AIRTIGHT & NOISECHECK LIMITED

Ground Floor, Unit 9, Fitzherbert Road, Farlington, Hampshire, PO6 1RU
Phone: 03450 666966 Email: info@airtightnoisecheck.co.uk

ACOUSTIC TESTING REPORT FOR

WPL CONSULTING
1 AIRPORT WEST
LANCASTER WAY
LEEDS
WEST YORKSHIRE
LS19 7ZA

SITE ADDRESS

STATION ROAD
THURNSCOE
ROTHERHAM
SOUTH YORKSHIRE
S63 0JR

Written By: Michael Vine: MIOA

Checked By: Mark Witcher : TIOA

Acoustic Engineer: **Date: 22-23rd Sept 2015**

Michael Vine

AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

Contents

Customer Details	**- Page 3**
Site Address	**- Page 3**
Equipment Used	**- Page 3**
Measurement Procedure	**- Page 3**
Executive Summary	**- Page 4**
Objective	**- Page 5**
Calibration	**- Page 5**
Site Layout & Microphone Positions	**- Page 5**
Hours of Operation	**- Page 6**
Background Noise Levels	**- Page 6**
Results Table	**- Pages 6&7**
Conclusion	**- Page 8&9**
Site Plan	**-Page 10**
Google Earth	**- Page 11**
Appendix	**- Page 12**
Plant Frequency Data Table	**- Page 13**

Raw data is attached

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Customer Name: **Date: 22-23rd Sept 2015**

WPL Consulting
1 Airport West
Lancaster Way
Leeds
West Yorkshire
LS19 7ZA

Site Address:

Station Road
Thurnscoe
Rotherham
South Yorkshire
S63 0JR

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Nor121 Environmental Analyser – Serial No 31375, Calibration due February 2016.

Analyser complies with the following standards:
IEC 60651 type 1
IEC 60804 type 1
IEC 61260 class 1
IEC 225
ANSI S1.4 – 1985 type 1
ANSI S1.43 – 1997 type 1
ANSI S1.11 – 1986 order 3 type 1D
Norsonic production standard set for the Nor121

Measurement Microphone (Gras 40AF) – Serial No 62522, Cal due Feb 2016

Acoustic Calibrator Nor 1251 – Serial Number 31169, Cal Due Feb 2016

Measurement Procedure:

The existing external day time & night time sound levels were measured in one microphone location for 24hours between Tuesday 22nd September to Wednesday 23rd September 2015 in order to establish the current noise emissions associated with the proposed erection of the commercial store. This report is concerned with the installation of the plant for the building (2 x Luvata MN199956 Gas Coolers), the deliveries to and from site from vehicles and the use of the car park from vehicles.

This report will make reference to the necessary British Standards, including BS4142: 2014.

All calculations will be based on manufacturers information in relation to the plant.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Executive Summary:

Airtight & Noisecheck Ltd were instructed by WPL Consulting to undertake a noise impact assessment (NIA) at one microphone location in order to establish if the erection of a new commercial store & associated plant, and the deliveries and use of the car park to and from site will have an adverse impact on the nearest residential dwelling. The unit is currently part vacant with industrial buildings located on part of the site also. The proposals for the site are shown in the site plan at the rear of the report.

This report is concerned with:

1 The installation of plant to the rear of the building, comprising of 2 x Luvata MN199956 Gas coolers
2 The deliveries to and from site using delivery vehicles, believed to be 3 per day between 0600-2300
3 The use of the proposed car park of vehicles, believed to be circa 200 movements in ay one hour period

The results for the plant noise in this report were measured against criteria set out in British Standard BS4142: Method for Rating industrial noise affecting mixed residential and industrial areas 2014. This document states:

1- a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

2- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

3- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level this is an indication of the specific sound source having a low impact, depending on the context.

