MTR Corporation Limited

Shatin to Central Link –
Hung Hom to Admiralty Section

Fixed Plant Noise Audit Report
(Batch 1 – Admiralty Station (ADM) and Hong Kong Park Ventilation Building (HKB))

(March 2022)

Verified by:	Claudine Lee
Position:	Independent Environmental Checker
Date:	11 March 2022

MTR Corporation Limited

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Certified by:	Lisa Poon 
Position:	Environmental Team Leader
Date:	11 March 2022

MTR Corporation Limited

Consultancy Agreement No. C11033B

Shatin to Central Link – Hung Hom to Admiralty

[SCL (HUH-ADM)]

Fixed Plant Noise Audit Report (Batch 1 – Admiralty Station (ADM) & Hong Kong Park Ventilation Building (HKB))

March 2022

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Version: A	Date: 10 March 2022

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 EIA Report for SCL – Hung Hom to Admiralty (HUH-ADM) Section (Register No.: AEIAR - 166/2012) was approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, the Environmental Permit (EP) (EP No: EP-436/2012), covering the construction and operation of SCL (HUH-ADM), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-436/2012 and the latest Environmental Permit (EP No: EP-436/2012/F) was issued by Director of Environmental Protection (DEP) on 29 January 2019.

1.1.3 Pursuant to EP Condition 2.31, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(HUH-ADM) EIA Report (Register No. AEIAR-166/2012) or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) having due regard to the characteristics of tonality, impulsiveness and intermittency.

1.1.4 Since the installation of fixed plant along the SCL (HUH – ADM) would be completed in stages, the fixed plant noise audit will be conducted in stages according to the testing and commissioning programmes in each area.

1.1.5 This Fixed Plant Noise Audit Report (Batch 1 – Admiralty Station (ADM) and Hong Kong Park Ventilation Building (HKB)) (hereinafter referred to as “the Report”) specifies the noise measurement methodology and measurement results at the fixed plant noise sources at ADM and HKB, and at the representative Noise Sensitive Receivers (NSRs) near ADM and HKB.

1.1.6 AECOM Asia Co. Ltd has been commissioned by the MTR to prepare this Report and to conduct noise measurement at the identified NSRs for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.

1.2 Purpose of This Report

1.2.1 This Report presents the noise measurement methodology and measurement results at the fixed plant noise sources at ADM and HKB, and at the representative NSRs near ADM and HKB.

1.2.2 This Report comprises the following sections:

- Section 1 presents the background information.
- Section 2 presents the noise criteria and the representative NSRs.
- Section 3 presents the latest information of fixed plant noise sources.
- Section 4 presents the noise measurement methodology.
- Section 5 presents the noise measurement results.
- Section 6 presents the conclusion.

2 NOISE CRITERIA AND REPRESENTATIVE NOISE SENSITIVE RECEIVERS

2.1 Environmental Legislation, Standard and Guidelines

2.1.1 The Noise Control Ordinance, Cap. 400 (NCO) and Environmental Impact Assessment Ordinance, Cap. 499 (EIAO) provide the statutory framework for noise control. Operational noise from fixed noise sources is controlled by Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM) under NCO. To plan for a better environment, the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) under EIAO has specified the following requirements:

- 5 dB below the appropriate ANLs in the IND-TM; or
- the prevailing background noise levels (for quiet areas with level 5dB or more below the ANL).

2.1.2 The Acceptable Noise Levels (ANLs) for different Area Sensitivity Ratings (ASRs) during different periods are summarized in the **Table 2.1**.

Table 2.1 ANLs for Assessment of Noise from Fixed Sources

Time Period	ANL, dB(A)		
	ASR "A"	ASR "B"	ASR "C"
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

2.2 Assessment Criteria and Representative Noise Sensitive Receivers

2.2.1 Table 9.7 of the approved SCL (HUH-ADM) EIA Report presents the identified Noise Sensitive Receivers (NSRs) and the adopted noise assessment criteria for fixed plant noise assessment. The assessment criteria at the NSRs selected for assessing the fixed plant noise impact from ADM are summarised in **Table 2.2**.

Table 2.2 Summary of Noise Criteria at Representative NSRs for Fixed Noise Sources (Reference from Table 9.7 of the approved EIA Report)

Description (NSR No.)	Time Period (1)	Prevailing Background Noise Levels, dB(A) (2)	ASR	ANL-5, dB(A) (3)	Criteria, dB(A) (4)
ADM					
Ching Yi To Barracks Paget House (AD1)	Day & evening	> 70	C	65	59
	Night	> 60	C	55	49
HKB					
Regent on the Park (AD2)	Day & evening	> 70	B	60	57
	Night	> 60	B	50	47
Roberts Block (formerly named as Jockey Club New Life Hostel) (5) (AD3)	Day & evening	> 70	B	60	57
	Night	> 60	-	-	-

Notes:
(1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(2) Prevailing background noise levels for areas near ADM are extracted from Table 9.6 of approved EIA Report.
(3) A 5 dB(A) is deducted from ANL as specified in requirement of EIAO-TM.

(4) The minimum of prevailing background noise level & ANL-5 is adopted. In accordance with Section 9.34 of the approved EIA Report for SCL(HUH-ADM), "noise criteria -6 dB(A)" (i.e. ANL-5-6 dB(A)) and "noise criteria -3 dB(A)" (i.e. ANL-5-3 dB(A)) were adopted at NSRs near ADM and HKB respectively to account the cumulative impact from the fixed plants of SCL and SIL(E).

(5) Roberts Block (ROB) had been occupied as the Jockey Club New Life Hostel from 1986 to 2013, and left vacant since 2013. ROB was planned to be revitalised into a creative arts and play therapy centre for providing psychological and emotional health care services (https://www.legco.gov.hk/yr20-21/english/fc/pwsc/papers/p21-28e.pdf refers). It is anticipated that there would be no sensitive use during the night-time period.

