

SPRATT+HAMER



Noise Impact Report

Client	JSM Company Group Limited
Client Address	18 – 26 Fleet Street Liverpool L1 4AN
Site Address	9-11 Regent Street Wrexham LL11 1SG
Survey Date	03/02/23
Reference	20664

Quality Assurance	
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1 Introduction

JSM Company Group Limited has instructed Spratt and Hamer Limited to undertake an environmental noise survey in order to assess the impact from the nearby road, night clubs, commercial units, as well as other general noise within the local environment which may have an impact on future residents of the proposed development.

The proposed development site is an existing three-storey building that currently comprises ground floor retail and commercial space. It is proposed to convert the entire first and second floors into 20no. 1-bedroom and 2-bedroom residential apartments, while maintaining ground floor commercial units.

This report is prepared solely for JSM Company Group Limited. Spratt and Hamer Limited accepts no responsibility for its use by any third party.

This document has been prepared using the various documents listed within the appendices of this report, together with drawings, technical information and additional verbal representations made by third parties. We have not audited nor independently verified the content or accuracy of any of the documents and information provided to us in the preparation of this report.

If additional information comes to light subsequent to the production of this report, we reserve the right to revise our opinions and the conclusions reached within this report.

1.1 An Environmental Noise Assessment

Spratt and Hamer Limited has undertaken an environmental noise assessment at the above site with noise levels measured externally over 24-hour periods, consisting of 16-hour days (07:00 – 23:00) and eight-hour nights (23:00 – 07:00). The measurements were carried out during weekdays and over a weekend (11:30 Friday – 11:30 Monday).

This report will state the measured noise levels and will refer to guidance relevant to the nature of this survey whilst considering Local Planning Authority guidance and conditions.



2 Assumptions, Limitations & Uncertainty

- a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building elements.
- b. It is assumed that the sound pressure levels measured on site during the environmental noise survey are typical of the site.
- c. It is assumed that the technical data provided by glazing and ventilation manufacturers is up to date and correct.
- d. It is assumed that drawings and information supplied by JSM Company Group Limited are up to date and correct.
- e. It should also be noted that building elements modelled in INSUL are only an approximation of the proposed specifications due to the limitation of materials available within the software. These models are shown in the appendix.
- f. All building elements modelled in INSUL Acoustic Prediction Software have had a 3 dB correction applied to account for a margin of error within the software.
- g. It is assumed that single-glazed front façade windows are 6mm thick.
- h. The consultant attending site was not granted access to the second floor of the building, therefore monitoring equipment could only be set up on the first floor.



3 Planning Policies, Guidance and Criteria

The planning policies and criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal and external noise levels.

3.1 Planning Policy Wales

The Planning Policy Wales Edition 11/ February 2021 (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs¹, MTANs² and policy clarification letters comprise national planning policy.

The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties such as the Socio-economic Duty. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places.

PPW promotes action at all levels of the planning process which is conducive to maximising its contribution to the well-being of Wales and its communities. It encourages a wider, sustainable and problem solving outlook which focuses on integrating and addressing multiple issues rather than on an approach which is fragmented, un-coordinated and deals with issues in isolation. It provides an opportunity to remove any actual or perceived problems in current approaches and stimulate and support innovative and creative ideas as well as high standards of evidence and assessment to underpin the preparation of development plans and strategies and individual proposals. Monitoring and learning from development outcomes so as to drive sustainable improvements in planning practice is also important.

Technical Advice Note 11: Noise provides a way of assessing noise exposure inside new residential dwellings by separating it into distinctive categories. When planning applications are considered, local planning authorities should determine into which of the categories the proposed site falls. Noise categories are expressed in Table 2 overleaf.



Noise Exposure Categories for New Dwellings					
A		Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.			
B		Noise Should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.			
C		Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.			
D		Planning permission should normally be refused.			

Noise Source		Noise Exposure Category			
		A	B	C	D
		$L_{Aeq,T}(dB)$	$L_{Aeq,T}(dB)$	$L_{Aeq,T}(dB)$	$L_{Aeq,T}(dB)$
Road Traffic	07:00 – 23:00	<55	55 – 63	63 – 72	>72
	23:00 – 07:00	<45	45 – 57	57 – 66	>66
Rail Traffic	07:00 – 23:00	<55	55 – 66	66 – 74	>74
	23:00 – 07:00	<45	45 – 59	59 – 66	>66
Air Traffic	07:00 – 23:00	<57	57 – 66	66 – 72	>72
	23:00 – 07:00	<48	48 – 57	57 – 66	>66
Mixed Sources	07:00 – 23:00	<55	55 – 63	63 – 72	>72
	23:00 – 07:00	<45	45 – 57	57 – 66	>66

Table 1: Noise Exposure Categories in Accordance with Technical Advice Note 11: Noise



3.2 Criteria

3.2.1 Local Planning Authority Criteria

Environmental Health Office (EHO) from Wrexham County Borough Council has commented about noise.

“The EHO has advised that the development site is in an area that can be affected by noise from the night-time economy, and you are therefore required to carry out a noise survey in order to determine noise levels for both day (07:00 – 23:00 hours) and night (23:00 – 07:00 hours) having regard to relevant Planning Guidance (Wales). The report of the noise survey findings shall include:

- a) Noise levels arising from day/night-time activities in the vicinity of the proposed development site and the impact upon the proposed accommodation, and
- b) A detailed scheme of noise insulation and / or attenuation measures so designed to safeguard the amenity of the future occupants of the proposed accommodation hereby approved.”

Conservation Officer has commented about front façade windows.

“9 to 11 Regent Street is within Wrexham Town Centre Conservation Area. Regent Street is part of one of the key shopping streets in the conservation which includes several buildings of character. This is reflected in the elevation which faces Regent Street, especially in the upper floors.

Windows to the Regent Street elevation are timber sliding sashes. It is important that these are retained. Please confirm if there are any proposals to undertake work on these windows, for example to 'upgrade' from single to double glazing? Changing to double glazing will only be appropriate if it can be demonstrated that the windows are currently in poor condition, and that the thicker glazing unit can be accommodated without significant change to the thickness of frames and glazing bars. The method of opening should remain as sliding. Provided that assurance can be given on proposals for the windows to the Regent Street elevation of the building, I have no objections to the application.”

3.2.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

The British Standard BS 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, provides appropriate internal levels of noise within dwellings, flats and rooms in residential use when unoccupied.

Section 7.2.2 'Internal ambient noise levels in dwellings' of BS 8233: 2014 states that 'In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4'.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 2: Table 4 of BS 8233:2014 Indoor ambient levels for dwellings

* Typically taken to be daytime/evening – 07:00 – 23:00 and night-time 23:00 – 07:00.

Note 7 of section 7.7.2 states 'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5 dB and reasonable internal conditions still achieved'.



In addition, Note 4 of section 7.7.2 states, 'Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values'.

In the absence of a specific performance criterion within BS 8233 for short-term noise maxima, reference can be made to guidance published by the WHO. In particular, the WHO publication 'Guidelines for Community Noise' (1999), from which the guidance given in BS 8233: 2014 is itself derived, states that 'for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than ten to fifteen times per night'.

The WHO publication 'Guidelines for Community Noise' (1999) has since been updated in 2018; however, it is widely accepted by Local Authorities that L_{AFmax} 45 dB is the target level for short-term noise maxima between 23:00–07:00.

3.2.3 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Specific Requirement	Critical Health Effect (s)	L_{Aeq} (dB)	Time base (hours)*	L_{AFmax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	–
	Moderate annoyance, daytime evening	50	16	–
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	–
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Table 3: A Summary of the Guidance Noise Levels

3.3 Criteria Summary

In order to meet the requirements of Wrexham County Borough Council, the assessment and recommendations will be made in reference to BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings and WHO Guidelines for Community Noise.



4 Site Description

The proposed development at 9-11 Regent Street is an existing three-storey building situated in the city centre of Wrexham, approximately 220m east of Wrexham Central train station. The front façade of the building faces north onto Hope Street, which is a pedestrianised area with multiple commercial units including cafés and shops. The west façade faces Hill Street which is considered to be a busy street. There are commercial units as well as Hill Street Social bar and Grove Park Theatre to the west. The south façade faces a building which consists of several units. Lot 11, The Priory and Rock Suite café, as well as a music venue. The east façade faces a building with several shops and a public house.

Due to the central location of the site, it is likely to be impacted by night time activities during weekends. There are multiple bars and public houses located within the central area of Wrexham. Multiple mechanical plant can be found within the area from various commercial premises. The street at the rear of the building is typically accessed by bin lorries in early mornings.

4.1 Subjective Observations

During site attendance, subjectively the main source of noise was road traffic on Hill Street, on Hope Street primarily pedestrians were audible. At the rear façade facing Brynyffynnon some bin lorries were observed. Plants were observed in the area; however, they were inaudible on the day.

4.2 Weather

Description	Daytime Average	Night time Average
Temperature	6°C	4°C
Wind Speed	4.3m/s	3.3m/s
Wind Direction	E	E
Precipitation	Light for 2 hours	None
Damp road/ wet ground	None	None
Fog/snow/ice	None	None

Table 4: Weather Conditions

Source: windy.com



5 Noise Measurement Procedure

5.1 Personnel Present

Pawel Tatar BSc AMIOA

5.2 Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Rion	NA-28	00211583	Integrating Sound Level Meter and Real Time Analyser
Rion	NL-52	01032413	Integrating Sound Level Meter and Real Time Analyser
Rion	NL-52	00976149	Integrating Sound Level Meter and Real Time Analyser
Rion	NC-74	35125832	Acoustic Calibrator
Rion	NC-74	34678495	Acoustic Calibrator

Table 5: Survey Equipment Used

5.3 Calibration

The sound level meters were calibrated with the field calibrator to a level of 94.0 dB @ 1 kHz prior to and on completion of the survey. No significant drift in calibration was observed. The meters used during the survey are precision grade Class 1.

Calibration certificates are available on request.

5.4 External Ambient Sound Measurements

The measurement locations chosen during the survey were deemed suitable for the determination of the noise levels able to impact upon the façades of the proposed development.

The sound level meters were set to measure broadband L_{Aeq} , L_{A90} , L_{A10} , and L_{AFmax} in 5-minute periods, as well as A-weighted 1:1 octave spectrum analysis over a 72-hour weekend period.



5.4.1 Monitoring Position 1

A microphone was placed 3m above the ground floor surface at first-floor level 1m from the west façade overlooking Hill Street/Regent Street. The sound level meter was set to record WAV file audio recordings for all maximum sound level events above 75 dBA.

5.4.2 Monitoring Position 2

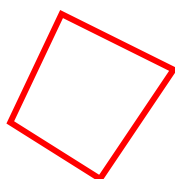
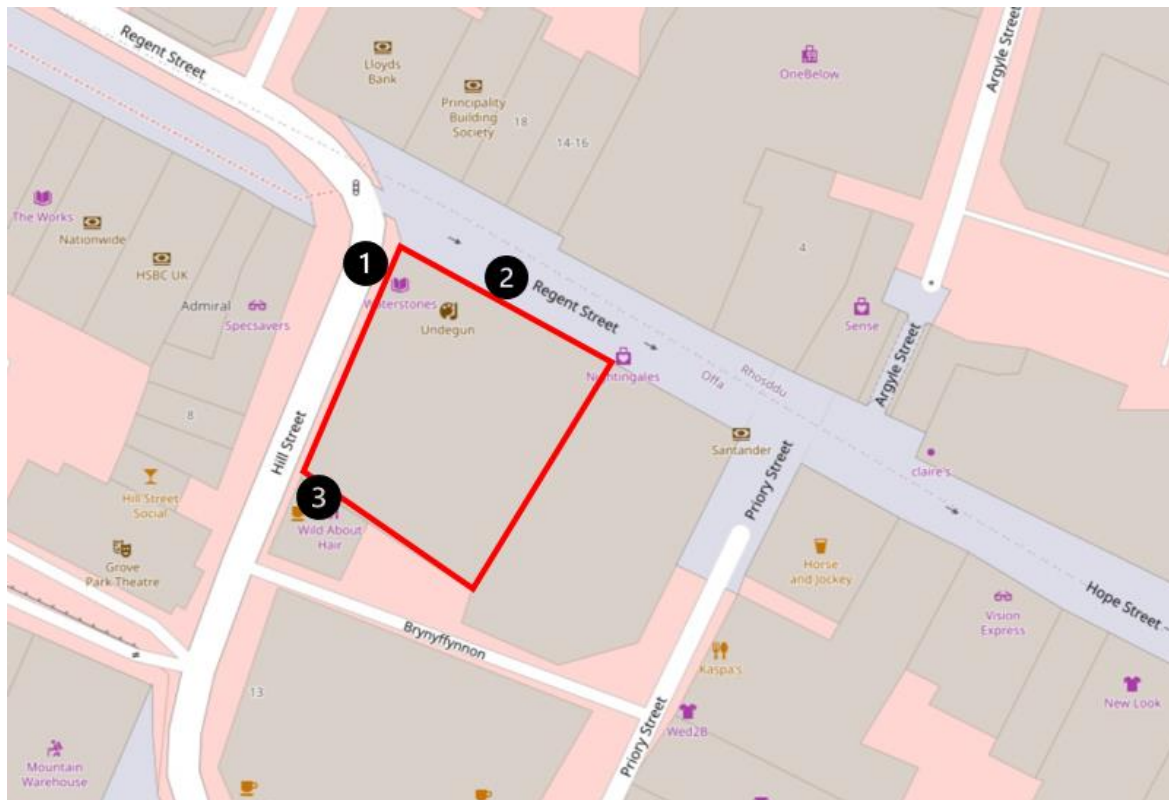
A microphone was placed on a roof outside front window, 1.5m above the canopy surface and 1m away from the front façade, overlooking Hope Street. The sound level meter was set to record WAV file audio recordings for all maximum sound level events above 70dBA.

5.4.3 Monitoring Position 3

A microphone was placed 3m above the ground floor surface at first-floor level 1m from the rear façade overlooking Brynffynnon.

5.4.4 Location Plan of Measurement Positions

The location plan below shows the proposed development and location positions of the meters.



- Proposed development

1

- Monitoring positions



6 Results and Analysis

6.1 External Ambient Sound Measurement Analysis in Accordance with BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

The following table presents the measured results from all monitoring positions.

Monitoring position	Day	Time Period	Time Base T (hours)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
1	Friday/Monday	Daytime	16*	66.6	-	56.8	68.0
		Night time	8	63.7	62.4 – 104.5	51.7	63.2
	Saturday	Daytime	16	66.6	-	57.4	67.9
		Night time	8	62.9	64.8 – 94.1	52.9	64.8
	Sunday	Daytime	16	65.5	-	54.5	66.7
		Night time	8	57.4	50.4 – 83.3	49.7	58.1
2	Friday/Monday	Daytime	16*	61.2	-	52.6	60.6
		Night time	8	58.2	54.7 – 92.2	47.0	55.9
	Saturday	Daytime	16	59.4	-	53.0	60.6
		Night time	8	59.5	56.3 – 91.6	48.3	58.1
	Sunday	Daytime	16	65.1	-	50.1	58.8
		Night time	8	51.0	46.8 – 81.0	45.8	51.0
3	Friday/Monday	Daytime	16*	62.4	-	52.8	64.2
		Night time	8	58.2	56.8 – 93.0	43.4	55.9
	Saturday	Daytime	16	61.7	-	52.1	63.4
		Night time	8	56.6	53.0 – 92.2	44.7	57.3
	Sunday	Daytime	16	61.4	-	47.6	61.5
		Night time	8	51.7	42.1 – 83.2	42.1	49.8

Table 6: Measurement Results

*The data from the Friday and Monday measurements was merged to provide an understanding of weekday noise levels.

Data charts can be found in the appendix.



6.2 Night Time L_{AFmax} Analysis

The L_{AFmax} measured during the night time (23:00-07:00) has been analysed. WHO Community Noise Guidelines states “For a good night sleep it is believed that indoor sound pressure should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night (Vallet & Vernet 1991).

6.2.1 Night Time L_{AFmax} Selection

All max levels were considered. It was found that multiple max events were related to night time activities during the weekend time, on Friday and Saturday nights. Table shown in Section 8.3 shows an amount of max level exceedances during night time every night based on the collected data and calculations.

6.2.2 Night Time L_{AFmax} at Monitoring Position 1

The maximum measured L_{AFmax} is 104.5 dB, which occurred at 02:00 on Friday night. The next highest L_{AFmax} is 94.1 dB, which occurred at 23:15 on Saturday. L_{AFmax} 100.0 dB is exceeded only once and L_{AFmax} 90.0 dB is exceeded six times during the night time periods throughout the weekend.

The WAV file recordings and frequency spectrum data indicate that on Friday the L_{AFmax} 104.5 dB as well as 90.0 dB events were from modified exhaust vehicles accelerating, 88.8 dB which occurred at 06:20 is also due to a vehicle acceleration. The L_{AFmax} 85.4 dB event was from an HGV/road sweeper.

On Saturday the L_{AFmax} 94.1 dB event was related to people shouting, and the 91.6 dB event was from a metallic object being dropped on the floor. Both events are likely to be related to night time activities. The L_{AFmax} 90.6 dB was from modified exhaust vehicle acceleration.

The L_{AFmax} 94.1 dB event which occurred at 23:15 on Saturday night will be used for the assessment at this monitoring position as this is considered representative of other L_{AFmax} events during the weekend night time period.