The factors such as:

- Distance to dwelling
- Screening offered by building
- Orientation
- Sound pressure levels (taken from manufacturers)

Have all played a part in determining the rating level of the condensers at the residential façade. The combined level of the 2 x gas coolers is 31dB(A) at the residential facade, this includes a correction of +6dB for the units being placed in the junction of two planes (facade and floor). In addition there is no acoustic feature correction for tonality, impulsiveness or intermittency (at receptor location) being added due to the distance offered between the units it is unlikely any of the features will be noticeable at the receptor location. This calculation does not take into account the screening offered by the building or the attenuation offered by the barrier, which will also reduce the sound level. It is understood that the plant will be enclosed in an acoustic enclosure/louvre with a -10dB sound reduction capacity so this feature correction has been applied to the levels.

The calculations to assess the impact from the deliveries shows that the calculated L_{Aeq} should be very similar to the $L_{A90\ 1hour}$ value for the delivery time period, indicating no adverse impact for the residents, and the vehicles entering and leaving the car park should offer a sound level of 43dBA which is -2dB below the lowest $_{LA90\ 1hour}$ value during opening hours.

The combined sound level of vehicle deliveries & unloading activity will be 41dBA, which is -10dB below the $L_{Aeq\ 15mins}$ between the hours of 0615-0630 and -8dB below the $L_{Aeq\ 1hour}$ value between 2200-2300 thus showing that the sound associated with the deliveries should not adversely affect the residents. In addition all of the combined noise levels are very similar to the representative L_{A90} values for the time periods.

Whilst this report supports the delivery times of 0600-2300 with no further mitigation measures, the client is installing a comprehensive acoustic fence (Jakoustic Plus Barrier) around the delivery bay to increase the level of sound attenuation offered in this location.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

1 **Objective & Assessment Criteria:**

1.1 To determine if the proposed erection of a large commercial store and associated plant, the arrival of delivery vehicles and use of the car park area will have an adverse impact on the residential dwellings located in close proximity to the site. The report will address the noise associated with the plant sound levels, delivery vehicle movements and car movements. All of these noise sources will be compared to the background noise levels at the specific time that is apparent as this will be a fair reflection of the likely impact.

The plant noise will be compared to BS4142: 2014, whilst the noise associated with the vehicle movements, deliveries and unloading will be compared to the current ambient noise levels (LAeq) as this is affair comparison to be made and should indicate if the proposed noise sources will have an adverse impact on the dwellings or increase the current ambient noise levels.

2 **Calibration:**

2.1 The microphone was calibrated before and after the testing procedure and no drift was recorded.

3 **Site Layout & Microphone Position:**

3.1 Thurnscoe is a village located in the borough of Barnsley, it is located 9 miles from Barnsley and 8 miles from Doncaster. Station Road is a mixed use area with both residential and industrial units located in close proximity to the site. The proposed site is located to the South of Station Road and immediately to the West of a railway line.

3.2 The proposed store will be located on the Eastern part of the site, with the car park located on the Western part. The plant will be located within an enclosure on the Eastern façade of the building and the delivery area will be located to the South of the building.

3.3 The nearest residential dwellings are located to the South of the proposed site, with the nearest residential façade being approximately 15metres from the proposed delivery area and 25metres from the proposed plant area. The centre of the car park is approximately 25metres for the residential façade and this was the distance used for the necessary equation to assess the impact of this noise source. It is fair to say that there will be some parking spaces closer to the dwellings, but these are limited in number and the majority of the cars will be located further away but for a fair assessment the centre of the car park has been used.

3.4 The noise levels were measured at a location that fairly represents the background noise apparent on site for the residential dwellings. It was located as close to the Southern boundary as possible due to security, in excess of 3metres from the ground and at least 3.5metres from any reflective surface.

3.5 The plant to be installed is: **2 x Luvata MN199956 Gas coolers**

These units will be located within an enclosure on the Eastern façade of the store and this enclosure should have a sound reduction of 10dB.

It is anticipated that there will be 1 x HGV and 2 & smaller vehicle deliveries in a 17hour period so the following equation has been used for these noise sources:

LAeq (T) = SEL + 10 log N - 10 log T
where LAeq (T) = Equivalent continuous sound pressure level over time period T
SEL = 'Single Event Level', i.e. the 1 second LAeq - which has the same total A-weighted energy as the entire event
N = Number of events in time period T (3)
T = Time period in seconds (61200) – 17hours

The same equation has been used to determine the impact of the cars, and it has been assumed that there will be circa 200 car movements within any 1hour period (arriving & leaving).