2.3 Review of Area Sensitivity Rating

2.3.1 Area Sensitive Ratings (ASR) as defined in the approved EIA Report were determined by the existence of any influencing factors (IFs) (e.g. major road, industrial area) according to IND-TM at the time of preparation of the EIA Report. During the preparation of this Report, it is revealed that there was no major change on the land use in the vicinity of representative NSRs, and thus only the existence of any major road (i.e. annual average daily traffic flow in excess of 30,000) has been reviewed.

2.3.2 Based on best available information (i.e. The Annual Traffic Census 2020) during the preparation of this Report, Queenways remains as an IF to the NSR located in the vicinity of ADM, while there was no major road affecting the NSRs located in the vicinity of HKB. Therefore, the ASR defined in **Table 2.2** remains unchanged.

3 LATEST INFORMATION OF FIXED PLANT NOISE SOURCES

3.1.1 Based on the latest design information, the fixed plant sources including ventilation louvres, cooling towers and Packaged Condenser Unit (PCU) at ADM and HKB are shown in **Figure Nos. C11033B/C/SCL/ACM/M52/061** and **C11033B/C/SCL/ACM/M52/061** respectively. The updated maximum allowable SWLs of fixed plant noise sources are presented in **Table 3.1** and the predicted fixed plant noise levels are presented in **Appendix A**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test conducted at the representative NSRs.

Table 3.1 Updated Maximum Allowable SWLs for Fixed Plant Noise Sources at ADM and HKB

Location	Fixed Plant ID	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1]	
			Daytime & Evening[2]	Night-time[2]
ADM	ADM VS1-1	Ventilation Louver	94	84
	ADM VS1-2	Ventilation Louver	86	76
	ADM VS1-3	Ventilation Louver	87	77
	ADM VS1-7	Ventilation Louver	93	83
	ADM VS2-1	Ventilation Louver	88	78
	ADM VS2-2	Ventilation Louver	91	81
	ADM VS3-1	Ventilation Louver	96	73
	ADM VS3-2	Ventilation Louver	102	82
	ADM VS3-3	Ventilation Louver	106	96
	ADM VS4-1	Ventilation Louver	83	73
	ADM VS4-2	Ventilation Louver	83	73
	ADM VS4-4	Ventilation Louver	84	74
	ADM VS4-5	Ventilation Louver	93	83
	ADM VS5	Ventilation Louver	98	88
	ADM VS6-1	Ventilation Louver	84	74
	ADM VS6-2	Ventilation Louver	88	78
	ADM VS6-3	Ventilation Louver	84	74
	ADM VS6-4	Ventilation Louver	89	79
	ADM VS6-7	Ventilation Louver	95	85
	ADM VS6-8	Ventilation Louver	95	85
	ADM VS7	Ventilation Louver	98	88
	ADM VS8	Ventilation Louver	102	92
	ADM VS14-1	Ventilation Louver	91	81
	COT-4004	Cooling Tower	102	92
	COT-4005	Cooling Tower	101	91
	PCU-4203A	Packaged Condenser Unit	91	81
	PCU-4203B	Packaged Condenser Unit	92	82
	PCU-4101	Packaged Condenser Unit	96	86
	PCU-4102	Packaged Condenser Unit	92	82

Location	Fixed Plant ID	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1]	
			Daytime & Evening[2]	Night-time[2]
	PCU-4103	Packaged Condenser Unit	88	78
	PCU-4204	Packaged Condenser Unit	92	82
	PCU-4205	Packaged Condenser Unit	92	82
	PCU-4206	Packaged Condenser Unit	90	80
	PCU-4501	Packaged Condenser Unit	97	87
HKB	HKB VS1-1	Ventilation Louver	95	85
	HKB VS1-2	Ventilation Louver	92	82
	HKB VS2-1	Ventilation Louver	93	83
	HKB VS2-2	Ventilation Louver	93	83
	PCU 101	Packaged Condenser Unit	88	78

Notes:
(1) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(3) The transformer bay at ADM substation is managed by Hong Kong Electric Company and therefore was excluded in this fixed plant noise prediction.

4 MEASUREMENT METHODOLOGY

4.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

Measurement Methodology

4.1.1 Details of measurement methodology for SCL are presented in **Appendix B1**. Noise measurements to obtain the SWLs of the fixed plant noise sources followed **Appendix B1** and were conducted by Wilson Acoustics Limited.

Measurement Equipment

4.1.2 The sound level meters and calibrators used for noise measurements are listed in the **Table 4.1**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are provided in **Appendix B2**.

Table 4.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	SVANTEK 958	59120
	SVANTEK 958	59121
	SVANTEK 959	11228
	SVANTEK 977	69787
Calibrator	Larson Davis CAL200	17867
	SVANTEK SV30A	10814

4.1.3 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Date and Time

4.1.4 There will be daytime/evening and night-time operation modes for fixed plant sources at ADM, and the operation of fixed plant sources at HKB are identical during both daytime and night-time periods. Nevertheless, the noise measurements at ADM and HKB were all conducted during night-time periods at the fixed plant noise sources in order to minimise influence from background noise on measurement data. Details of the noise measurement schedule are shown in **Table 4.2**.

Table 4.2 Measurement Schedule

Location	Date
ADM	22, 23, 26 & 27 July 2021
	26 August 2021
	3, 9, 10 & 11 September 2021
HKB	28 Aug 2020
	15 July 2021

4.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Measurement Parameters

4.2.1 L_{Aeq} (30min) was measured at each designated measurement location. 1/3 octave band spectrum and time history over the measurement period was also be logged for determination of tonal, impulsiveness and intermittency characteristic.

4.2.2 Background noise level was measured at the same measurement location in term of L_{Aeq} (5 min) immediate before or after the noise measurement when all Project's fixed plant equipment shut down. To minimise the measurement data being influenced by background noise, noise data obtained at an instance of minimal or no traffic on the road was used to evaluate the tonal characteristic. The corrections for tonality, impulsiveness or intermittency at the representative NSRs were determined in accordance with IND-TM. In addition, any noticeable characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources was recorded during the measurement.

Measurement Equipment

4.2.3 The sound level meters and calibrators used for noise measurements at representative NSRs are listed in the **Table 4.3**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are shown in **Appendix C1**.