6.2.3 Night Time L_{AFmax} at Monitoring Position 2

The maximum measured L_{AFmax} is 92.2 dB, which occurred at 02:00 on Friday night which is the same max event as measured at monitoring position 1. The next highest L_{AFmax} is 91.6 dB, which occurred at 00:35 on Saturday night. L_{AFmax} 90.0 dB is exceeded only twice and L_{AFmax} 85.0 dB is exceeded eight times throughout the weekend night time periods.

The WAV file recordings and frequency spectrum data indicate that on Friday the L_{AFmax} 92.2 dB event was from modified exhaust vehicle accelerating, the 86.2 dB event was also from a vehicle. The L_{AFmax} 85.3 dB event was from an HGV/road sweeper.

On Saturday the L_{AFmax} 91.6 dB event was from modified exhaust vehicle accelerating and the 86.6 dB event was also from a vehicle.

The L_{AFmax} 85.3 dB event which occurred at 05:50 on Friday night will be used for the assessment at this monitoring position as this is considered representative of other L_{AFmax} events during the night time period.

Various max events related to the night time economy, such as people shouting, were recorded at this monitoring position. The events however were lower than the L_{AFmax} level chosen for the assessment.



6.2.4 Night Time L_{AFmax} at Monitoring Position 3

The maximum measured L_{AFmax} is 93.0 dB, which occurred at 04:50 on Friday night. The next highest L_{AFmax} is 92.2 dB, which occurred at 00:30 on Saturday night. L_{AFmax} 90.0 dB is exceeded only twice and L_{AFmax} 85.0 dB is exceeded seven times during the night time periods.

The frequency spectrum data suggests that the L_{AFmax} 87.7 dB event which occurred on Saturday night was from HGV pass. This event will be used for the assessment as it is considered representative of other max events during the night time.



7 Recommendations

The estimated internal noise levels attributed by the external noise sources have been assessed over an average of $L_{Aeq,T}$ from the daytime and night time survey periods and L_{AFmax} values from the night time. This along with the results from building element evaluation provide the basis for the following recommendations.

7.1 Glazing Specification for all Bedrooms

7.1.1 West and Rear Façade

The glazing specification in bedrooms on west and rear façade should consist of at least 10mm glass / 16mm void / 8.8mm glass Pilkington double glazed unit; in well-sealed frames.

7.1.2 Front Façade

The glazing specification in bedrooms on front façade should consist of at least 6mm glass / 140mm void / 4mm glass / 12mm void / 6mm glass triple glazed, double window unit; in well-sealed frames.

Alternatively, the glazing specification can consist of acoustic timber sash windows such as Bereco Ambient Range 8.8mm glass / 20mm void / 6mm glass double-glazed unit in well-sealed frames.

7.2 Glazing Specification for Living Rooms

7.2.1 West and Rear Façade

The glazing specification in living rooms should consist of at least 4mm glass / 12mm void / 6mm glass double glazed unit; in well-sealed frames.

7.2.2 Front Façade

The glazing specification in bedrooms on front façade should consist of at least 6mm glass / 140mm void / 4mm glass / 12mm void / 6mm glass triple glazed, double window unit; in well-sealed frames.

Alternatively, the glazing specification can consist of timber sash windows such as Bereco 4mm glass / 16mm void / 4mm glass double-glazed unit in well-sealed frames.

7.3 Ventilation

The ventilation in bedrooms can be a quality mechanical system or a wall acoustic vent such as Greenwood MA3051.

The ventilation in living rooms can be a quality mechanical system or a wall acoustic vent such as Greenwood MA3051 on front façade, a passive window vent such as hit and miss trickle vent at the rear façade and a passive acoustic vent such as Greenwoods EA5000 with two sets at the west façade.



7.3.1 Notes on Ventilation

NOTE 5 in section 7.7.2 of BS 8233:2014 states “if relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.”

It is our understanding that all dwellings are to be ventilated either with passive vents or mechanically ventilated. Where mechanical ventilation is utilised, the system is to be designed by a suitably qualified engineer or M&E consultant. The system shall be designed so the sound levels from any external plant or inlet/outlets do not exceed the background noise level at any noise receptor, i.e., outside a neighbouring window. This may require further assessment once the type and location of system has been specified.

The glazing and ventilation suggestions have been calculated assuming the windows are tightly closed. However, it must be noted that windows are suggested to be openable to provide rapid or purge ventilation or means of escape.

It should be noted that it's the responsibility of JSM Company Group Limited to ensure that the ventilation strategy is sufficient to meet the requirements of Building Regulations Part F.

Greenwood MA3051 acoustic wall vent is recommended on the front façade due to the recorded noise levels and to maintain appropriate ventilation within habitable rooms. Since the original windows on the façade had to be maintained and the only appropriate noise mitigating solution is placing a secondary window, passive ventilation is not possible. Considering the front façade being in the Wrexham's Conservation Area, a wall vent may not be possible to be installed due to potential visual concerns.



8 Calculation Methodology

The BRE Building Envelope Insulation calculator has been used for the noise break in calculations for the BS 8233:2014 assessment which is based on the rigorous calculation method of BS 8233:2014 and BS EN 12354-3.

In order to calculate the glazing recommendations, the measurements at all positions have had a façade correction of 3 dB applied in order to adjust the measurement so that it is comparable to a free-field sound pressure level.

The calculations are based on one vent per room. If more ventilation is required, then further calculations will need be carried out.

All room dimensions used in calculations are based on drawings provided by the architect.

The calculations assume the external walls to be brick and block as stated in 8233:2014.

The calculations assume each living room has a reverberation time of 0.5 and each bedroom of 0.4 seconds.

The predictions also have been calculated assuming all windows are tightly closed.



8.1 Building Elements

The following table shows the expected performance of the glazing and ventilation.

Element	Description*	$R_w/D_{n,e,w}$ (C ; C_{tr}) (dB)	Octave Centre Frequencies (Hz)					
			SRI / $D_{n,e}$ (dB)					
			125	250	500	1k	2k	4k
Glazing	4mm/12/6mm BS EN 12758-2011	32 (-2;-4)	21	20	26	38	37	39
	10mm/16/8.8mm Acoustic laminated glass Pilkington Optiphon	44 (-2;-6)	28	31	42	45	50	58
	6mm/140/4mm/12/ 6mm INSUL	42 (-2;-5)	26	33	39	43	41	54
	8.8mm/20/6mm Bereco Ambient Range	41 (-1;-6)	30	32	40	42	43	47
	4mm/16/4mm Bereco	33 (-1;-5)	25	19	28	36	42	40
Ventilation	Greenwood MA3051 (Greenwood) Acoustic Wall Ventilator	55 (-1;-3)	47	46	49	56	66	69
	Greenwood EA5000.AC2 Acoustic Passive Vent	42 (-2;-4)	40	38	32	47	54	48
	Hit and Miss Trickle Vent BRE	-	34	27	37	35	34	-

Table 7: Table showing suggested Glazing & Ventilation

*The selected units or products described have been used as a guide to form part of the specification. Other similar units or products can be used provided they can achieve the given minimum acoustic performance.



8.2 Example of Estimated Performance

The following table compares the estimated performance values with the measured values.

Location	Time period	Measured Level		Estimated Internal	
		$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
West Facade	Night time (23:00 – 07:00)	63.7	94.1	21.6	46.3*
	Daytime (07:00 – 23:00)	66.6	–	30.2	–
Front Facade	Night time (23:00 – 07:00)	59.5	85.3	16.8	43.5
	Daytime (07:00 – 23:00)	65.1	–	25.5	–
Rear Façade	Night time (23:00 – 07:00)	58.2	87.7	14.4	40.0
	Daytime (07:00 – 23:00)	62.4	–	28.0	–

Table 8: Estimated performance

*The L_{AFmax} shows an exceedance in regards to WHO guidance. Refer to Section 8.3 for more detailed breakdown of max level exceedances.

8.2.1 Example of Estimated Performance Using Acoustic Sash Windows

The following table compares the estimated performance values with the measured values using acoustics sash windows on the front facade.

Location	Time period	Measured Level		Estimated Internal	
		$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
Front Facade	Night time (23:00 – 07:00)	59.5	85.3	16.3	43.3
	Daytime (07:00 – 23:00)	65.1	–	23.9	–

Table 9: Estimated performance of acoustic sash windows



8.3 Max Event L_{AFmax} Exceedances

If the specified glazing and ventilation detail was to be adopted, L_{AFmax} exceedances would still occasionally occur on all façades of the building.

Location	Day	Exceeding Levels L_{AFmax} (dB)	Calculated Internal Levels (dB)	Exceedances
West Facade	Friday Night	104.5, 90.0 & 88.8	60.2, 46.0 & 46.4	3
	Saturday Night	94.1, 90.6 & 90.4	46.3, 49.0 & 47.4	3
	Sunday Night	-	-	0
Front Facade	Friday Night	92.2 & 86.2	48.7 & 46.5	2
	Saturday Night	91.6 & 86.6	45.1 & 46.4	2
	Sunday Night	-	-	0
Rear Facade	Friday Night	93.0 & 88.1	47.8 & 49.9	2
	Saturday Night	92.2	49.2	1
	Sunday Night	-	-	0

Table 10: Expected exceedances

It is important to identify that if opening windows was to be relied upon for room ventilation, number of exceedances is likely to increase.

WHO Community Noise Guidelines states “For a good night sleep it is believed that indoor sound pressure should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night (Vallet & Vernet 1991). In the worst case, three exceedances of 45dB have been calculated during any given night time period, which is within the BS8233:2014 and WHO Guidance recommended values.



9 Conclusion

When installing the glazing and ventilation detail as discussed in the recommendations section, the recommended internal noise levels described in BS 8233:2014 can be achieved for internal noise levels in all habitable rooms, therefore, discharging the Local Authority conditions.



10 References

Planning Policy Wales Edition 11: February 2021

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

World Health Organisation Guidelines for Community Noise

BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

BS EN 12758:2011 Glass in building – Glazing and airborne sound insulation

openstreetmap.org

<https://www.bereco.co.uk/ambient-range>

10.1 Drawing References

520-P-02 First Floor

520-P-03 Second Floor

520-P-04 Elevations



Appendix

Figure 1: Picture Showing Monitoring Position 1



Figure 2: Picture Showing Monitoring Position 2



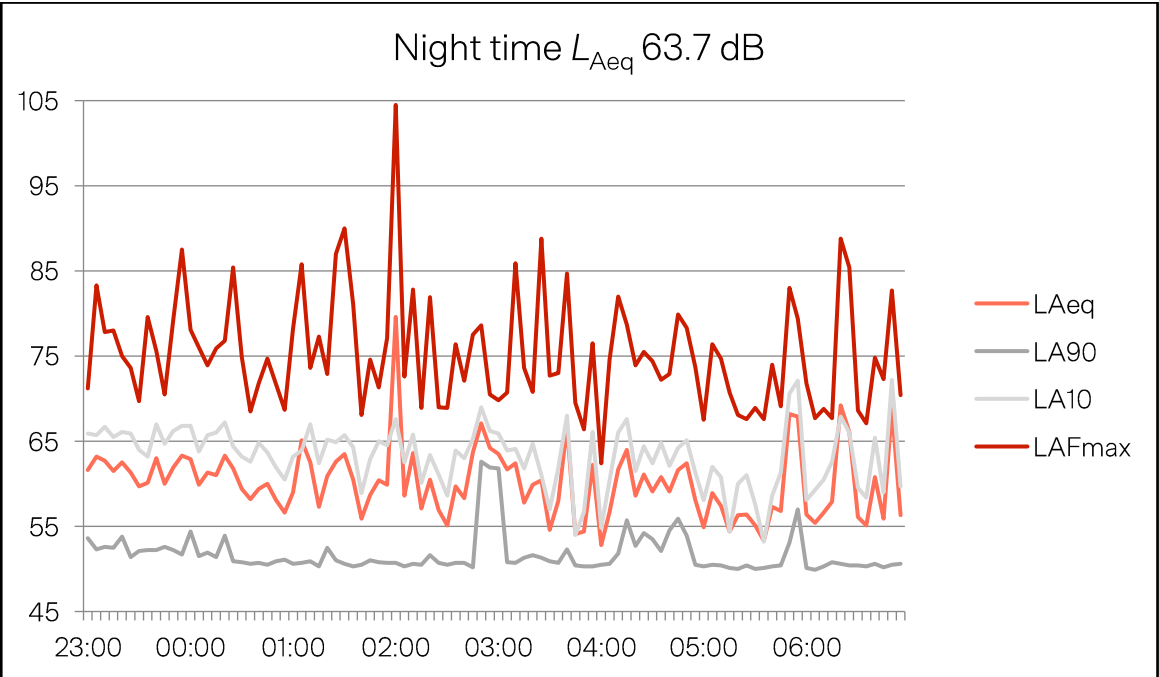
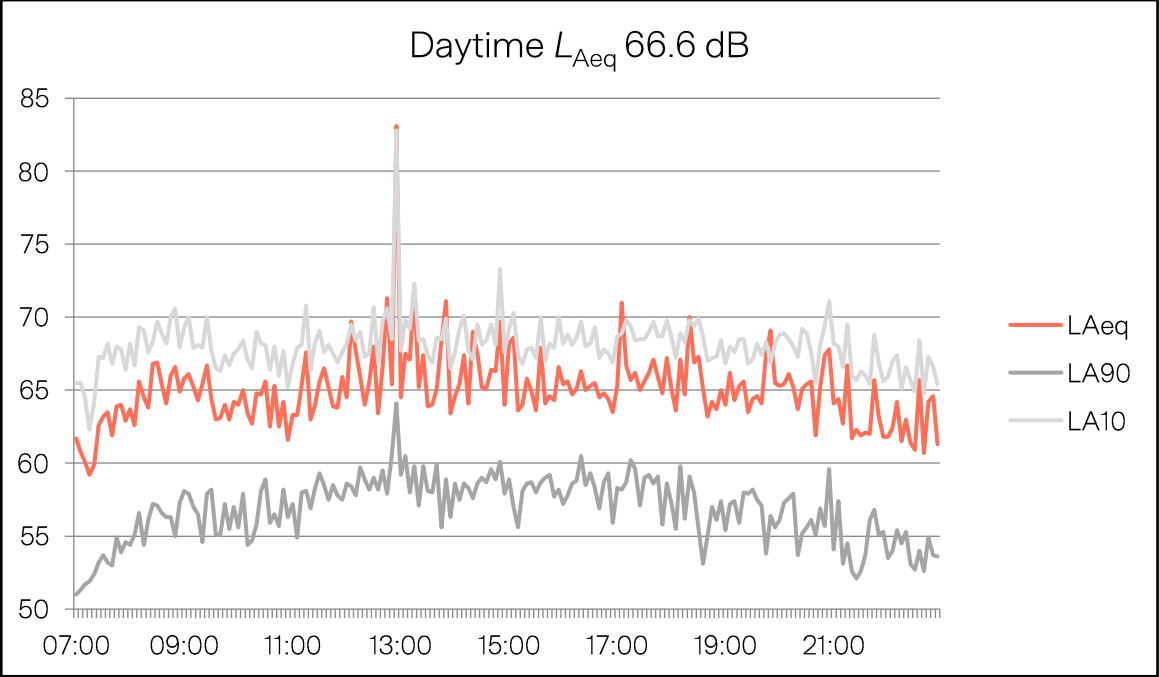
Figure 3: Picture Showing Monitoring Position 3