4 **Weather Conditions:**

4.1 The weather was dry for the duration of testing, ranging between 5 - 18degrees Celsius, there was no wind or rain during the measurement procedure.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

5 **Hours of Operation:**

5.1 The proposed hours of operation for the gas coolers is 24hours a day and the store opening hours are understood to be 0800-2200 Monday – Saturday and 1000-1600 on Sunday.

6 **Results: Background Noise Levels:**

The sound associated with the gas coolers will be compared to the lowest $L_{A90\ 1hour}$ value during the night time period as they will be in operation 24hours a day and compered to the criteria set out in BS4142: 2014. The sound associated with the vehicle deliveries will be compared to the lowest $L_{Aeq\ 1hour}$ value during the delivery time period as this is the time period that they will be operating (0600-0700). The sound associated with the cars using the car park will be compared to the lowest $L_{Aeq\ 1hour}$ value during the store opening hours (0800-2200) as this is the time when the cars will be using the car park. It must be taken into context and as such the sound associated with the vehicle movements and deliveries will not be compared to the lowest L_{A90} value during the night time period as they will not be in operation during this time.

Time Period	Lowest Value 1hr	Noise Source
Night Time – 0200-0300	32dB(A) LA90	Gas Coolers (BS4142)
Night Time – 0615-0630	51dB(A) LAeq	HGV Deliveries & Unloading
Day Time – 2200-2300	49dB(A) LAeq	HGV Deliveries & Unloading
Day Time – 2100-2200	52dB(A) LAeq	Car movements within car park

(Results obtained using the environmental sound level meter and where needed taking a logarithmic average of different values)

6.1 Gas Coolers – BS4142 Results Table

Results		*Commentary*
Ambient Sound Level	SPL @ 1m = 71dBA 2 coolers so 74dBA	Taken from Manufacturer data
Residual Sound Level	48dBA – Night time $L_{Aeq\ 1hour}$	Measured at receptor
Specific Sound Level	74dBA	$Ls = 10lg(10^{La/10} – 10L^{r/10})$ BS4142: 2014 7.3.3
Acoustic Feature Correction	+6dB (Q = 4)	Units placed in junction of 2 planes
Reductions due to facade & distance	-10dB for enclosure -39 for distance	Acoustic Enclosure Noise sensitive dwellings to South =(-1)*(20*LOG(dis)+11)
Rating Level	31dB(A)	
Background Sound level	32dBA	
Excess of rating over background	(31-32) = -1dB	
Assessment indicates no impact at receptor		Perimeter fence & orientation should also offer further reductions

6.2 Vehicle Deliveries

	Arrival	Reversing	Leaving	
SEL at 10m dB(A)	79	86	79	
No of events	3	3	3	
Distance, m	15	15	15	
Distance correction	-3.5	-3.5	-3.5	
Reference period	17 hours	17 hours	17 hours	
Correction for reference period	-43	-43	-43	
Barrier correction	-10	-10	-10	**Total**
Total Noise at dwelling	23	30	23	**31**

The above values are the SEL values and not an average, a higher SEL has been used for reversing to accommodate for reversing beepers, although the client has insisted these will not be in operation during sensitive hours.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

6.3 Delivery Unloading

Unloading Noise at 10m, dB LAeq	**58**
Distance, m	15
Distance correction	-3.5
Barrier Correction	-10
Time correction, 20mins per hour	-5
Unloading sound level at dwelling	**40**

6.4 Combined delivery vehicle movement & unloading

Noise Source	*1*	*2*	*Total*
Level at dwelling, dB LAeq	31	40	41

1 – Delivery vehicle movements
2 – Unloading

6.5 The table below shows the combined noise level of the delivery vehicle movements & unloading and the current ambient noise levsl L_{Aeq} at various times during the delivery period, it indicates that the specific noise will be below the L_{Aeq} values thus having minimum adverse imapct on the residents.