Table 4.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250L	2681366
	B&K 2270	2644597
Calibrator	B&K 4231	3006428
	Rion NC-74	34246490

4.2.4 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Locations

4.2.5 The proposed noise measurement locations were selected at the representative NSRs where have direct line of sight to the noise sources and were accessible for noise measurement. These measurement locations had been agreed with EPD prior to noise measurement. The measurement locations are summarised in **Table 4.4** and shown in **Figure Nos. C11033B/C/SCL/ACM/M52/061** and **C11033B/C/SCL/ACM/M52/062**. Photographs of measurement locations are shown in **Appendix C2**.

Table 4.4 Noise Measurement Locations

NSR ID	Description	Type	Measurement Location and Height
ADM			
AD1	Ching Yi To Barracks Paget House	Residential	Public area near Ching Yi To Barrack Paget House (5m above ground) (free-field condition)
HKB			

NSR ID	Description	Type	Measurement Location and Height
AD2	Regent on the Park	Residential	Pedestrian near British Council (free-field condition) (1)
AD3	Roberts Block (formerly named as Jockey Club New Life Hostel)	Government, Institution and Community	1/F of Roberts Block (5m above ground and 1m from building façade) (façade condition)

Note:
(1) The management office of Regent on the Park refused to provide access for measurement due to the recent pandemic situation. An alternative location had been identified in accordance with selection criteria presented in Section 4.4.3 of the Fixed Plant Noise Measurement Plan (Batch 1 – ADM & HKB).

Measurement Date and Time

4.2.6 There will be daytime/evening and night-time operation modes for ADM and the operation of fixed plant sources at HKB are identical during both daytime and night-time periods. To minimise the influence from background noise in measurement data, noise measurements at representative NSRs were therefore only conducted during night-time period. The measurement schedule is presented in **Table 4.5.**

Table 4.5 Measurement Schedule

Location	NSR ID	Date
ADM	AD1	19 Feb 2022
HKB	AD2 & AD3	18 Feb 2022

5 MEASUREMENT RESULTS

5.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

5.1.1 The measured SWLs under conservative approach during daytime and evening, and night-time periods are presented in **Table 5.1**. The measurement results indicated all the fixed plant noise levels in ADM and HKB comply with the updated maximum allowable SWLs. Details of the measurement results are shown in **Appendix B4**.

Table 5.1 Summary of Measured SWLs for Fixed Plants

Plant Item	Measured SWL, dB(A) (2)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)
ADM						
ADM VS1-1	84	84	94	84	Y	Y
ADM VS1-2	76	76	86	76	Y	Y
ADM VS1-3	77	77	87	77	Y	Y
ADM VS1-7	83	83	93	83	Y	Y
ADM VS2-1	78	78	88	78	Y	Y
ADM VS2-2	81	81	91	81	Y	Y
ADM VS3-1	96	73	96	73	Y	Y
ADM VS3-2	102	82	102	82	Y	Y
ADM VS3-3	96	96	106	96	Y	Y
ADM VS4-1	73	73	83	73	Y	Y
ADM VS4-2	73	73	83	73	Y	Y
ADM VS4-4	74	74	84	74	Y	Y
ADM VS4-5	83	83	93	83	Y	Y
ADM VS5	88	88	98	88	Y	Y
ADM VS6-1	74	74	84	74	Y	Y
ADM VS6-2	78	78	88	78	Y	Y
ADM VS6-3	74	74	84	74	Y	Y
ADM VS6-4	79	79	89	79	Y	Y
ADM VS6-7	85	85	95	85	Y	Y
ADM VS6-8	85	85	95	85	Y	Y
ADM VS7	88	88	98	88	Y	Y
ADM VS8	92	92	102	92	Y	Y
ADM VS14-1	81	81	91	81	Y	Y
COT-4004	92	92	102	92	Y	Y
COT-4005	91	91	101	91	Y	Y
PCU-4203A	81	81	91	81	Y	Y
PCU-4203B	82	82	92	82	Y	Y
PCU-4101	86	86	96	86	Y	Y
PCU-4102	82	82	92	82	Y	Y
PCU-4103	78	78	88	78	Y	Y
PCU-4204	82	82	92	82	Y	Y
PCU-4205	82	82	92	82	Y	Y
PCU-4206	80	80	90	80	Y	Y
PCU-4501	87	87	97	87	Y	Y
HKB						

Plant Item	Measured SWL, dB(A) (2)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)
HKB VS1-1	85	85	95	85	Y	Y
HKB VS1-2	82	82	92	82	Y	Y
HKB VS2-1	83	83	93	83	Y	Y
HKB VS2-2	83	83	93	83	Y	Y
PCU 101	78	78	88	78	Y	Y

Notes:
(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.
(2) As discussed in Section 4.1.4, some plants will be operated in different modes, namely daytime/evening and night-time operation modes. Therefore, the measured SWLs for these plants will be different at different operation modes. For those plants operating in the same mode during both daytime/evening and night-time periods, the measured SWL is same for both daytime/evening and night-time periods.

5.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at NSRs

5.2.1 Noise measurements to confirm any characteristics of tonality, impulsiveness and intermittency at the representative NSRs were conducted during night-time period. Measurement results are summarised in **Table 5.2** below. No characteristics of tonality, impulsiveness and intermittency was observed at the selected NSR. Data analysis has been carried out to determine the characteristics of tonality, impulsiveness and intermittency by assessing the logged 1/3 octave band spectra and time history profile. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. Based on site observation and findings of data analysis, it is concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources. Detailed noise measurements results are presented in **Appendix C3**.