Measurement Results

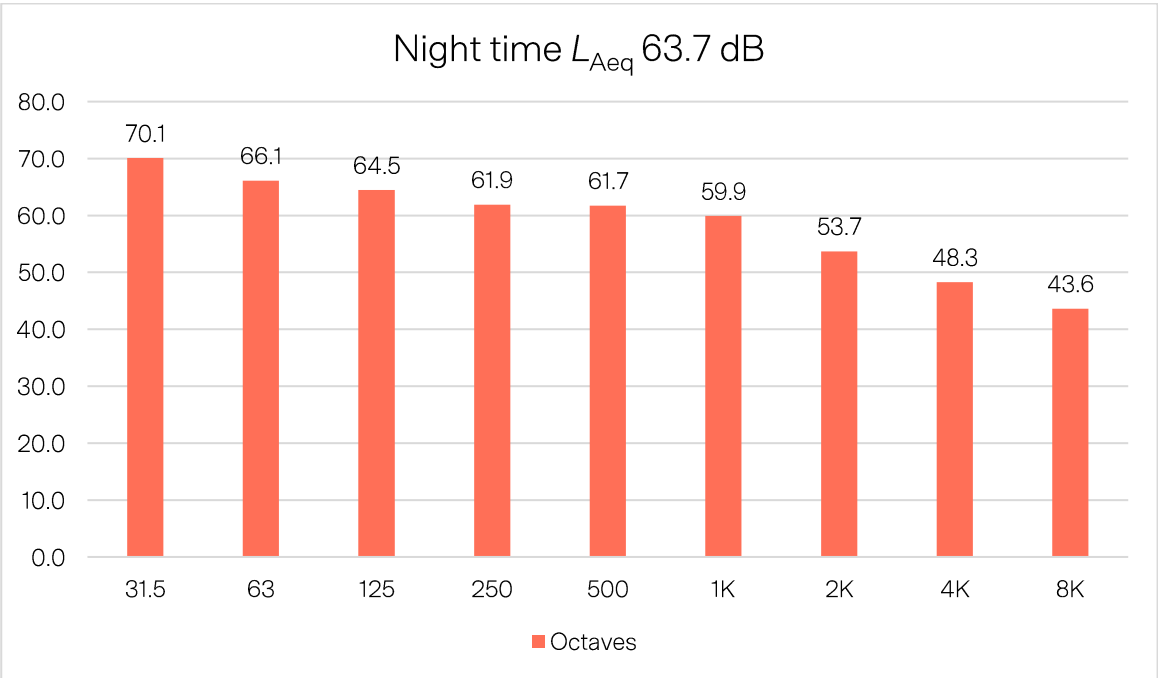
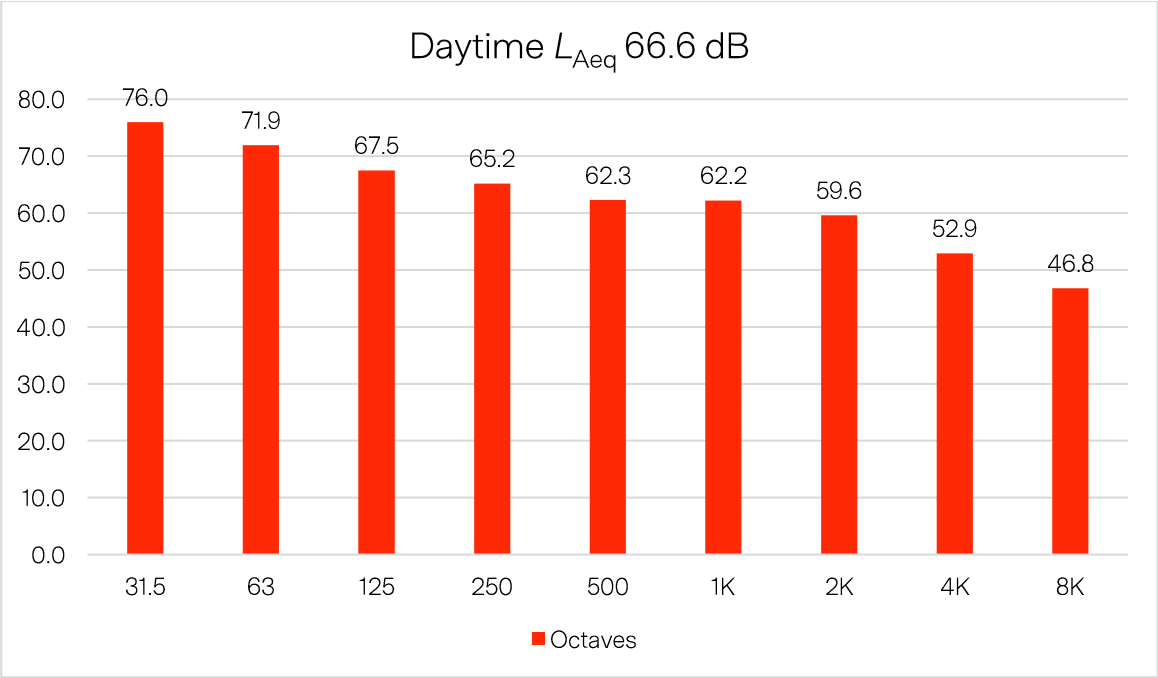
Monitoring Position 1

Friday/Monday

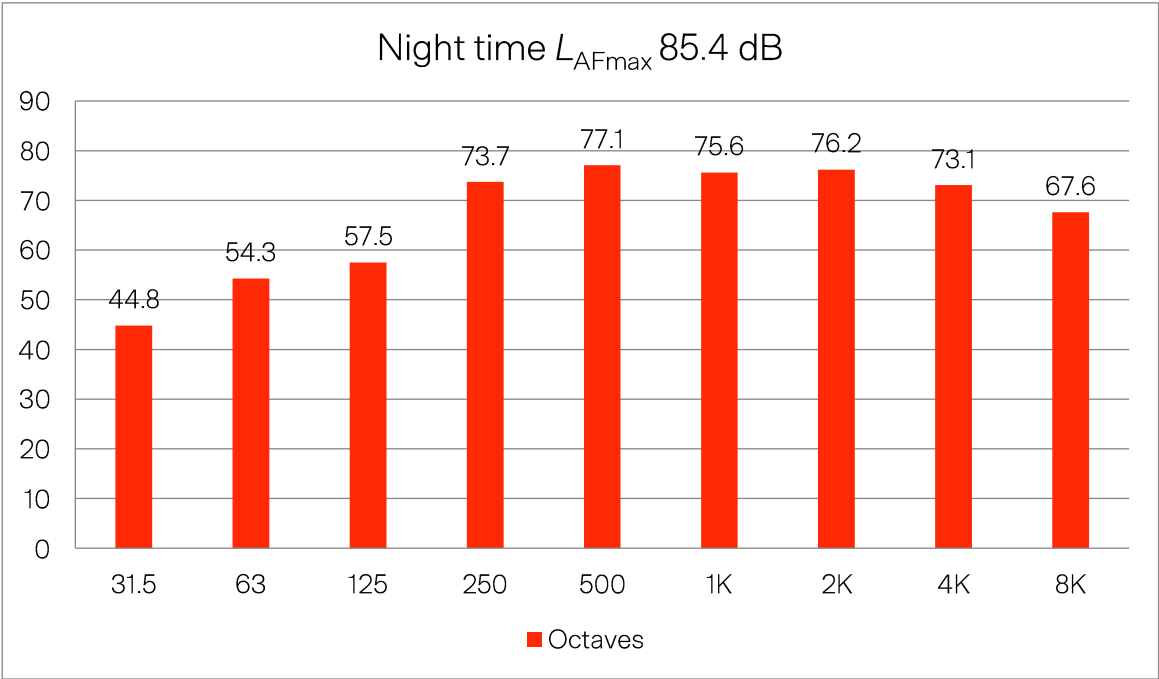


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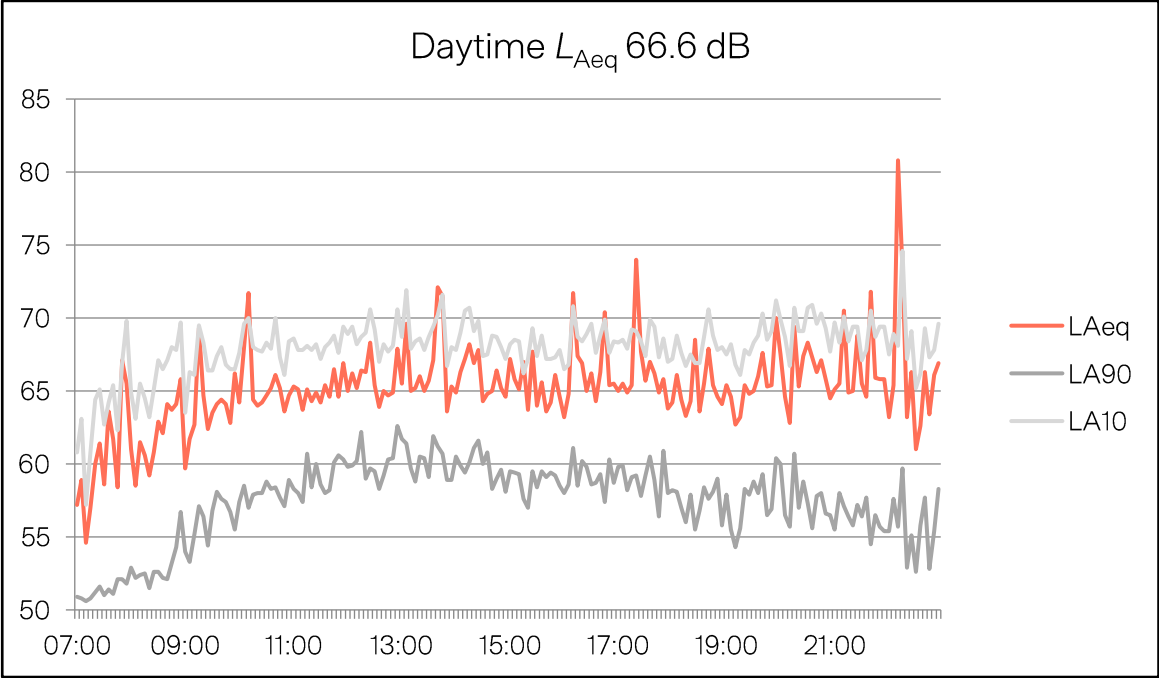
Un-weighted 1:1 Octave Results

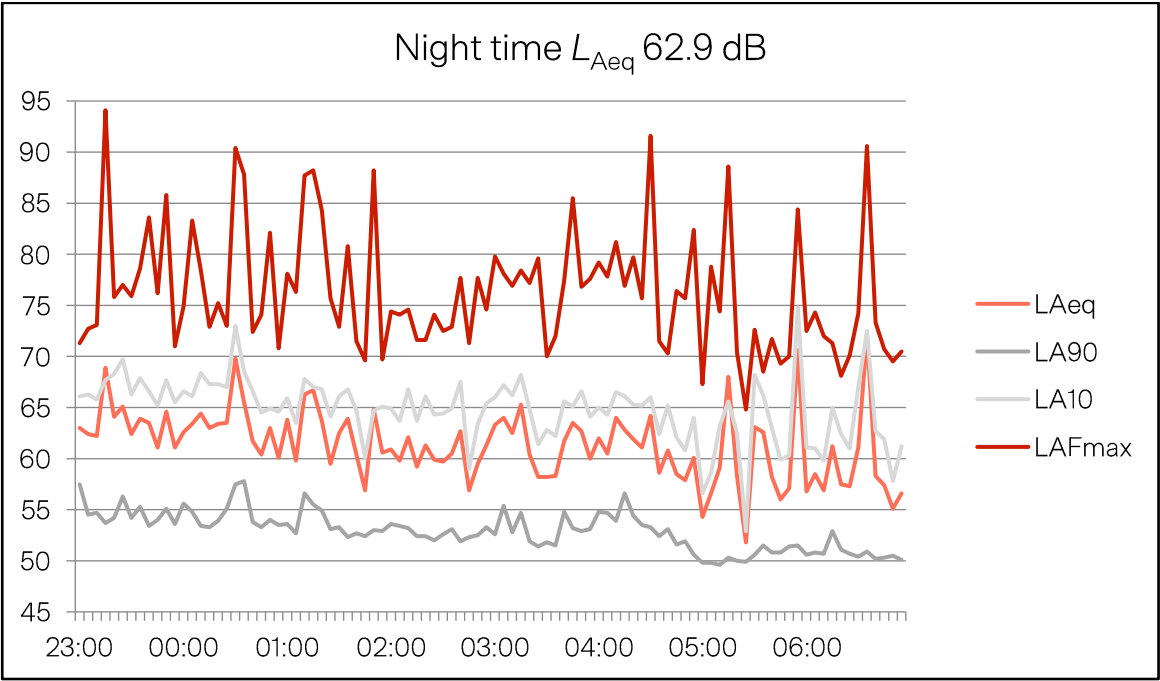


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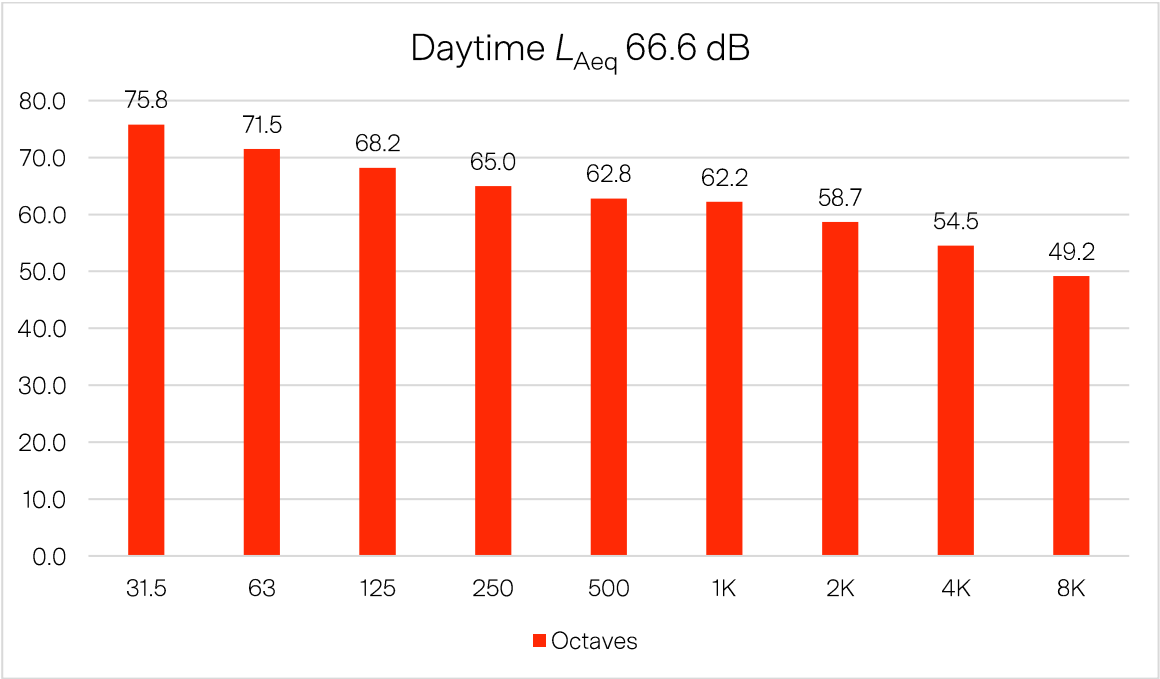


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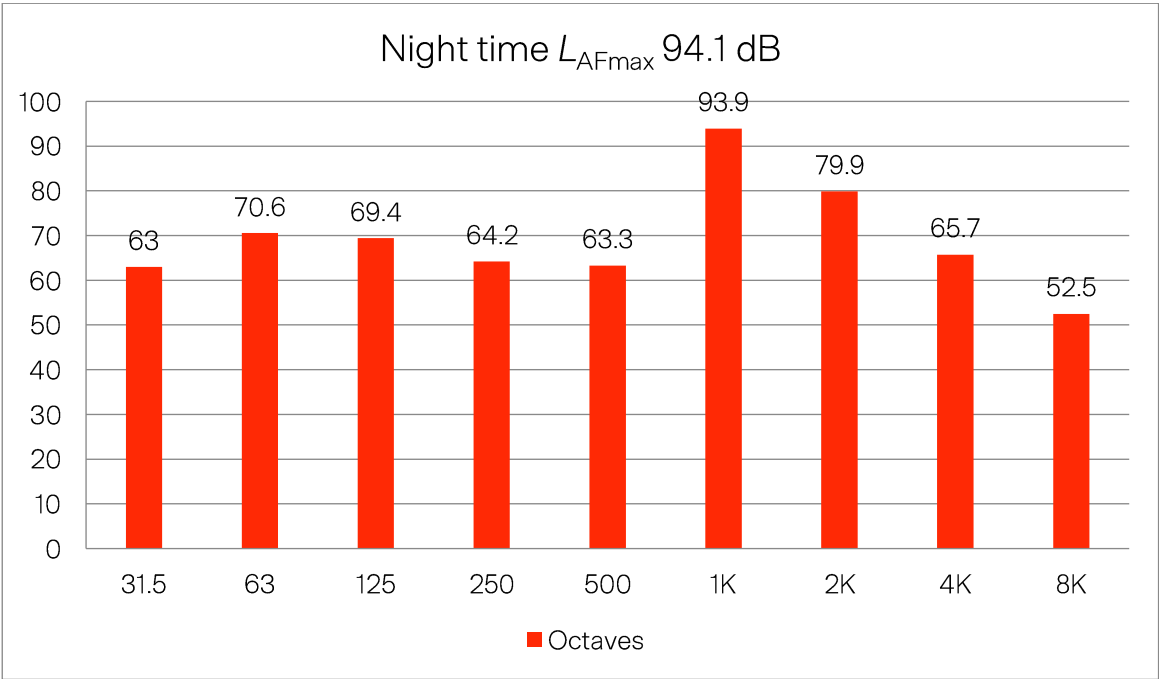
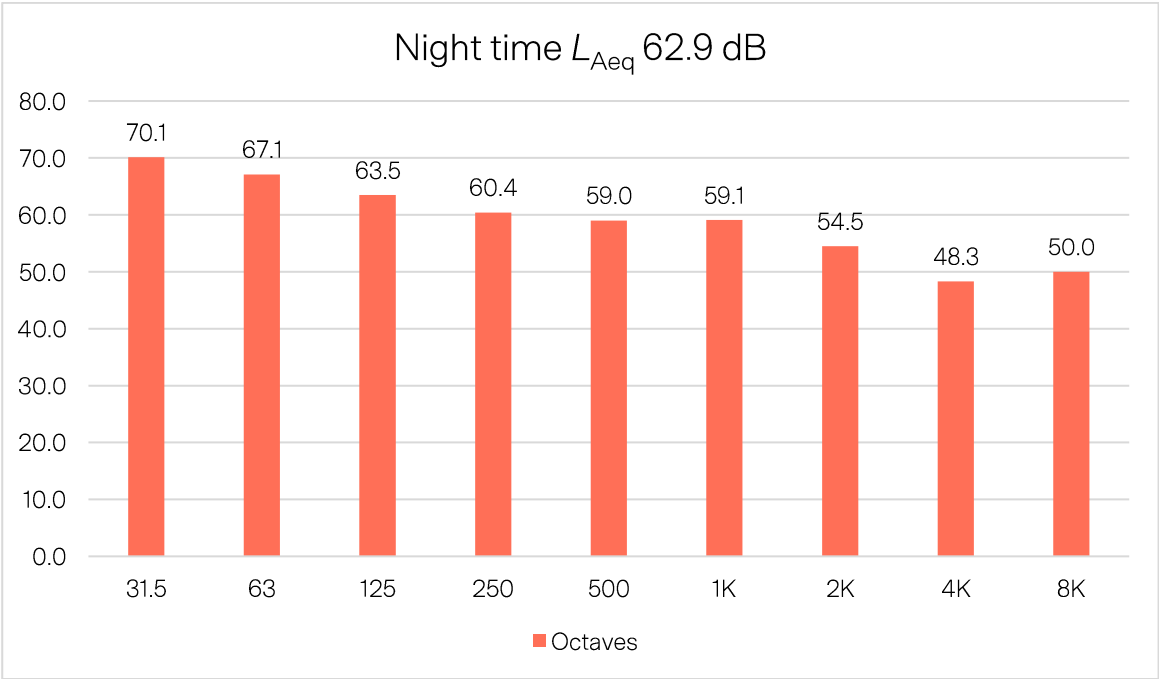