Combined Level	Ambient Noise Level	Difference	Assessment Indicates
41dB(A)	51dB(A) – 0615-0630 49dB(A) – 2200-2300	-10dB -8dB	No impact No Impact

Combined Servicing Noise Level	**41dBA**
Background LAeq (lowest)	49dBA
Combined BGN & specific	49.6dBA
Increase over BGN	0.6dB

6.6 Car movements

	Car Movements	
SEL at 10m dB(A)	68	
No of events	200	
Distance, m	25	
Distance correction	-8	
Reference period	1 hour	
Correction for reference period	-12.3	
Barrier correction	-5	**Total**
Total Noise at dwelling	43	**43**

Car Movements	Ambient Noise Level	Difference	Assessment Indicates
43dB(A)	52dB(A) – 2100-2200	-9dB	No impact

Car movements Noise Level	**43dBA**
Background Laeq (lowest)	49dBA
Combined BGN & specific	49.9dBA
Increase over BGN	0.9dB

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

7 **Conclusion:**

7.1 All calculations have been performed to recognised standards and equations and they show that the proposed store, plant & vehicle movements/deliveries should not have an adverse impact on the residential dwellings located to the South of the site. The noise associated with the plant, deliveries or car movements do not increase the current levels of background noise by more than 0.9dB, a difference of +3dB would be deemed detrimental and the predicted increase is nowhere near this amount. The increase by deliveries is even less at 0.6dB.

7.2 The sound levels produced from the plant have been compared to the criteria set out in BS4142: 2014 and the rating levels listed within this report. The noise associated with the vehicles have been compared to the current ambient noise levels apparent on site (L_{Aeq}) as this is a fair assessment criteria as it will show if the ambient noise levels will be increased. It must be mentioned however that the calculated noise levels are equal to or less than the LA90 values also thus substantiating the point that the proposed site and vehicles should not have an adverse impact on the residential dwellings.

7.3 There is an existing timber close-boarded fence surrounding the site at present and this will completely screen the line of sight between the dwellings & loading bay. Due to the short distance between the delivery bay and the fence, in addition to the complete screening of the source an attenuation of -10dB has been applied to these calculations. Due to the extra distance between the cars and barrier a feature correction of -5dB has been applied to these calculations although in reality the actual attenuation may exceed this value.

7.4 A 2.5m high Jakouctic Plus barrier will be erected around the delivery bay, this barrier could offer upto a 28dB sound reduction, and based on the literature it could offer close to 18dB reduction when 10m away from the barrier. The Plus Barrier is similar to the Jakoustic Barrier but with an additional absorptive layer, covered with a protective membrane on one side. The installation of this fence will further reduce the noise levels at the residential boundary and should reduce the noise levels by a further 6-8dB at the residential façade thus reducing the impact dramatically. It will completely screen the delivery bay from the dwellings.

Table showing predicted combined level at the façade with the Jakoustic Plus Barrier erected around the delivery yard ***(please note a sound reduction of -15 has been applied but it is understood the barrier will have a sound reduction higher than this).***

	Arrival	**Reversing**	**Leaving**	
SEL at 10m dB(A)	79	86	79	
No of events	3	3	3	
Distance, m	15	15	15	
Distance correction	-3.5	-3.5	-3.5	
Reference period	17 hours	17 hours	17 hours	
Correction for reference period	-43	-43	-43	
Barrier correction	-15	-15	-15	**Total**
Total Noise at dwelling	18	25	18	**26**

Delivery Unloading

Unloading Noise at 10m, dB LAeq	**58**
Distance, m	15
Distance correction	-3.5
Barrier Correction	-15
Time correction, 20mins per hour	-5
Unloading sound level at dwelling	**35**

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Combined delivery vehicle movement & unloading

Noise Source	*1*	*2*	*Total*
Level at dwelling, dB LAeq	26	35	36

1 – Delivery vehicle movements
2 – Unloading

Combined Level	Ambient Noise Level	Difference	Assessment Indicates
36dB(A)	51dB(A) – 0615-0630	-15dB	No impact
	49dB(A) – 2200-2300	-13dB	No Impact

Combined Servicing Noise Level	36dBA
Background LAeq (lowest)	49dBA
Combined BGN & specific	49dBA
Increase over BGN	0dB

7.5 This report illustrates that the proposed noise levels associated with the plant and vehicle movements/deliveries should not have an adverse impact on the residential dwellings. It is apparent that the area is a very busy area with high volumes of traffic using the local road network.