Table 5.2 Noise Measurement Results at Measurement Locations

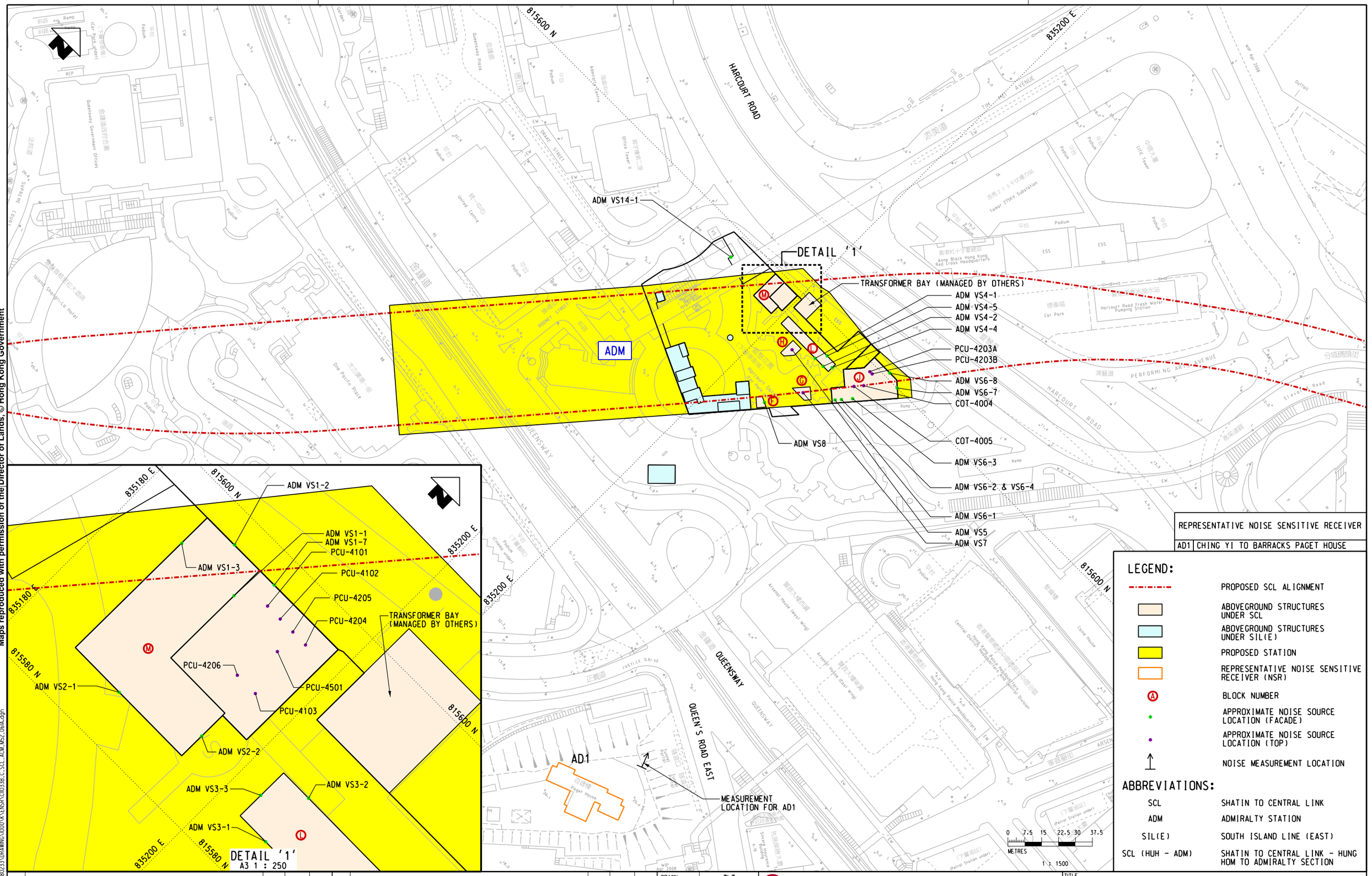
NSR ID	Description	Time Period[1][2]	Measurement Result			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$, dB(A)	Background Noise Level $L_{Aeq(5mins)}$, dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
ADM							
AD1	Ching Yi To Barracks Paget House	Daytime & Evening	61.8	61.9	-0.1	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location.	N
		Night-time	61.6	61.5	0.1		
HKB							
AD2	Regent on the Park [3]	Daytime & Evening / Night-time	50.7	49.3	1.4	Noise from SCL fixed plant was barely noticeable at measurement location.	N
AD3	Roberts Block (formerly named as Jockey Club New Life Hostel)		52.6	52.4	0.2	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location.	N

Notes:
(1) All noise measurement was conducted during night-time period (2300 to 0700 hours).
(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.
(3) The management office of Regent on the Park refused to provide access for measurement due to the recent pandemic situation. Noise measurement was conducted at an alternative location where is located at the Pedestrian near British Council.

6 CONCLUSION

6.1.1 The fixed plant noise verifications were undertaken and the measurement results indicated all the fixed plant noise levels in ADM and HKB comply with the updated maximum allowable SWLs. No characteristics of tonality, impulsiveness and intermittency were observed at the representative NSRs. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. It is therefore concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources.

Figures



REPRESENTATIVE NOISE SENSITIVE RECEIVER	
AD1	CHING YI TO BARRACKS PAGET HOUSE

LEGEND:

- PROPOSED SCL ALIGNMENT
- ABOVEGROUND STRUCTURES UNDER SCL
- ABOVEGROUND STRUCTURES UNDER SIL(E)
- PROPOSED STATION
- REPRESENTATIVE NOISE SENSITIVE RECEIVER (NSR)
- BLOCK NUMBER
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- APPROXIMATE NOISE SOURCE LOCATION (TOP)
- NOISE MEASUREMENT LOCATION

ABBREVIATIONS:

SCL	SHATIN TO CENTRAL LINK
ADM	ADMIRALTY STATION
SIL(E)	SOUTH ISLAND LINE (EAST)
SCL (HUH - ADM)	SHATIN TO CENTRAL LINK - HUNG HOM TO ADMIRALTY SECTION

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DATE	24/FEB/2022

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

AECOM

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TITLE

C11033B
SCL (HUH - ADM)
LOCATIONS OF NSR AND FIXED PLANT NOISE SOURCES (ADMIRALTY STATION)