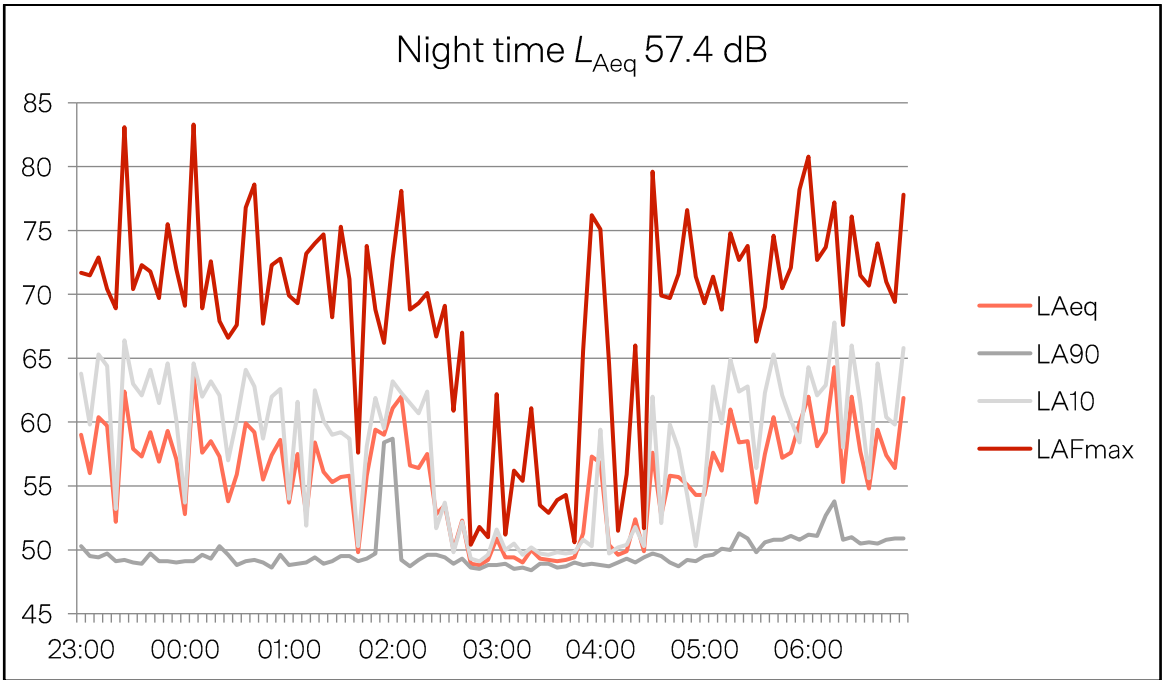
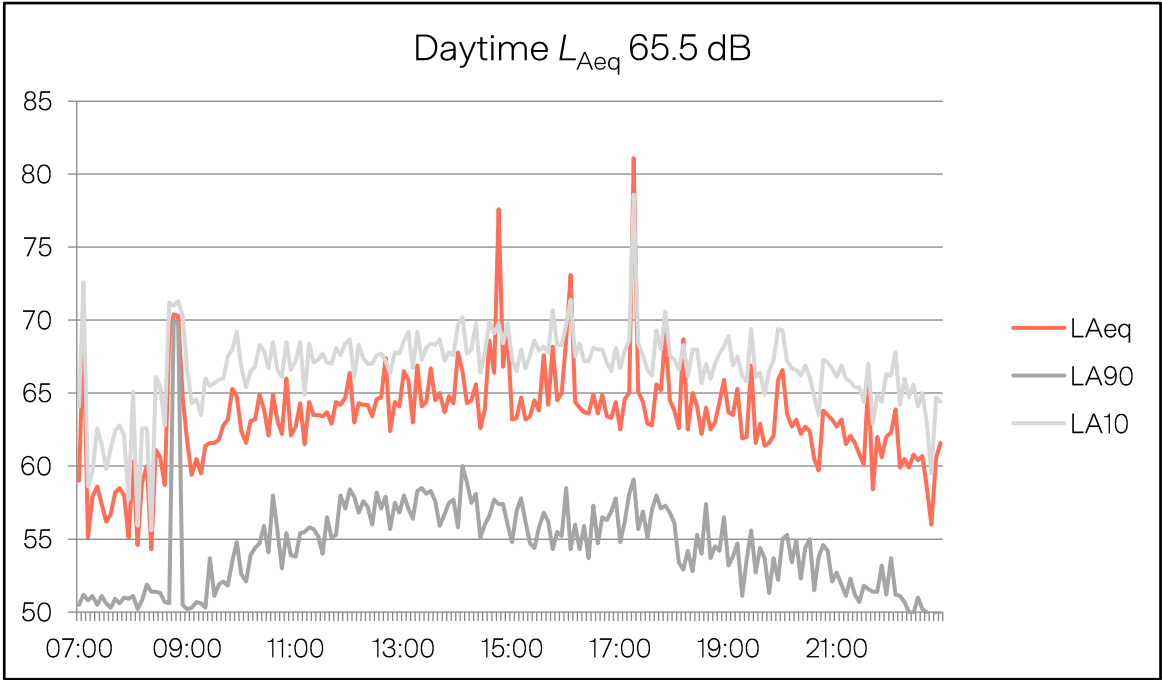
Un-weighted 1:1 Octave Results



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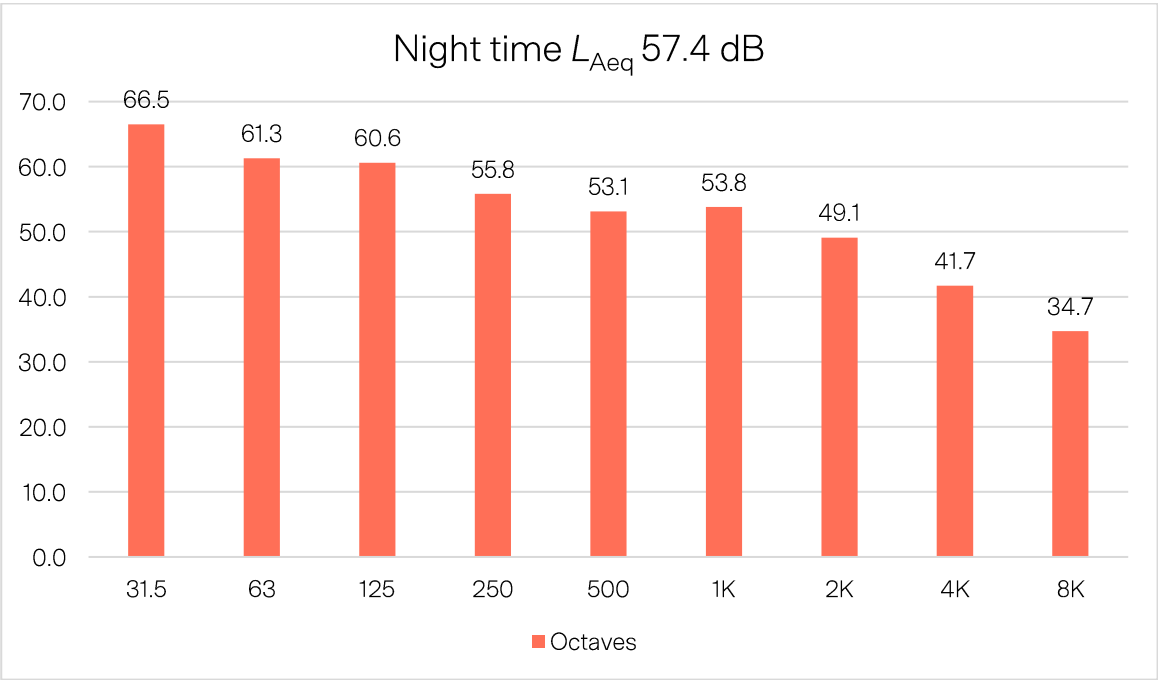
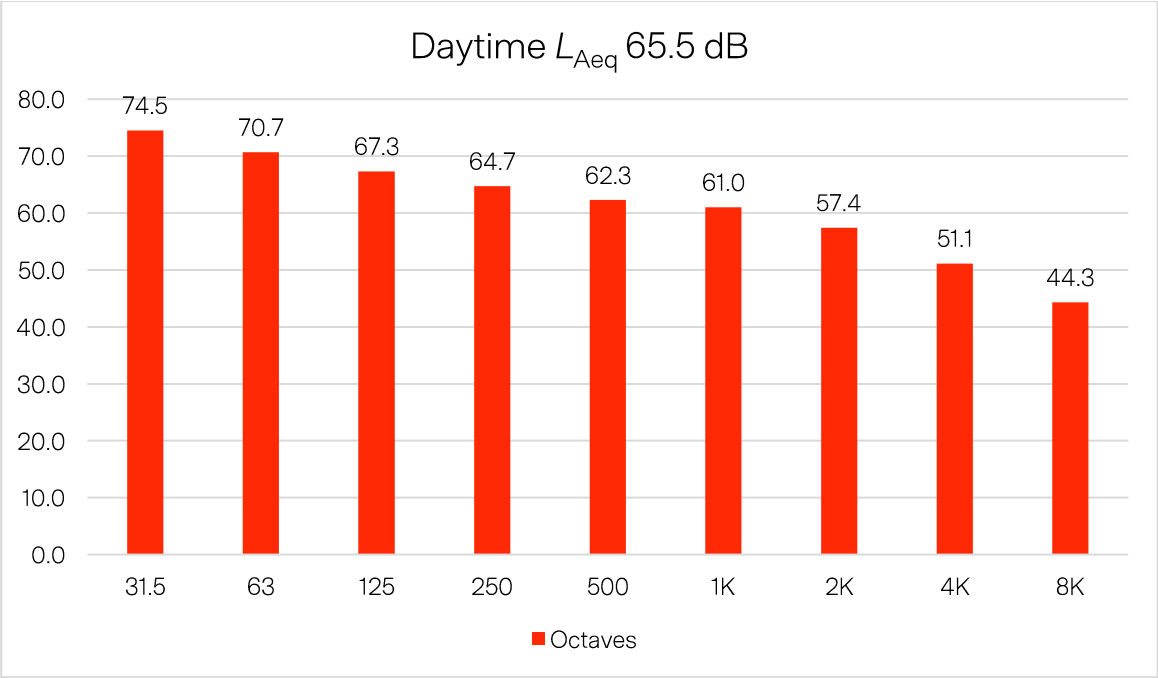


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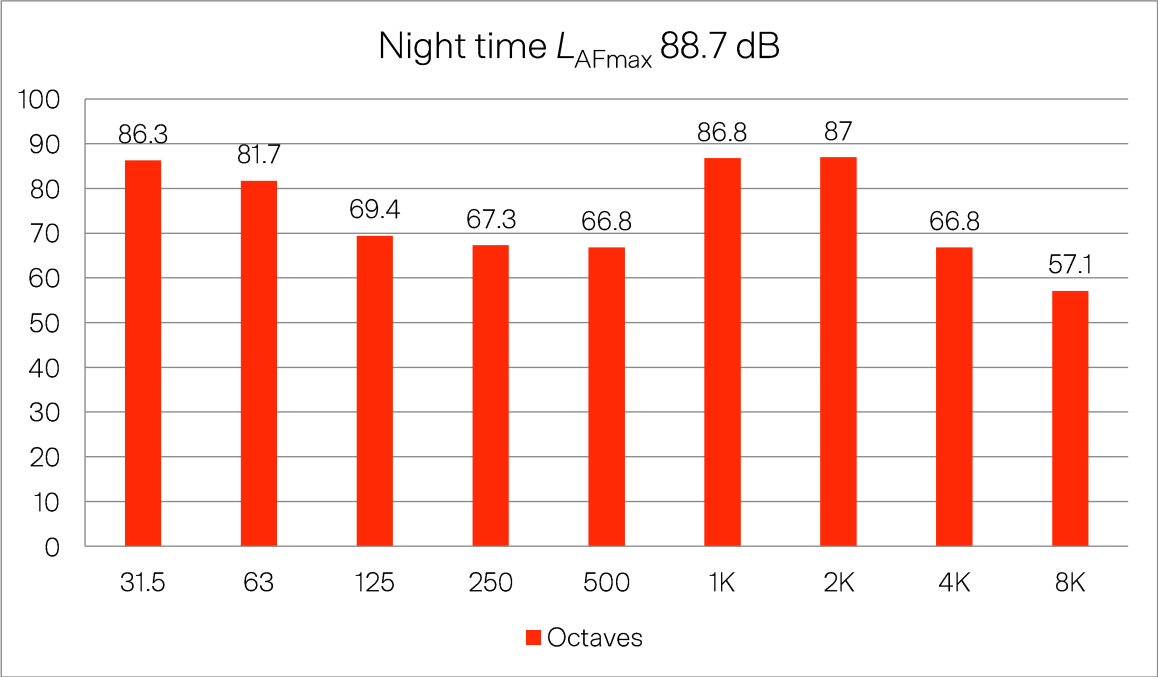


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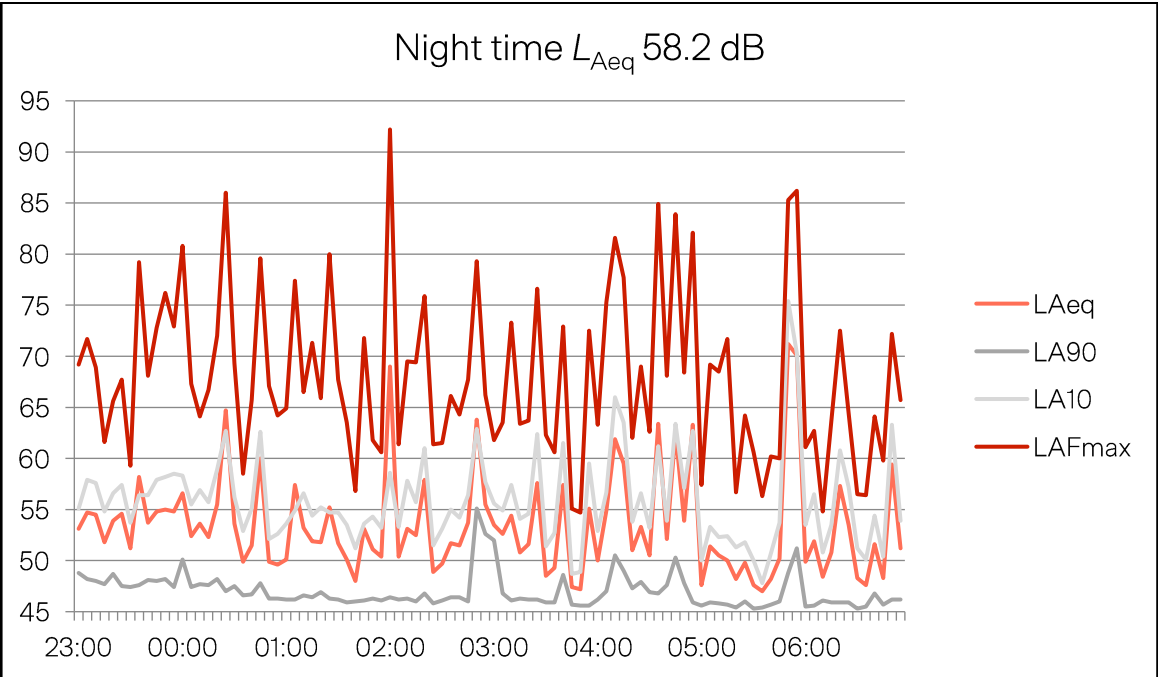
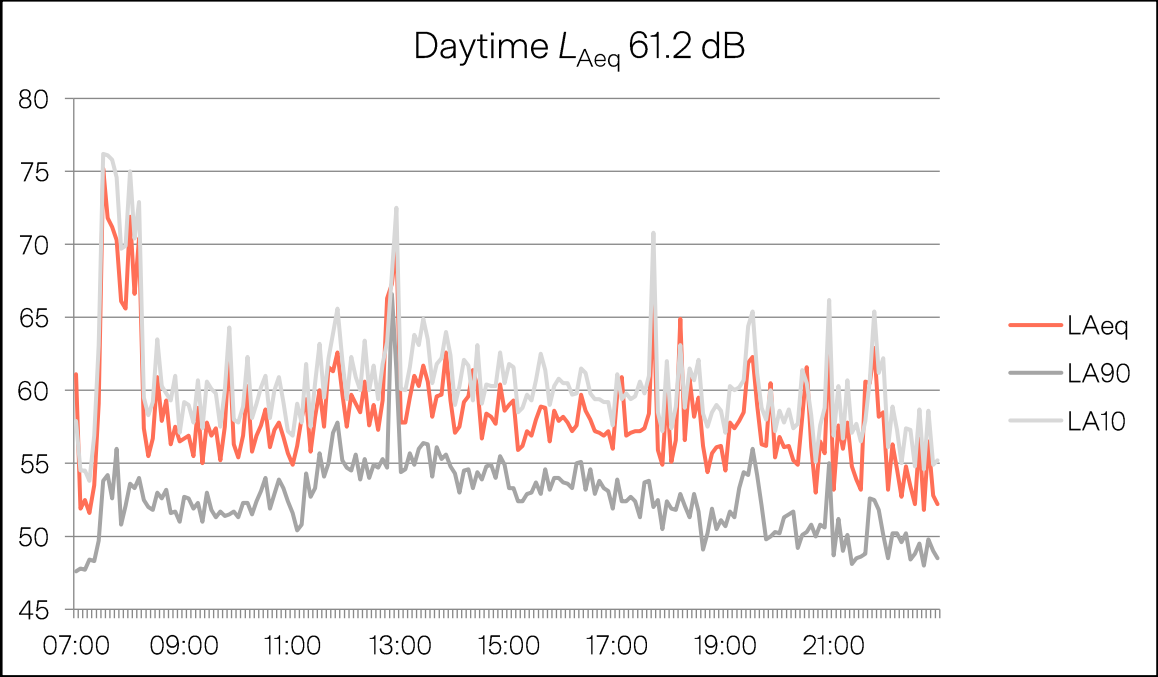