7.6 The calculations performed have assumed the delivery times of between 0600-2300 and it is recommended that there are no deliveries before this time as the noise levels drop during the early morning period. It also assumes that there will be no more than 3 deliveries during this time, all information relating to opening hours, plant specification, delivery times etc have been taken directly from the client.

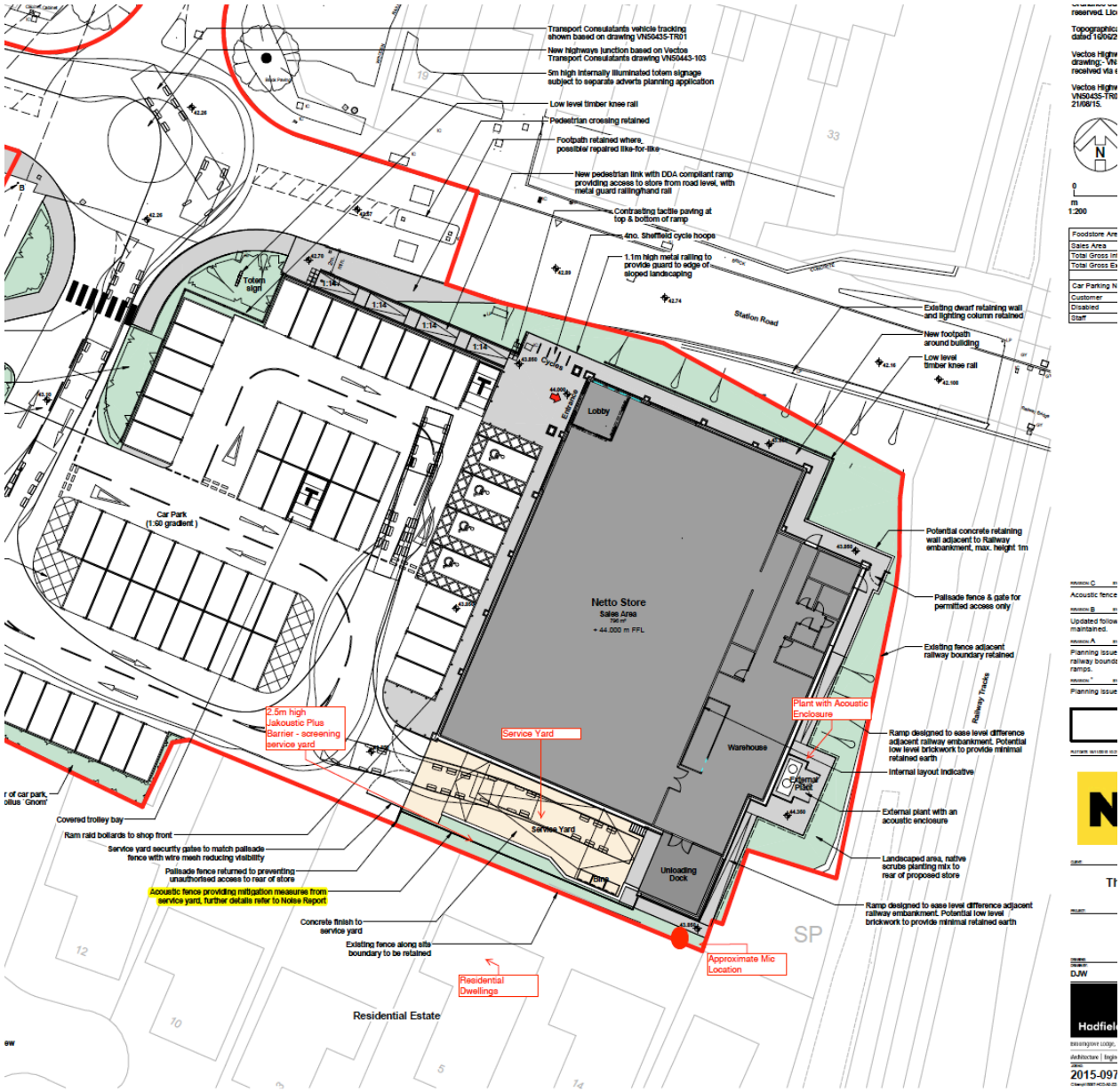
7.7 All calculations show that the predicted noise levels are below the criteria set out in BS8233: 2014 for external noise levels. This document states a level between 50-55dB $L_{Aeq\ (0700\text{-}2300)}$ as being adequate for gardens and external spaces. In addition, using the standard attenuation of 10-15dB for an open window the internal noise criteria would be below the habitable rooms criteria also.