SCALE	FIGURE NO.	REV.
1 : 1500 (A3)	C11033B/C/SCL/ACM/M52/061	A

834600 E
834900 E
835000 E
815200 N
815100 N

AD3
MEASUREMENT LOCATION FOR AD3
AD2
MEASUREMENT LOCATION FOR AD2

HKB
HKB VS2-2
HKB VS2-1
HKB VS1-1
HKB VS1-2
ABOVEGROUND STRUCTURES UNDER SIL (E)
PCU101

REPRESENTATIVE AIRBORNE NOISE SENSITIVE RECEIVER FOR HKB - OPERATIONAL PHASE	
AD2	REGENT ON THE PARK
AD3	ROBERT BLOCKS (FORMERLY NAMED AS JOCKEY CLUB NEW LIFE HOSTEL)

LEGEND:

- PROPOSED SCL ALIGNMENT
- REPRESENTATIVE NOISE SENSITIVE RECEIVER (NSR)
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- APPROXIMATE NOISE SOURCE LOCATION (TOP)
- NOISE MEASUREMENT LOCATION

ABBREVIATIONS:

SCL	SHATIN TO CENTRAL LINK
HKB	HONG KONG PARK VENTILATION BUILDING
SIL(E)	SOUTH ISLAND LINE (EAST)
SCL (HUH - ADM)	SHATIN TO CENTRAL LINK - HUNG HOM TO ADMIRALTY SECTION

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SHATIN TO CENTRAL LINK

ORIGINATOR
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C11033B_C_SCL_ACM_M52_062A.dgn

TITLE
C11033B
SCL (HUH - ADM)
LOCATIONS OF NSRS AND FIXED PLANT NOISE SOURCES (HONG KONG PARK VENTILATION BUILDING)

SCALE 1 : 1000 (A3)
FIGURE NO. C11033B/C/SCL/ACM/M52/062
REV. A

Appendix A

Detailed Calculation of Fixed Plant Noise Assessment

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - ADM (Daytime & Evening Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance, m	Vertical Distance, m	Slant Distance, m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criterion under EIAO-TM[2], dB(A)
Daytime													
Admiralty Station													
AD1													
AD1	Ching Yi To Barracks	ADM VS1-1	East	233	21	234	94	-10	-55	3	32		
	Paget House	ADM VS1-2	North	236	21	237	86	-10	-56	3	23		
		ADM VS1-3	West	235	21	236	87	-10	-55	3	25		
		ADM VS1-7	North	235	27	236	93	-10	-55	3	31		
		ADM VS2-1	South	223	20	224	88	0	-55	3	36		
		ADM VS2-2	East	222	20	223	91	0	-55	3	39		
		ADM VS3-1	South	217	19	218	96	0	-55	3	44		
		ADM VS3-2	North	222	20	223	102	-10	-55	3	40		
		ADM VS3-3	West	220	19	221	106	-10	-55	3	44		
		ADM VS4-1	South	212	20	213	83	0	-55	3	31		
		ADM VS4-2	South	211	20	212	83	0	-55	3	31		
		ADM VS4-4	East	213	21	214	84	0	-55	3	32		
		ADM VS4-5	North	216	19	217	93	-10	-55	3	31		
		ADM VS5	Top	210	23	211	98	0	-55	3	46		
		ADM VS6-1	Southeast	202	23	203	84	0	-54	3	33		
		ADM VS6-2	Southeast	203	23	205	88	0	-54	3	37		
		ADM VS6-3	Southeast	207	23	208	84	0	-54	3	33		
		ADM VS6-4	Southeast	210	23	211	89	0	-54	3	38		
		ADM VS6-7	Northeast	223	24	224	95	-10	-55	3	33		
		ADM VS6-8	North	226	24	227	95	-10	-55	3	33		
		ADM VS7	Top	196	23	198	98	0	-54	3	47		
		ADM VS8	Northeast	184	18	185	102	-10	-53	3	42		
		ADM VS14-1	East	237	29	239	91	-10	-56	3	28		
		COT-4004	All	214	17	215	102	0	-55	3	50		
		COT-4005	All	211	17	212	101	0	-55	3	49		
		PCU-4203A	All	221	18	222	91	0	-55	3	39		
		PCU-4203B	All	221	18	221	92	0	-55	3	40		
		PCU-4101	All	233	24	234	96	0	-55	3	44		
		PCU-4102	All	233	24	234	92	0	-55	3	40		
		PCU-4103	All	227	24	228	88	0	-55	3	36		
		PCU-4204	All	232	24	233	92	0	-55	3	40		
		PCU-4205	All	232	24	234	92	0	-55	3	40		
		PCU-4206	All	228	24	229	90	0	-55	3	38		
		PCU-4501	All	230	24	232	97	0	-55	3	45	**57**	**59**

Remark:

[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.

[2] In accordance with Section 9.34 of the approved SCL(HUH-ADM) EIA report, a design target of “noise criteria – 6 dB(A)” i.e. ANL – 5 – 6 dB(A) is applied for NSRs near ADM due to the cumulative impact from the fixed plants of existing ADM, SCL and SIL(E).