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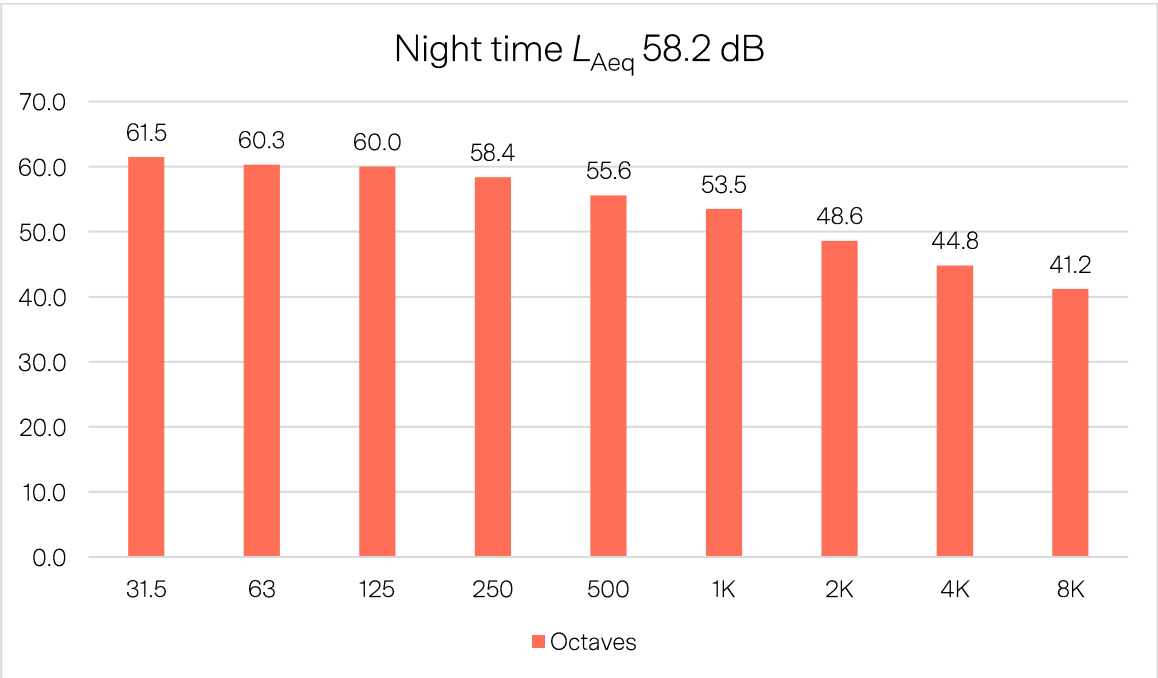
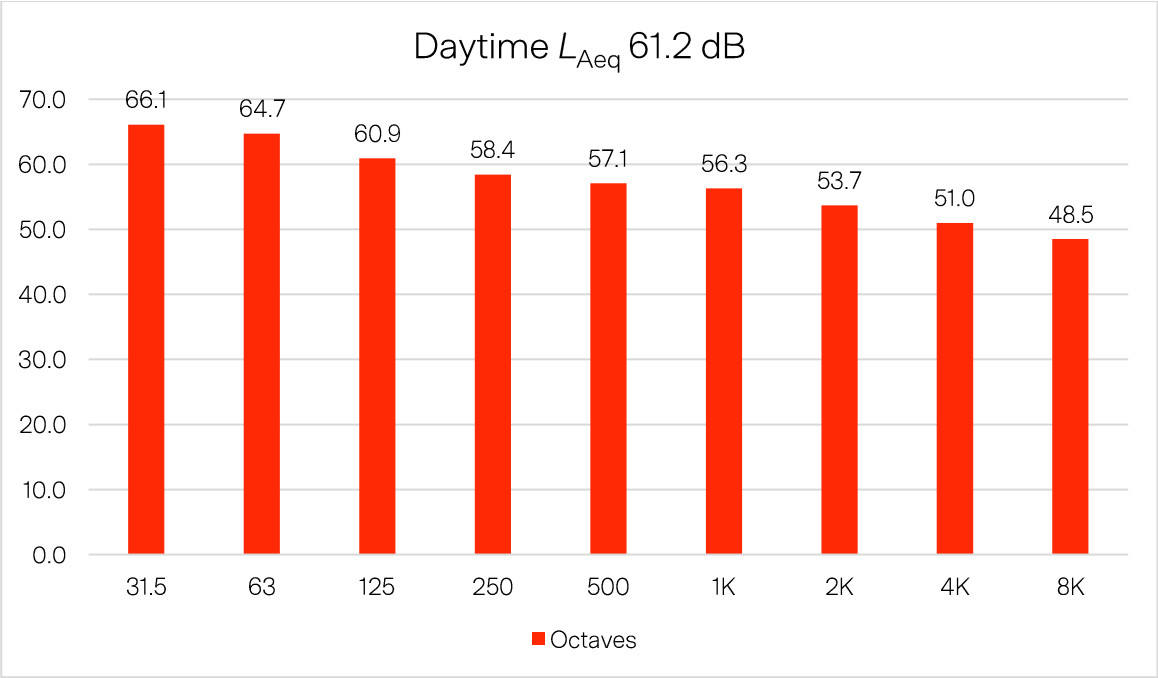
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Friday/Monday

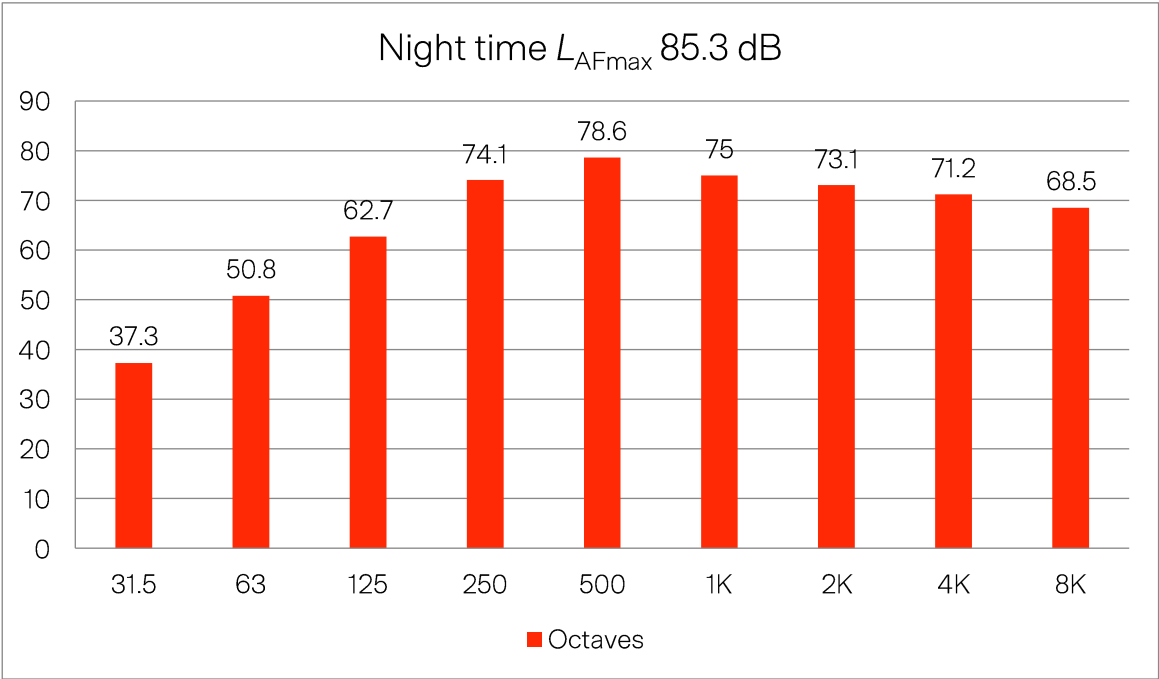


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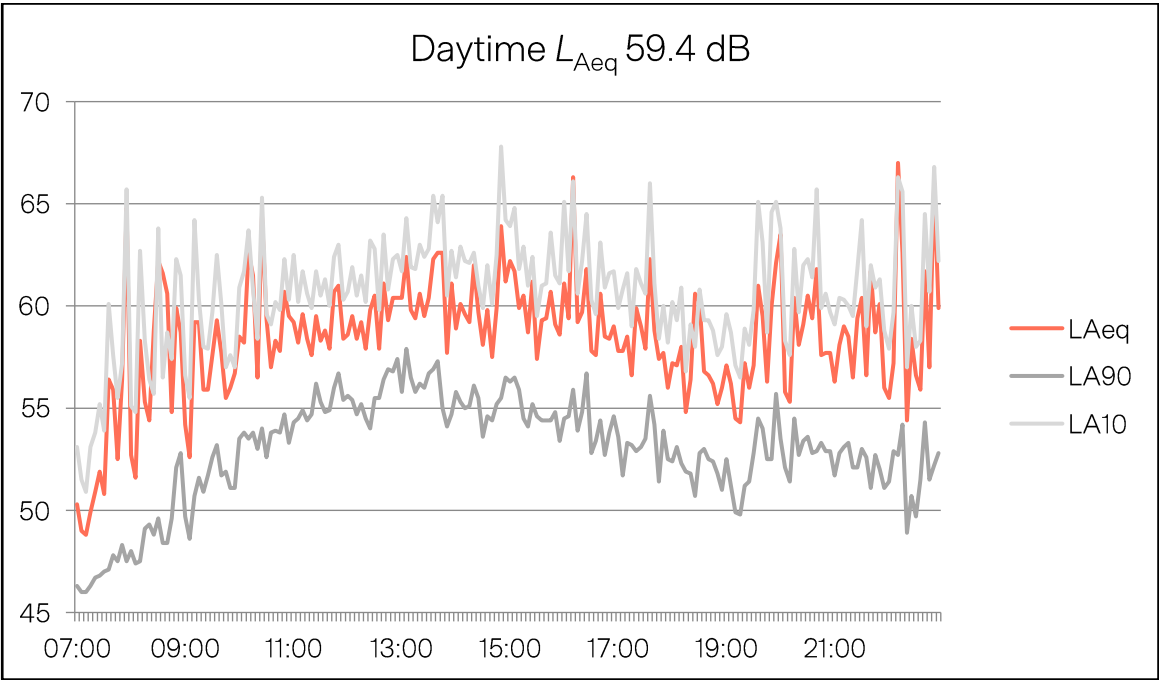
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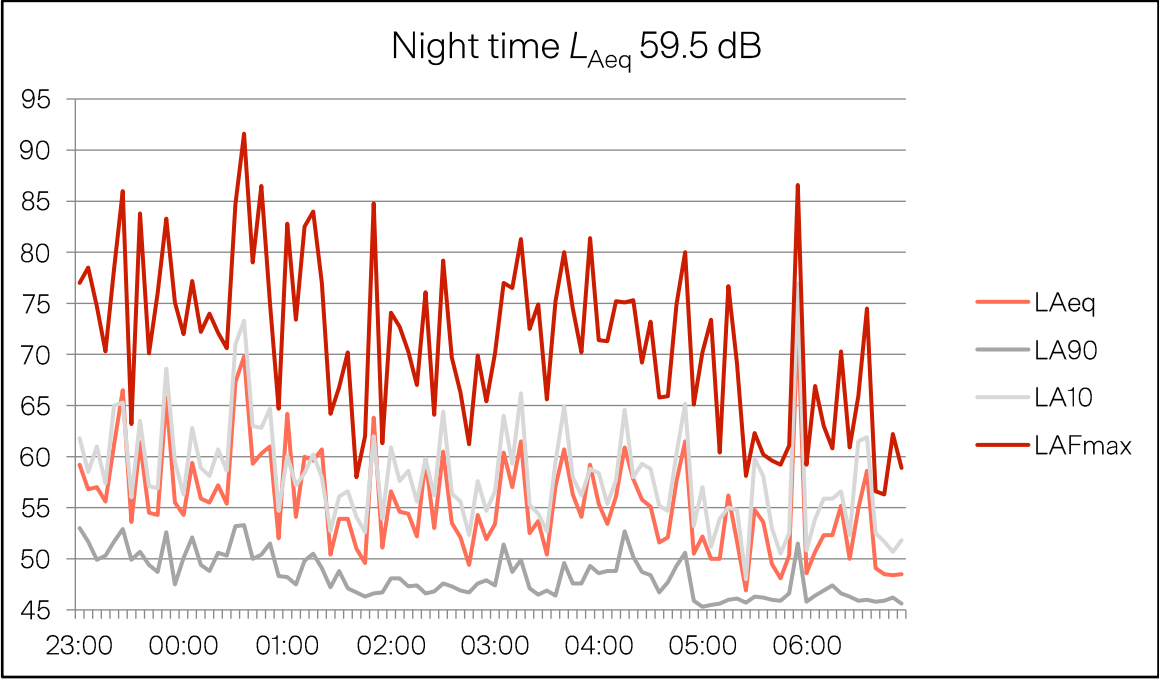


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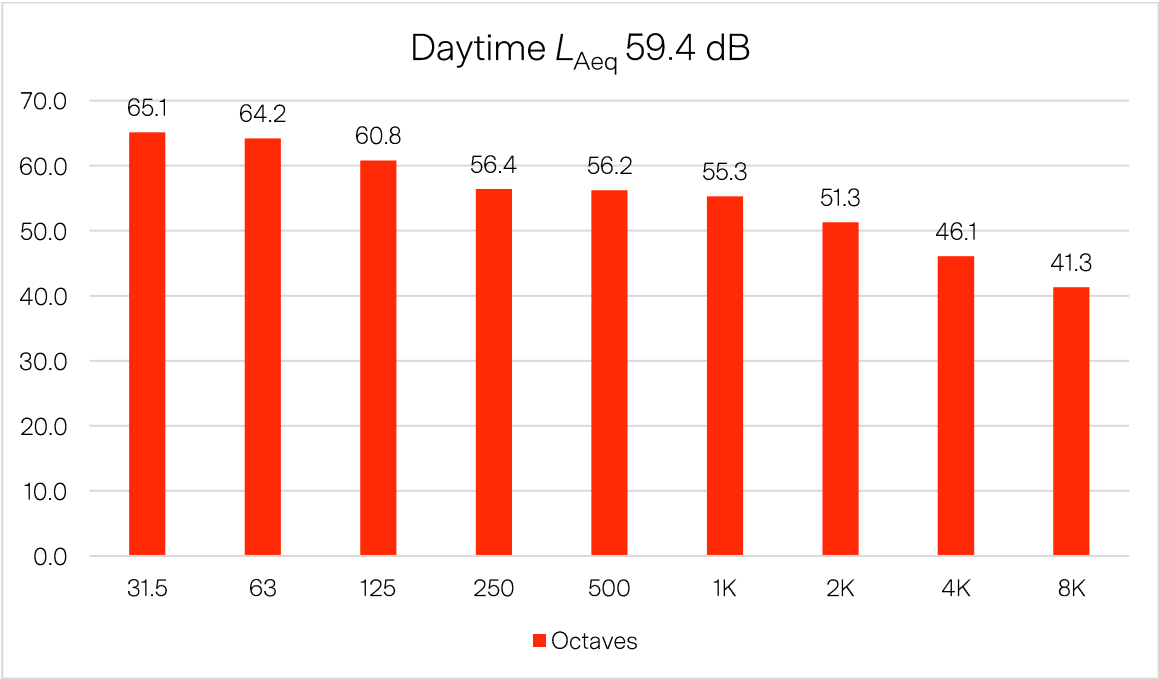


