there were a number of background sound levels recorded, the lower of the sound levels was used within the BS4142:2014+A1:2019 for comparing the Rating level against measured background.
5. To ensure a robust assessment, where there was neither tonality nor onset sounds, a 3dB "other" character correction was applied to account for the sounds heard during the changing of tyres.
6. Whilst initially, the equipment was taken to perform a sound insulation test to determine the performance of the separating floor on the basis of there being residential property above the site, it is now understood that the demise above remains a commercial use. Notwithstanding the use, access was not permissible at the time of the visit.

8 Conclusion

To support a planning application for a retrospective change of use from the sales of car parts to a tyre fitting premises, an acoustic survey has been carried out on site to measure equipment at source, as well as measurements made at distance, equivalent to the location of the nearest residential receptor.

Speedy Tyres operates during the daytime only and the soundscape is dominated by road traffic noise from Argyle Road, as well as passing traffic at Ockley Road and the neighbouring commercial premises of Arfur's Yard and the Magic Garage opposite.

Using BS4142:2014+A1:2019, a worst-case hour/reference period has been considered with the small amount of plant that might be utilised inside Speedy Tyres. Wheels are removed for the purposes of changing tyres as well as replacing brakes, although the latter, might only be carried out once or twice a week. No air tools are used and vehicles are manually jacked up, with no single operation reported to last longer than 30 minutes. However, in practice, tyres were seen to be changed much faster and within minimal impact to the surrounding soundscape.

With each of the tools considered using a BS4142:2014+A1:2019 approach, these were all below the measured background sound levels and evidenced as no to low impact, depending on context. Given that the sounds generated from the site are not continuous, the site and its tyre fitting operation presents a low impact risk.

In summary, the retrospective planning application should not be withheld on noise grounds.