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - ADM (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance, m	Vertical Distance, m	Slant Distance, m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Nighttime Noise Criterion under EIAO-TM[2], dB(A)
Night-time													
Admiralty Station													
AD1													
AD1	Ching Yi To Barracks Paget House	ADM VS1-1	East	233	21	234	84	-10	-55	3	22		
		ADM VS1-2	North	236	21	237	76	-10	-56	3	13		
		ADM VS1-3	West	235	21	236	77	-10	-55	3	15		
		ADM VS1-7	North	235	27	236	83	-10	-55	3	21		
		ADM VS2-1	South	223	20	224	78	0	-55	3	26		
		ADM VS2-2	East	222	20	223	81	0	-55	3	29		
		ADM VS3-1	South	217	19	218	73	0	-55	3	21		
		ADM VS3-2	North	222	20	223	82	-10	-55	3	20		
		ADM VS3-3	West	220	19	221	96	-10	-55	3	34		
		ADM VS4-1	South	212	20	213	73	0	-55	3	21		
		ADM VS4-2	South	211	20	212	73	0	-55	3	21		
		ADM VS4-4	East	213	21	214	74	0	-55	3	22		
		ADM VS4-5	North	216	19	217	83	-10	-55	3	21		
		ADM VS5	Top	210	23	211	88	0	-55	3	36		
		ADM VS6-1	Southeast	202	23	203	74	0	-54	3	23		
		ADM VS6-2	Southeast	203	23	205	78	0	-54	3	27		
		ADM VS6-3	Southeast	207	23	208	74	0	-54	3	23		
		ADM VS6-4	Southeast	210	23	211	79	0	-54	3	28		
		ADM VS6-7	Northeast	223	24	224	85	-10	-55	3	23		
		ADM VS6-8	North	226	24	227	85	-10	-55	3	23		
		ADM VS7	Top	196	23	198	88	0	-54	3	37		
		ADM VS8	Northeast	184	18	185	92	-10	-53	3	32		
		ADM VS14-1	East	237	29	239	81	-10	-56	3	18		
		COT-4004	All	214	17	215	92	0	-55	3	40		
		COT-4005	All	211	17	212	91	0	-55	3	39		
		PCU-4203A	All	221	18	222	81	0	-55	3	29		
		PCU-4203B	All	221	18	221	82	0	-55	3	30		
		PCU-4101	All	233	24	234	86	0	-55	3	34		
		PCU-4102	All	233	24	234	82	0	-55	3	30		
		PCU-4103	All	227	24	228	78	0	-55	3	26		
		PCU-4204	All	232	24	233	82	0	-55	3	30		
		PCU-4205	All	232	24	234	82	0	-55	3	30		
		PCU-4206	All	228	24	229	80	0	-55	3	28		
		PCU-4501	All	230	24	232	87	0	-55	3	35	**47**	**49**

Remark:

[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.

[2] In accordance with Section 9.34 of the approved SCL(HUH-ADM) EIA report, a design target of “noise criteria – 6 dB(A)” i.e. ANL – 5 – 6 dB(A) is applied for NSRs near ADM due to the cumulative impact from the fixed plants of existing ADM, SCL and SIL(E).

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - HKB (Daytime & Evening Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance, m	Vertical Distance, m	Slant Distance, m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criterion under the EIAO-TM, dB(A)[2]
Daytime													
Hong Kong Park Ventilation Building													
AD2													
AD2	Regent on the Park	HKB VS1-1	Northeast	74	25	79	95	-10	-46	3	42		
		HKB VS1-2	Southeast	70	25	74	92	0	-45	3	50		
		HKB VS2-1	Northeast	82	26	86	93	-10	-47	3	39		
		HKB VS2-2	Northwest	84	26	88	93	-10	-47	3	39		
		PCU101	Top	61	32	69	88	0	-45	3	46	**52**	**57**
AD3													
AD3	Roberts Block (formerly named as Jockey Club New Life Hostel)	HKB VS1-1	Northeast	130	42	137	95	-10	-51	3	37		
		HKB VS1-2	Southeast	134	42	140	92	-10	-51	3	34		
		HKB VS2-1	Northeast	118	42	125	93	-10	-50	3	36		
		HKB VS2-2	Northwest	113	42	121	93	0	-50	3	46		
		PCU101	Top	125	48	134	88	0	-51	3	40	**48**	**57**

Remark:
[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.
[2] In accordance with Section 9.34 of the approved SCL(HUH-ADM) EIA report, a design target of “noise criteria – 3 dB(A)” i.e. ANL – 5 – 3 dB(A), is applied for NSRs near HKB due to the cumulative impact from the fixed plants of SCL and SIL(E).

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - HKB (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance, m	Vertical Distance, m	Slant Distance, m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Nighttime Noise Criterion under the EIAO-TM, dB(A)[2]
Night-time													
Hong Kong Park Ventilation Building													
AD2													
AD2	Regent on the Park	HKB VS1-1	Northeast	74	25	79	85	-10	-46	3	32		
		HKB VS1-2	Southeast	70	25	74	82	0	-45	3	40		
		HKB VS2-1	Northeast	82	26	86	83	-10	-47	3	29		
		HKB VS2-2	Northwest	84	26	88	83	-10	-47	3	29		
		PCU101	Top	61	32	69	78	0	-45	3	36	**42**	**47**

Remark:
[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.
[2] In accordance with Section 9.34 of the approved SCL(HUH-ADM) EIA report, a design target of “noise criteria – 3 dB(A)” i.e. ANL – 5 – 3 dB(A), is applied for NSRs near HKB due to the cumulative impact from the fixed plants of SCL and SIL(E).

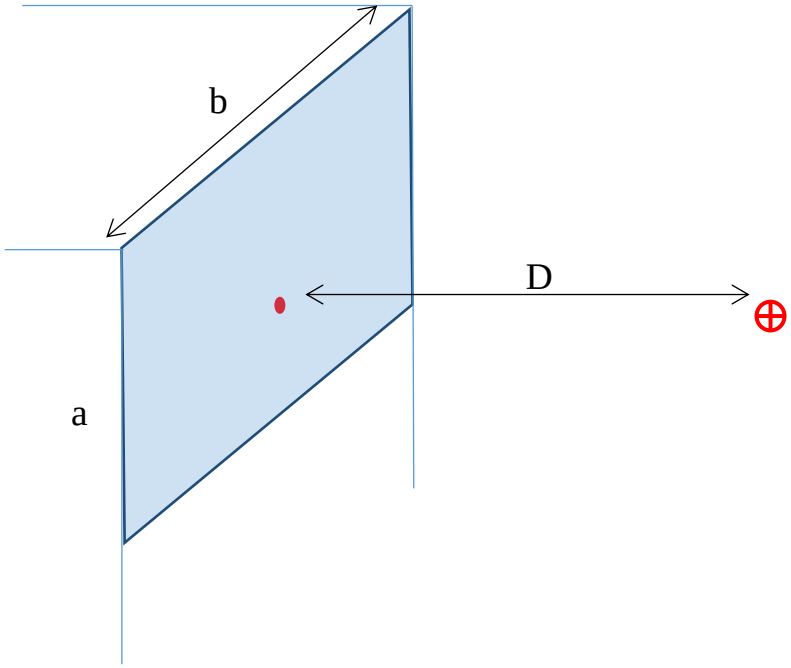
Appendix B

Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

Appendix B1

Measurement Methodology

Method 1: Far-Field Testing Method for Louver



a: Short side of the louver
b: Long side of the louver
D: Measurement distance (separation between louver and microphone), where D must be greater than (2b) and rounded up to interger.