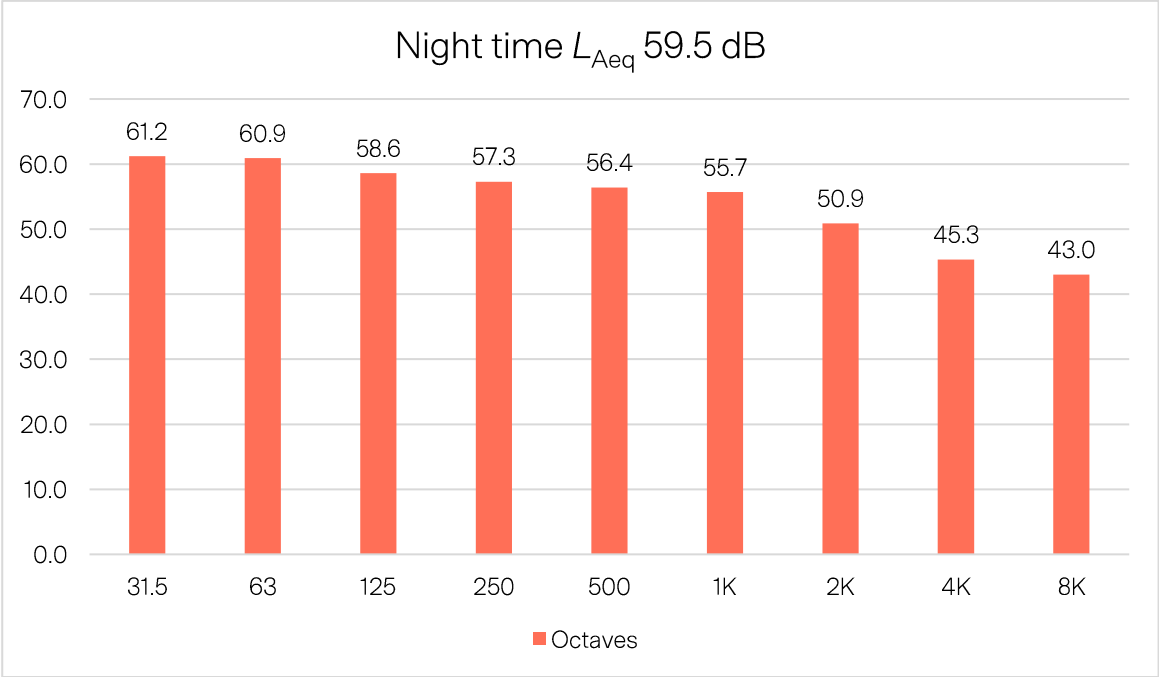
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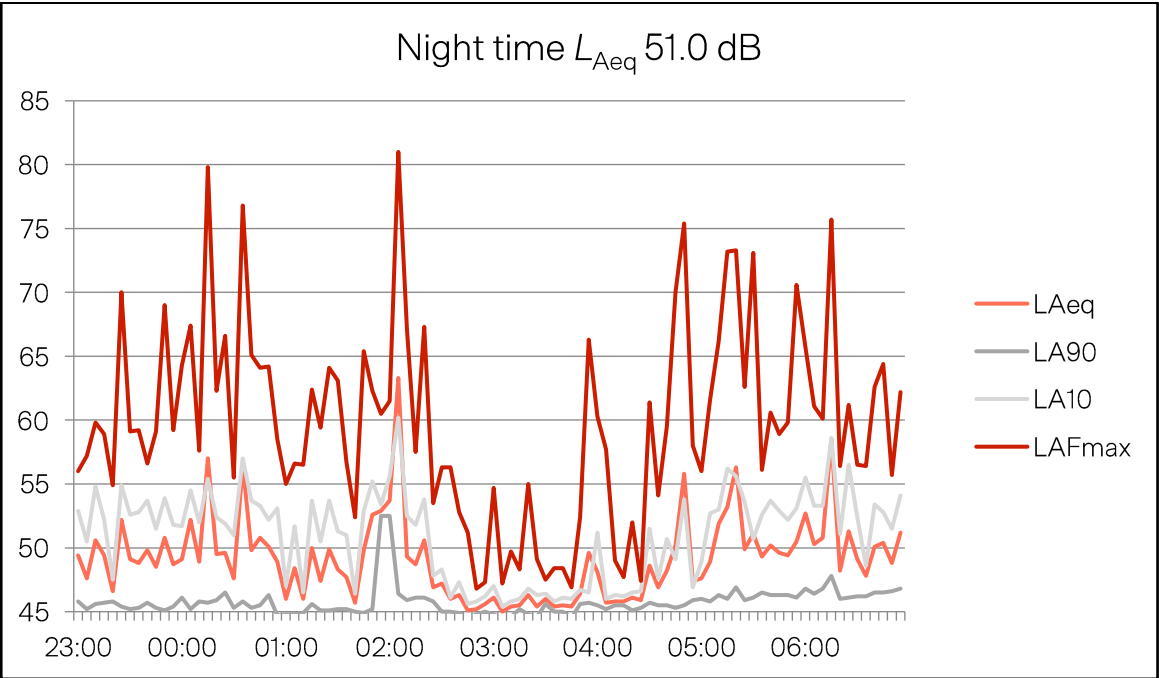
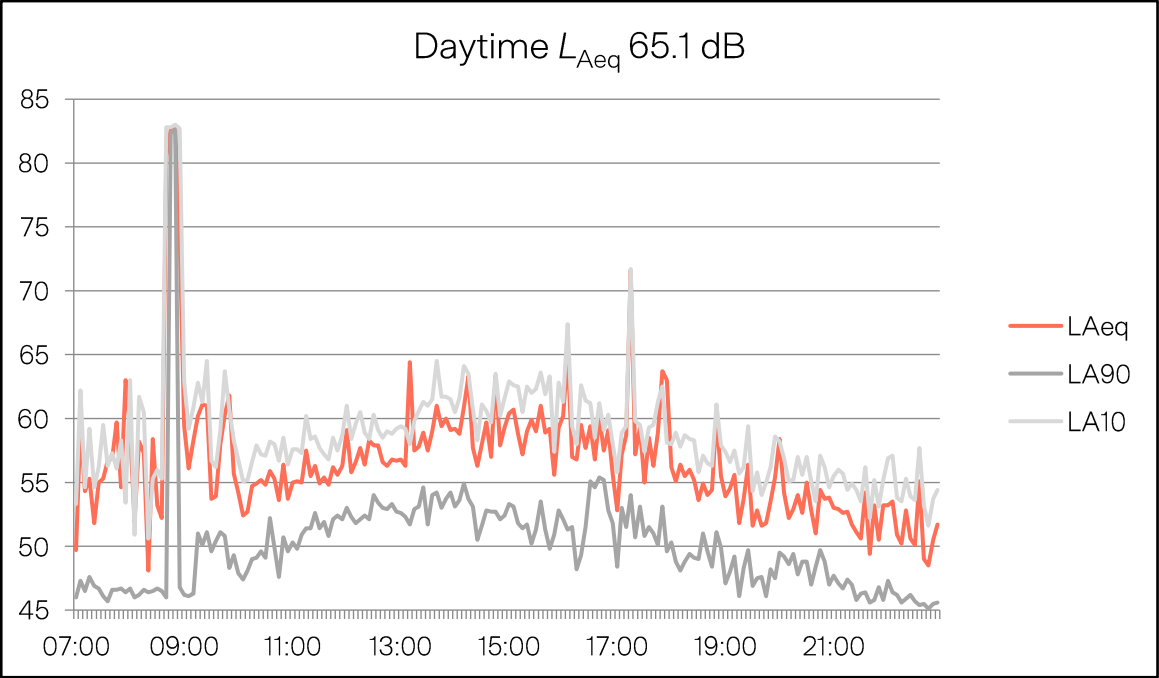


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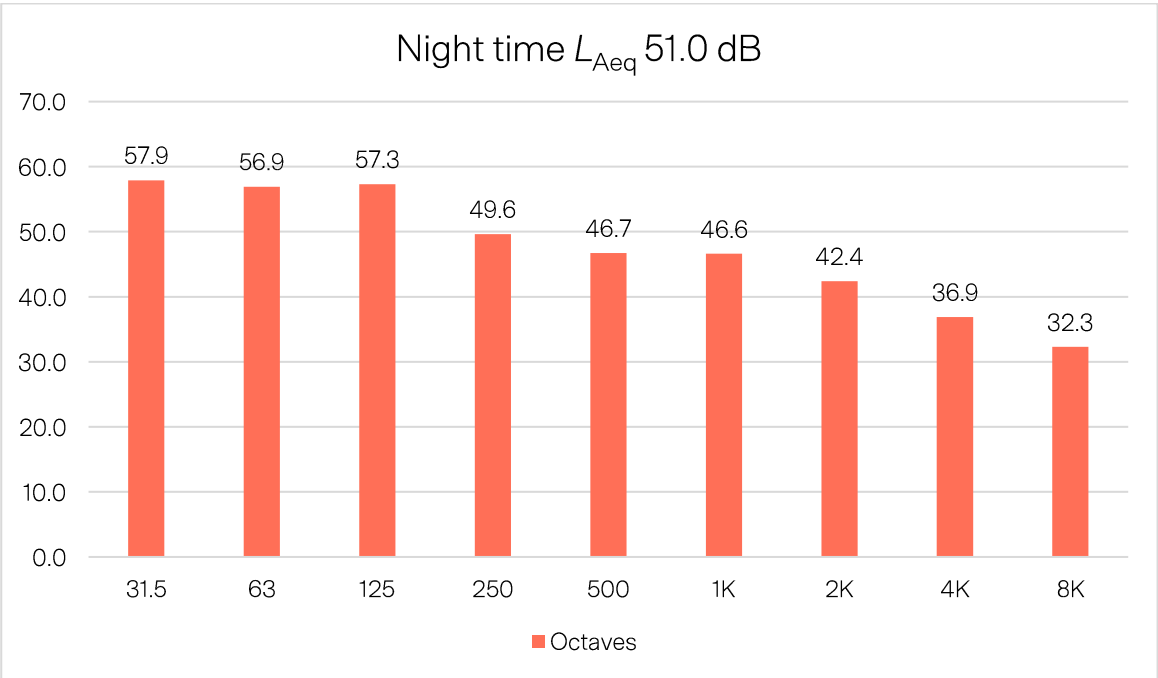
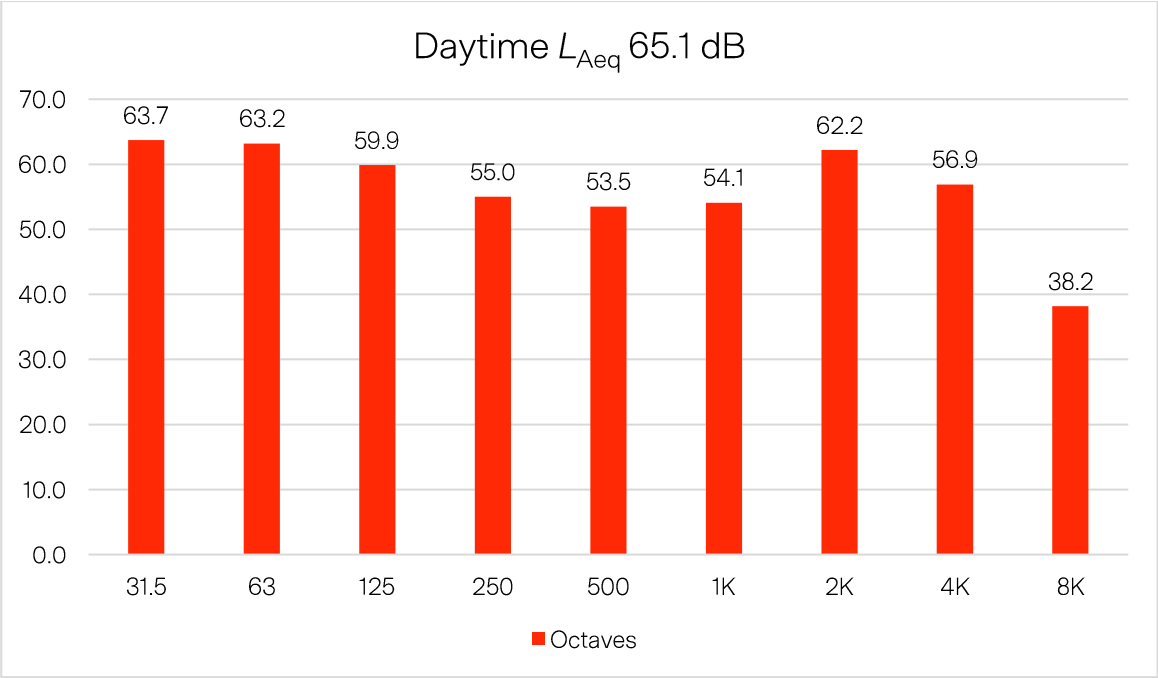