7.8 The L_{Amax} values were also compared and shown in the table below.

Servicing max at 10m, dBL_{Amax}	**75-85**
Distance, m	15
Distance correction, dBA	-3.5
Screening/Fence correction, dBA	-10
Servicing max at dwelling dB LAmax	**61.5-71.5**
Current noise levels dB LAmax	62-72

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

8 **Site Plan:**



AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

9 Google Earth:



AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

11 **Appendix:**

Continuous equivalent noise level, LAeq — The steady noise level (usually in dBA) which, over the period of time under consideration, contains the same amount of sound energy as the time varying noise.

LAmax - The maximum value that the A-weighted sound pressure level reaches during a measurement period.

dB (A) — The A-weighted sound pressure level.

Decibel (dB) — A unit used for many acoustic qualities to indicate the level of sound with respect to a reference level.

A-weighting — A frequency weighting that relates to the response of the human ear.

Background noise level — Prevailing noise level in a specified environment measured in the absence of the noise being studied.

Habitable Room – A room used for sleeping or recreation/relaxation

Dne,w Weighted element normalised level difference – A single-number quantity which characterises the airborne sound insulation of a small building elements.

Rw Weighted sound reduction index – A single-number quantity which characterises the airborne sound insulation of a material or building element measured in the laboratory.

LA10 – The A-weighted noise level exceeded for 10% of the measurement duration.

LA90 - The A-weighted noise level exceeded for 90% of the measurement duration.

British Standards & associated documents:

- BS4142: Rating industrial noise affecting mixed residential and industrial areas - 2014

- Code of Practice: BS8233: 2014 - Sound Insulation and noise reduction for buildings.

LAeq (T) = SEL + 10 log N - 10 log T
where LAeq (T) = Equivalent continuous sound pressure level over time period T
SEL = 'Single Event Level', i.e. the 1 second LAeq which has the same total A-weighted energy as the entire event
N = Number of events in time period T (3)
T = Time period in seconds (7200)

The values used for the above tables were the SEL values and not an average value over a timer period. These values were taken from other literature and reports used to assess noise produced from HGV deliveries and unloading.

Jacksons Acoustic fencing – www.jacksons-fencing.co.uk

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Plant Noise Break Out										
	63	125	250	500	1K	2K	4K	8K	Overall	
1 x Luvata MN199956	0	59	60	65	67	63	60	50	71	dB(A)
SWL dB	0	75	69	68	67	62	59	51	77	dB Lw
Distance	25	25	25	25	25	25	25	25		
DI	6	6	6	6	6	6	6	6		
Point Source Attenuation	-39	-39	-39	-39	-39	-39	-39	-39		
Enclosure	-10.00	-10	-10	-10	-10	-10	-10	-10		
Level at Room	-43	32	26	25	24	19	16	8	34	dB
	0	16	17	22	24	20	17	7	28	dB(A)

The above results table shows the frequency values for 1 x gas cooler, there will however be 2 coolers inbstalled at the site so the necessary decibel additino calculartions have been applied to the data above to obtain the value for the 2 x coolers.