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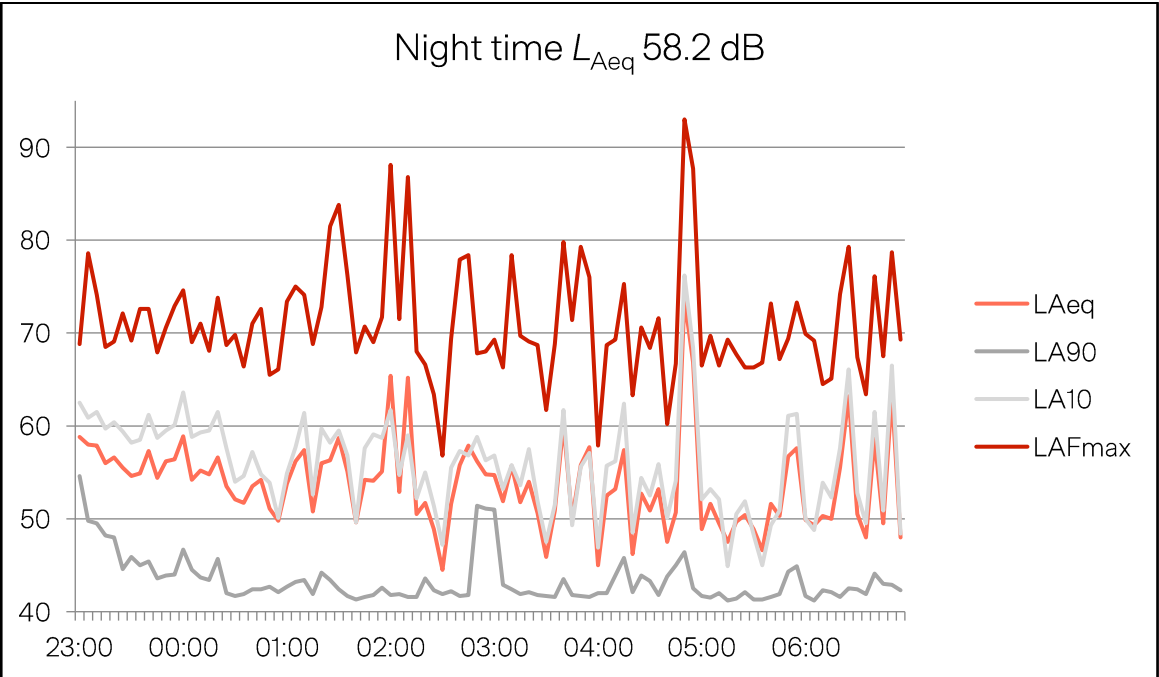
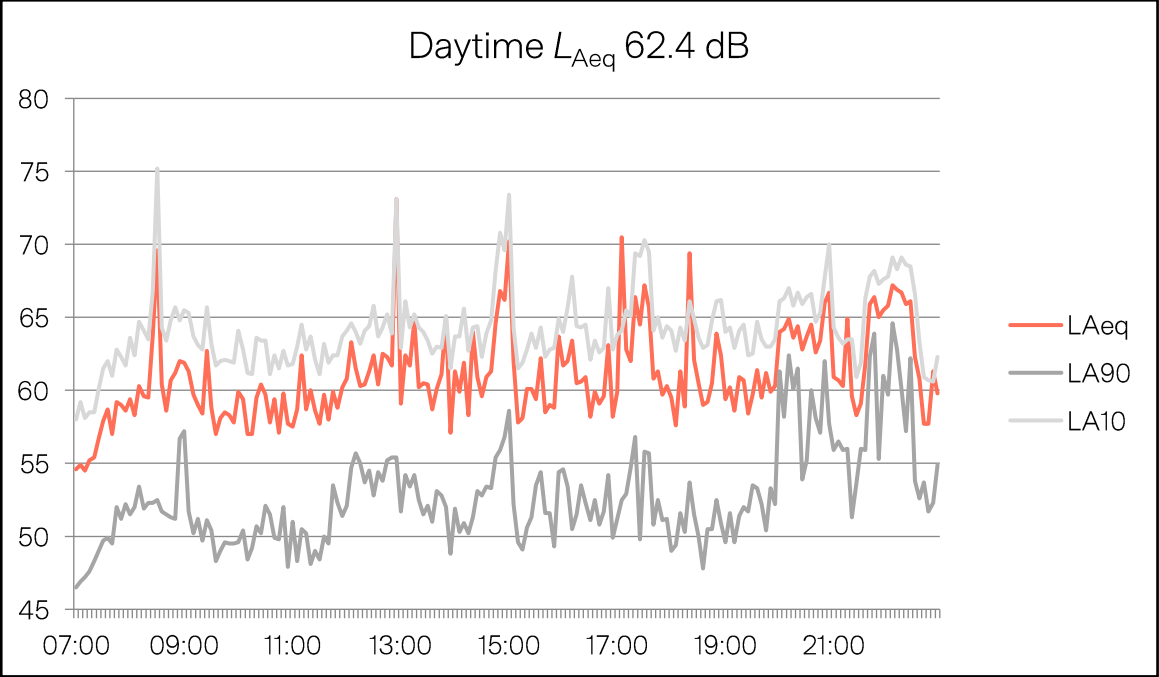
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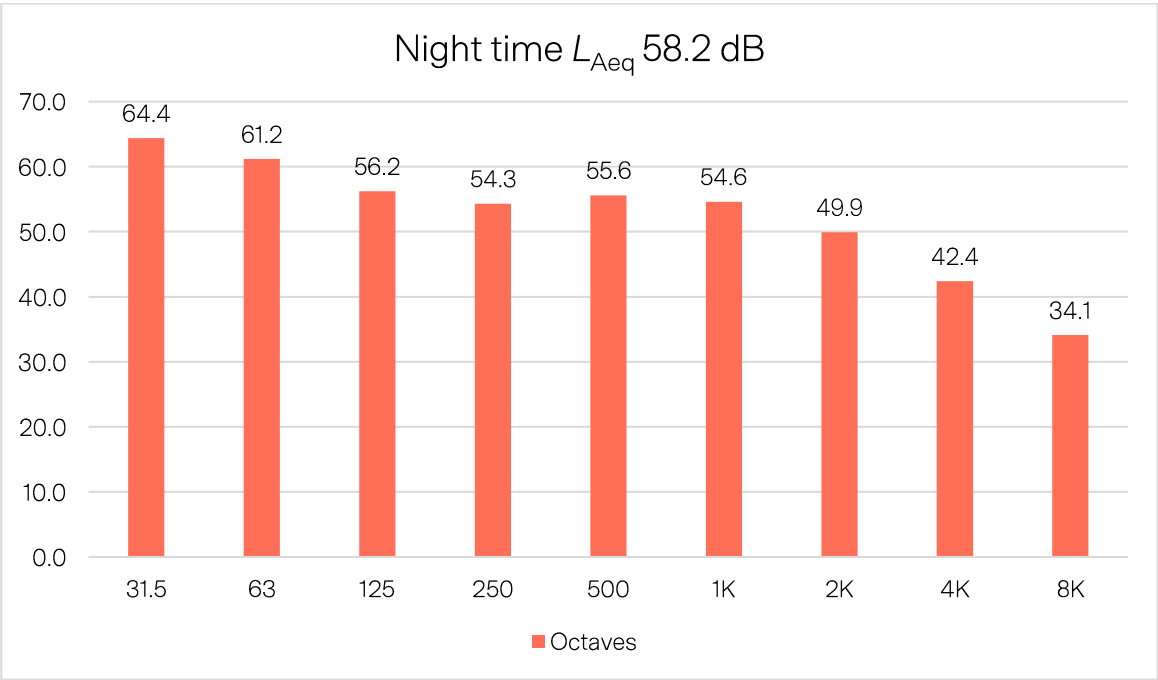
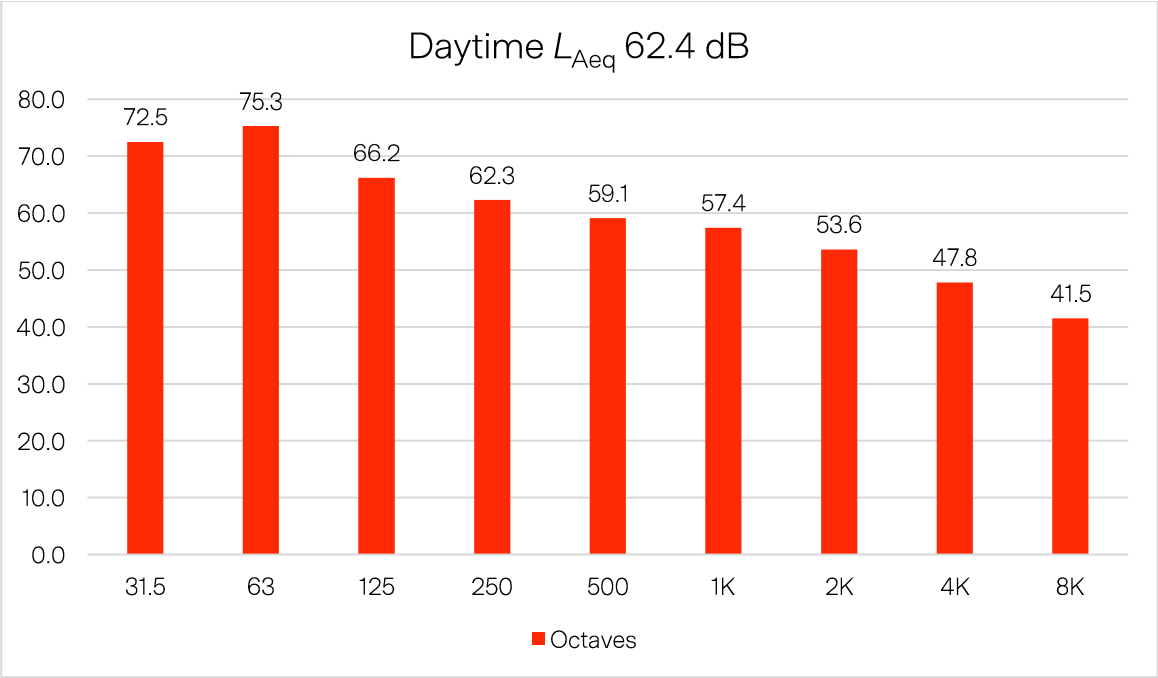
Monitoring Position 3

Friday/Monday

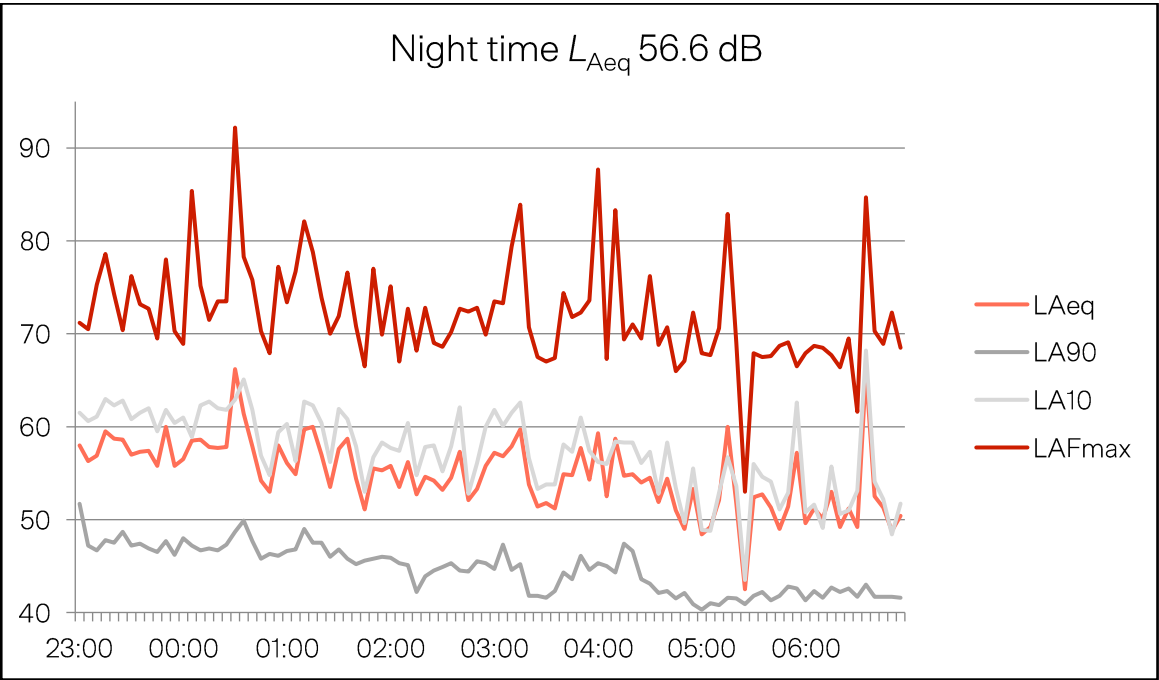
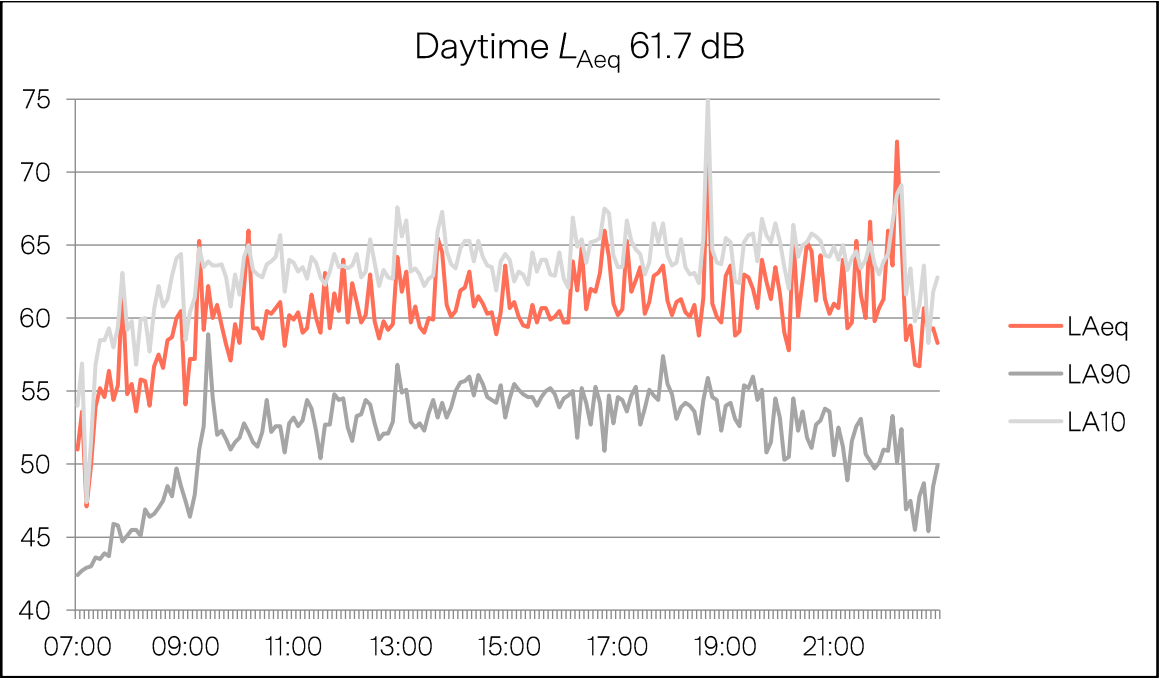


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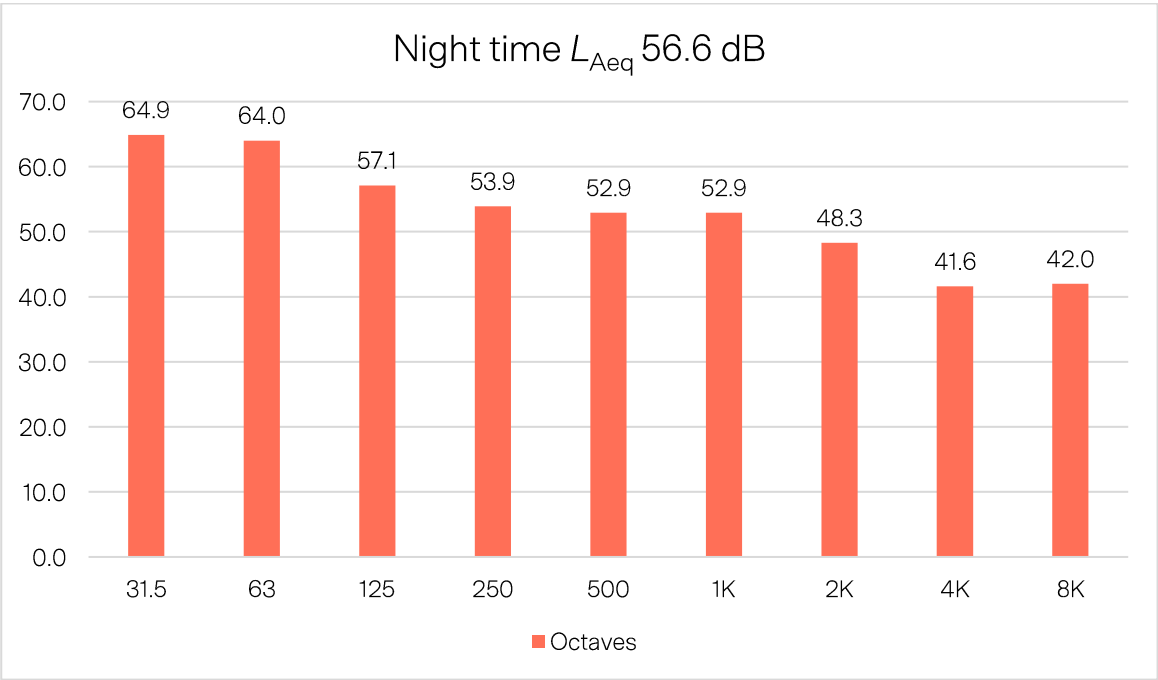
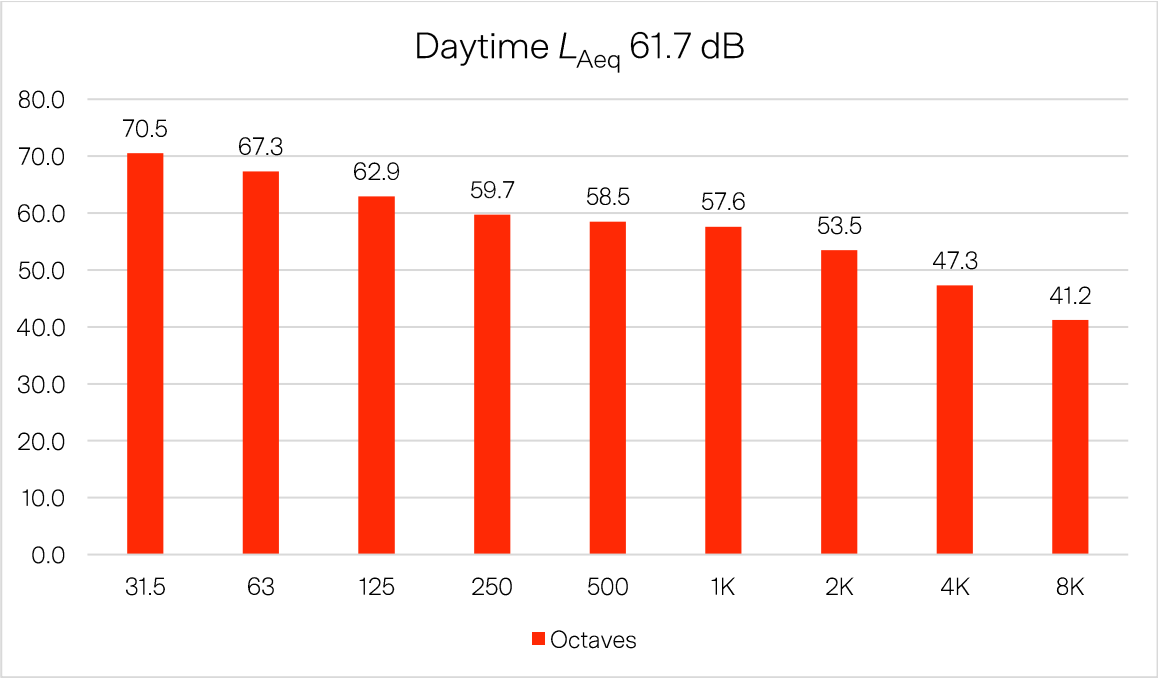


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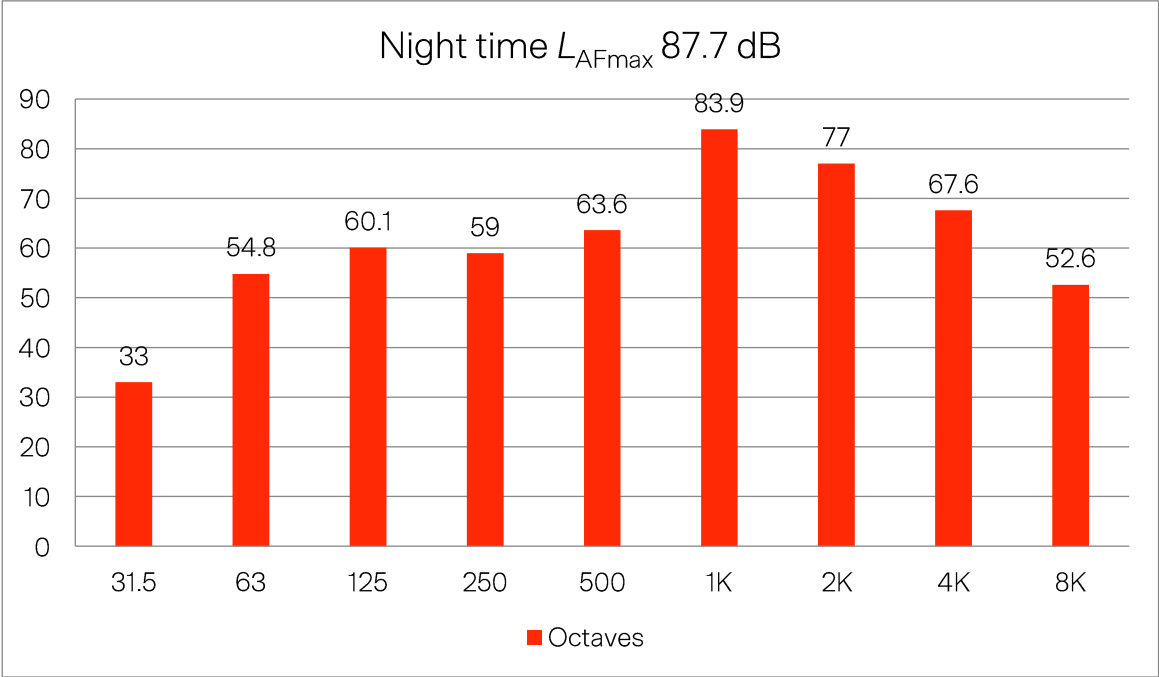


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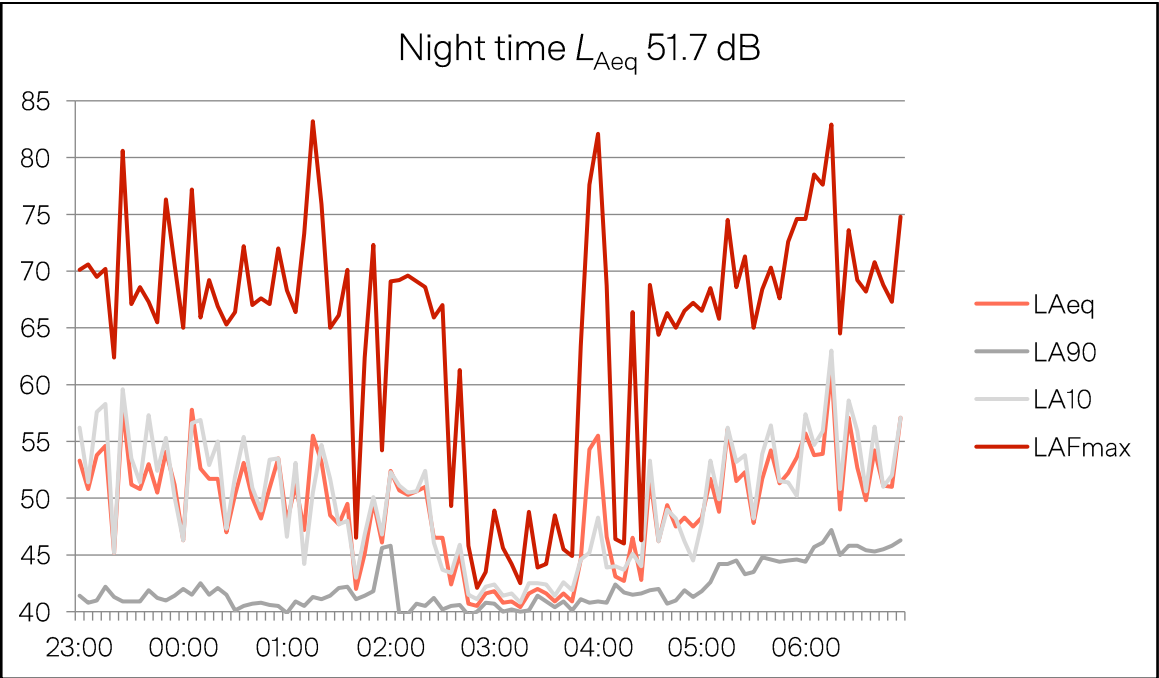
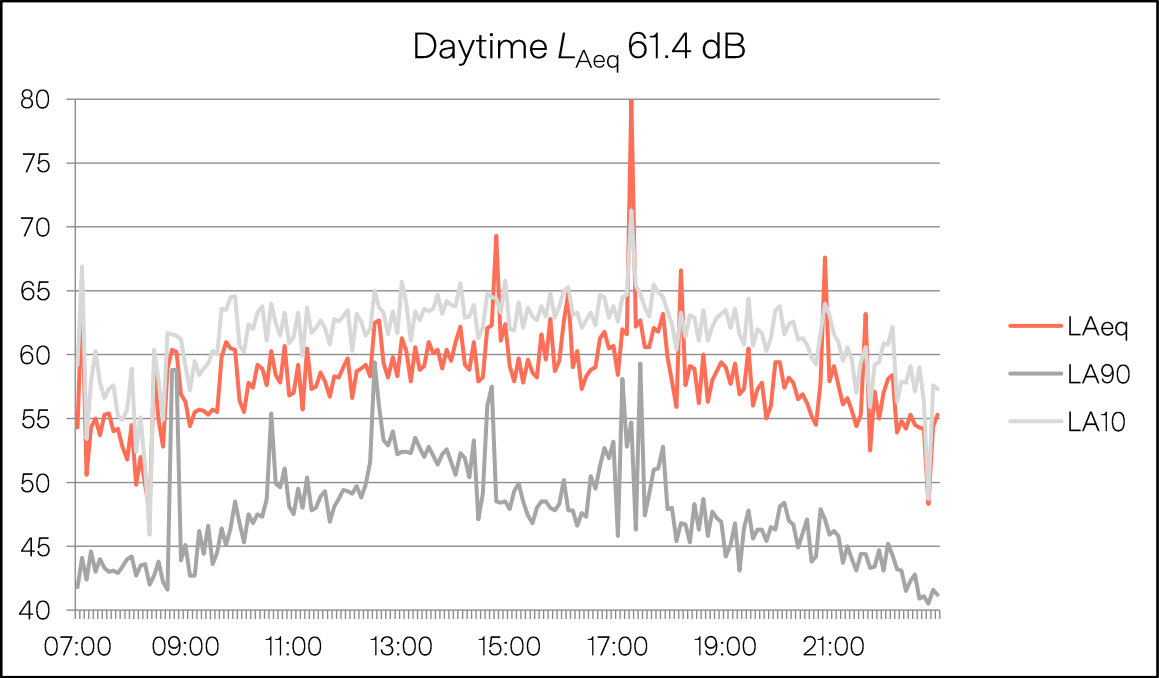
Un-weighted 1:1 Octave Results



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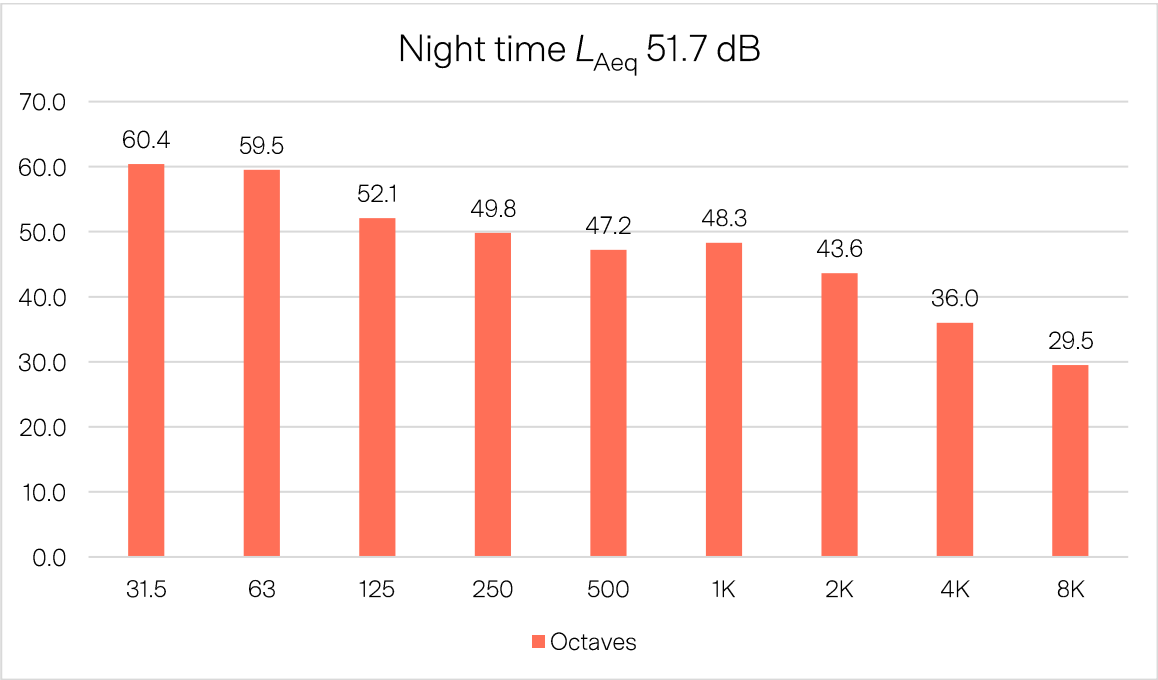
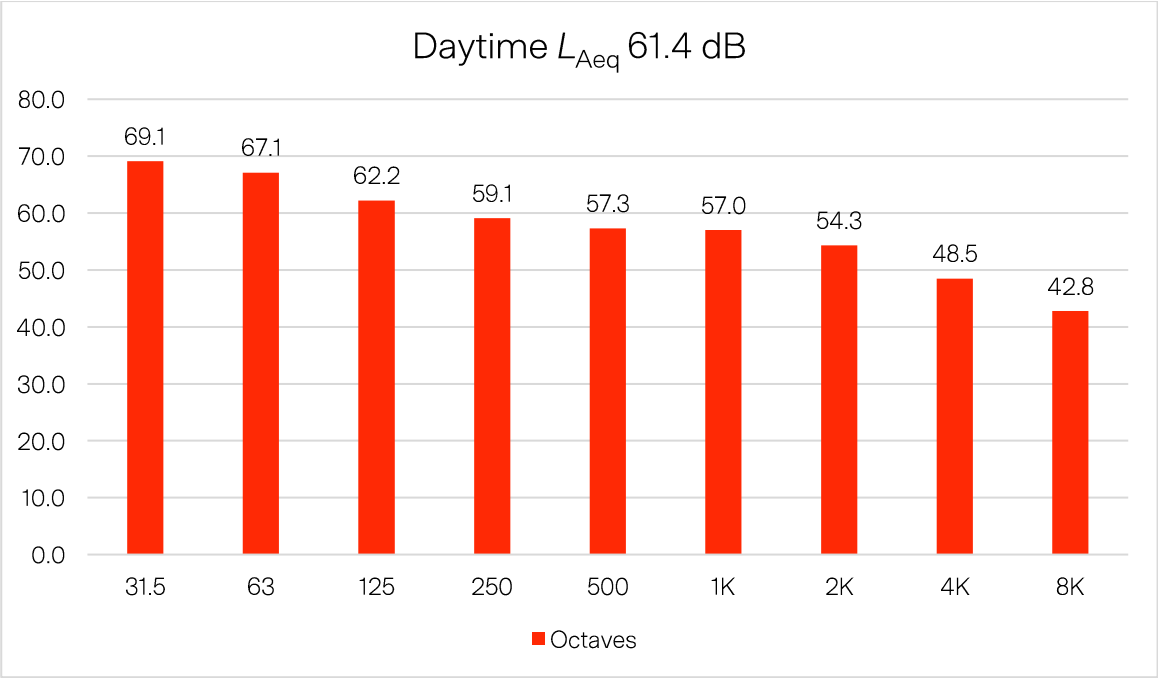


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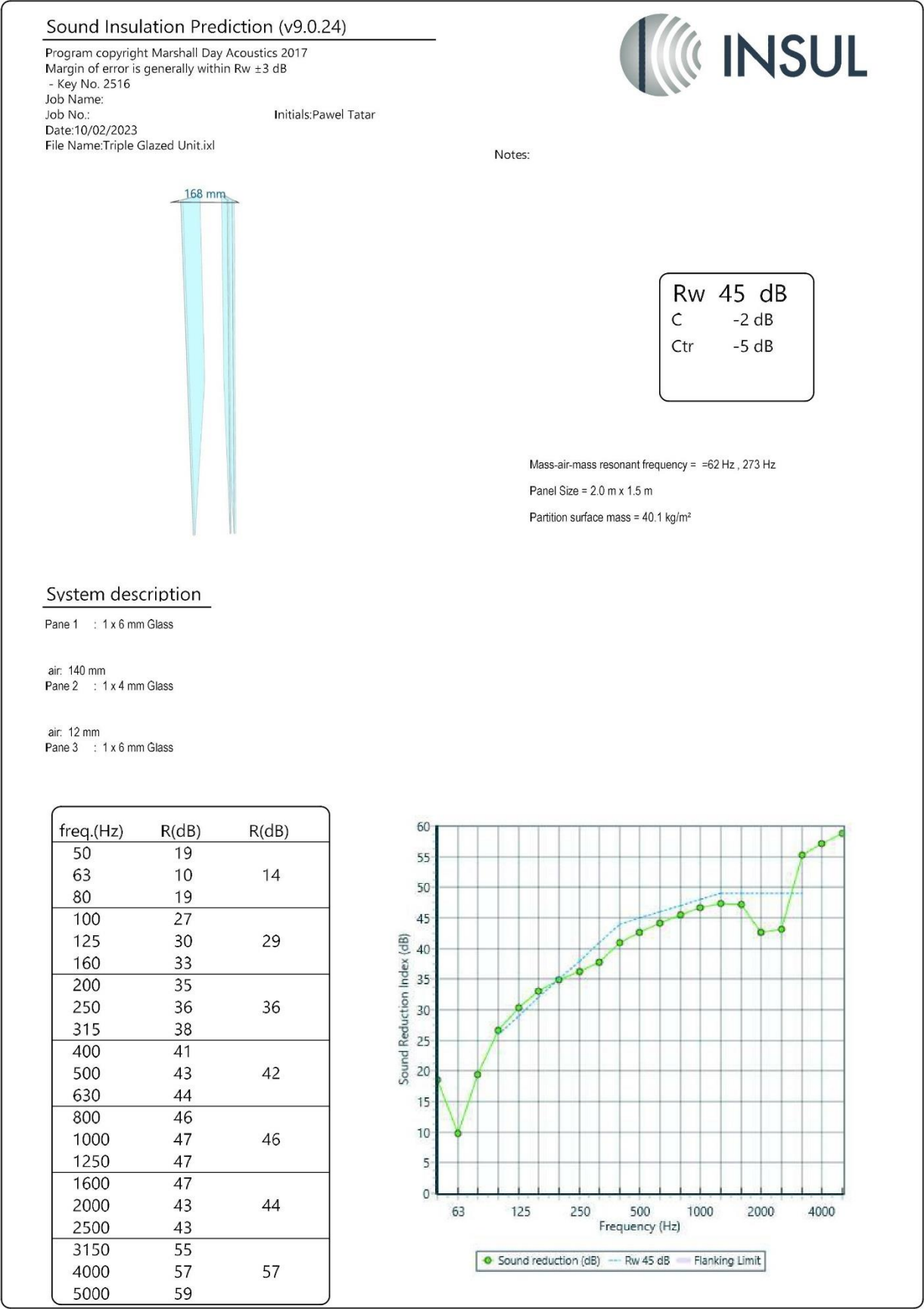


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Un-weighted 1:1 Octave Results



Model Used for Sound Insulation Prediction of Triple Glazed Windows



Glossary of Acoustical Terms

A-weighting

Noise levels are corrected to represent human response to sound.

L_{Aeq}

This is a continuous equivalent of time varying noise, or effectively the average measured (A weighted) noise level over a defined period of time.

$L_{Aeq,16hour}$

A 16 hour long measurement of the L_{Aeq} over the period between 07:00 and 23:00, also known as a daytime measurement.

$L_{Aeq,8hour}$

An 8 hour long measurement of the L_{Aeq} over the period between 23:00 and 07:00, also known as a night time measurement.

L_{AFmax}

The highest, or maximum A-weighted sound pressure level measured over a specified time period. The 'F' defines a time weighting in Fast.

L_{A90}

The A-weighted noise level or average level which is exceeded for 90 percent of the measured time period. Also known as a background level.

L_{A10}

The A-weighted noise level or average level which is exceeded for 10 percent of the measured time period.

1:1 & 1:3 octave spectrum analysis

A single measurement that is separated into frequency bands to allow for a more detailed analysis of the noise source in question.

R_w

The weighted sound reduction index of a partition or facade. A single number value based on the performance of a partition between two rooms across the frequency range 100Hz to 3150Hz. The level is adjusted for the effects of reverberation and background noise.



$D_{n,e,w}$

The weighted level difference of a partition or façade which takes into account a small element such as a grill or vent.

SEL (sound exposure level)

A measure of A-weighted sound energy used to describe a particular event, such as a train pass. It is the sound energy, which, if occurring over one second would contain the same energy as the event.

Free field sound pressure

Is where the radiation or spread of sound is completely unaffected by the presence of any reflecting surfaces or boundaries.

Low Frequency Noise

A term generally used for sound below a frequency of 100 to 150Hz.





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