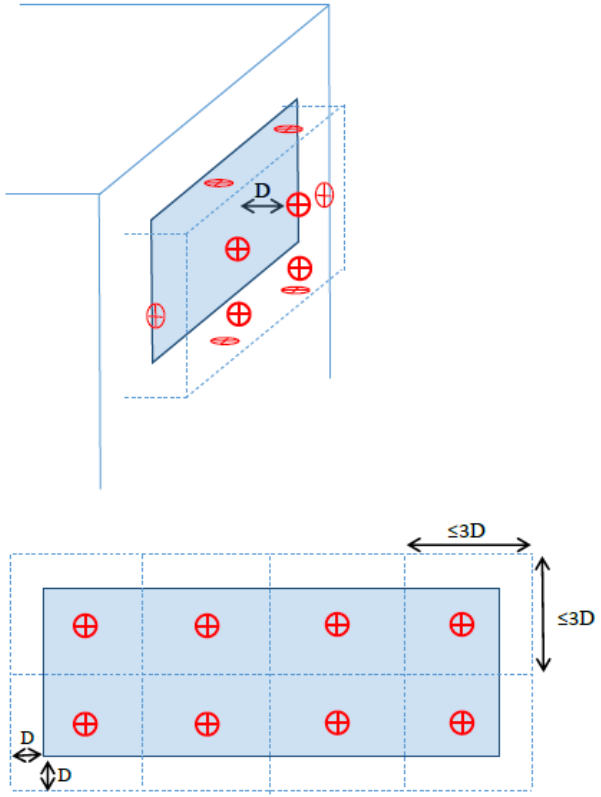
Louver opening
Proposed measurement point (microphone pointing perpendicular to the center of the louvre)

For method 1,

- "D" must be greater than 2b and round up to integer.
- The microphone must point to the center of the louver.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained.
- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with Method 2.
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0dB(A), noise measurement should then be conducted at near field in accordance with Method 2.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20log(D) + 8 + background noise correction factor

Method 2: Near-Field Testing Method for Louver



D: Measurement distance

Louver opening
Measurement box
Proposed measurement point (microphone pointing perpendicular to the louvre)

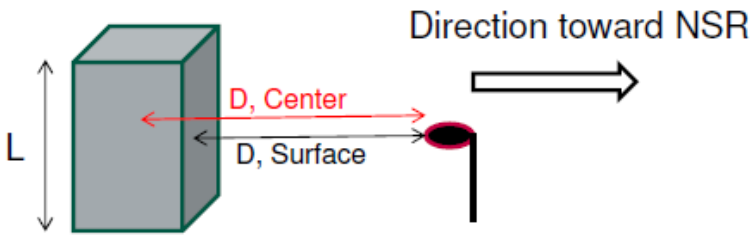
For method 2 (developed based on the principle of ISO3746:2010),

- First step is to determine a hypothetical measurement surfaces with at least 1m separation (D, measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- For louvre with largest dimension ≤3D, at least one measurement at the centre of the measurement surface parallel to the louvre should be conducted.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Extra localized microphone positions on the measurement surfaces in the region of high radiation should be considered. In this case follow the procedures of ISO3744.
- For louver with largest dimension > 3D, measurement surface and measurement position should follow ISO3746.
- Background noise level should be taken at each measurement point for determining the background correction (K1A).
- If the difference between the background noise and the measured noise level is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results, D should be reduced according to ISO3746 to obtain higher measured noise levels.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean LAeq over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Far Field Testing Method for Plant Item



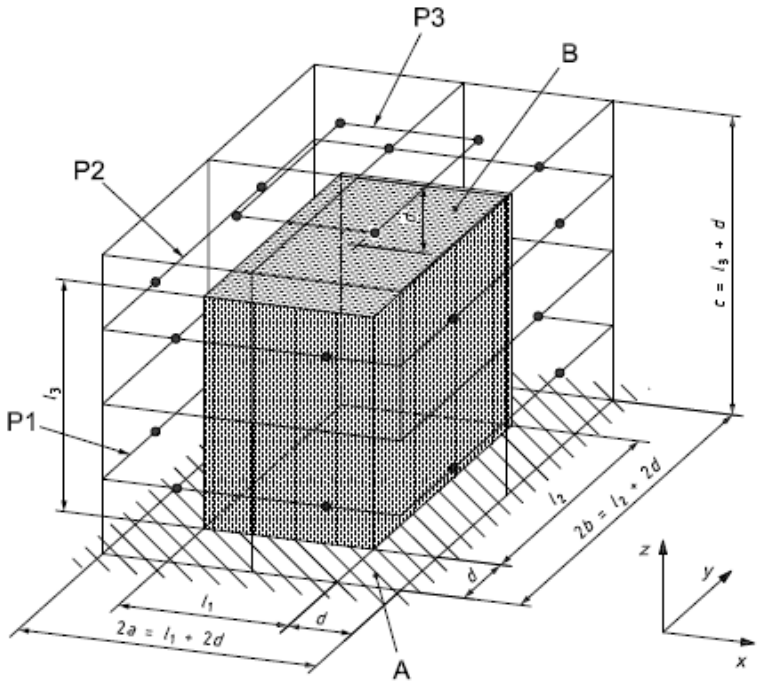
"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

- "D, Surface" must be greater than twice of L (2L) and roundup to integer (e.g 6m ,7m, 8m…).
- The microphone must be pointing to the center of the plant.
- Measurement should be carried out at the direction toward all NSRs.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained at each the measurement point.

- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0 dB(A), noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20 log (D,Center) + 8 + background noise correction factor

Method 4 – Near Field Testing Method for Plant Item



Key

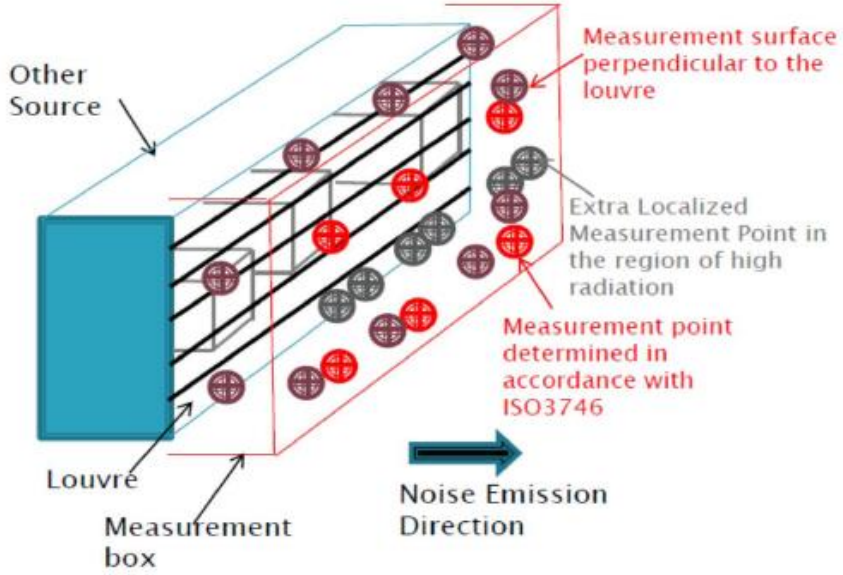
For Method 4 (based on ISO3746:2010),

- Please refer to latest edition of ISO3746 for measurement requirement.
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalized (see figure for example)
- Background noise measurement should be obtained for determination of background correction factor (K1A).According to ISO3746, if the source under test radiates noise predominantly in one direction or if the noise from a large source is emitted only from a small portion of the source, the usage of extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case, follow the procedures specified in ISO3744.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Detail calculation of the SWL should refer to the latest edition of ISO3746.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 5 – Near Field Testing Method for Plant Room or other source



For Method 5 (developed based on the principle of ISO3746 -2010),

- First step is to determine a measurement box with at least 1m separation (measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- Secondly, is to determine the location of measurement points on the measurement surface of the hypothetical box.
- Extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case follow the procedures of ISO 3744.
- Background noise level should be taken for determination of background correction (K1A.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- If the difference between the BGL and the measured noise level (MNL) is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results. D should be reduced according to ISO3746 to obtain higher MNLs.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Appendix B2

Calibration Certificates –
Noise Measurement for Fixed Plant Noise

Appendix B2 Calibration Certificates – Noise Measurement for Fixed Plant Noise

Cert B1: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 59120)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information			
Date of Issue	17-Nov-2020	**Certificate Number**	MLCN203076S

Customer Information	
Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)	
Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59120
Equipment Number	--

Calibration Particular			
Date of Calibration	17-Nov-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date		
	K.O. Lo	17-Nov-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.

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Unit B, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

MAXLAB

Certificate No. MLCN203076S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 17-Nov-2020

Checked By : K.O. Lo
Date : 17-Nov-2020

萬儀校正中心有限公司
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Cert B2: Calibration Certificate of Sound Level Meter **SVANTEK 958** (SN: 59121)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	31-Oct-2020	**Certificate Number**	MLCN202867S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59121
Equipment Number	--

Calibration Particular

Date of Calibration	31-Oct-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 31-Oct-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No. MLCN202867S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 31-Oct-2020

Checked By : K.O. Lo
Date : 31-Oct-2020

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Cert B3: Calibration Certificate of Sound Level Meter **SVANTEK 959** (SN: 11228)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	12-May-2020	**Certificate Number**	MLCN201166S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 959
Serial Number	11228
Equipment Number	--

Calibration Particular

Date of Calibration	12-May-2020		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 12-May-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No. MLCN201166S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
A / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB

- END -

Calibrated By : Dan
Date : 12-May-2020

Checked By : K.O. Lo
Date : 12-May-2020

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Cert B4: Calibration Certificate of Acoustic Calibrator **SVANTEK 977A** (SN: 69787)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	11-Dec-2020	**Certificate Number**	MLCN203353S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 977
Serial Number	69787
Equipment Number	--

Calibration Particular

Date of Calibration	11-Dec-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 11-Dec-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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MAXLAB

Certificate No. MLCN203353S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
A / FAST (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
C / FAST (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
Z / FAST (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB
A / SLOW (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB
C / SLOW (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB
Z / SLOW (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB
A / IMPULSE (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB
C / IMPULSE (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB
Z / IMPULSE (1 kHz Input)	LOW (22-123)	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	HIGH (30-140)	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 11-Dec-2020

Checked By : K.O. Lo
Date : 11-Dec-2020

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Cert B5: Calibration Certificate of Acoustic Calibrator **Larson Davis CAL200** (SN: 17867)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	24-May-2021	**Certificate Number**	MLCN211224S

Customer Information

Company Name	Wilson Ho and Associates Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, NT

Equipment-under-Test (EUT)

Description	Precision Acoustic Calibrator
Manufacturer	Larson Davis
Model Number	CAL200
Serial Number	17867
Equipment Number	--

Calibration Particular

Date of Calibration	24-May-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1357(MLTE190) / MLEC20/05/02 / 26-May-21		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 24-May-2021

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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Certificate No. MLCN211224S

Calibration Data

EUT Setting	Standard Reading	EUT Error from Setting	Calibration Uncertainty	EUT Specification
94 dB	94.0 dB	0.0 dB	0.15 dB	± 0.2 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.2 dB

- END -

Calibrated By : Dan
Date : 24-May-21

Checked By : K.O. Lo
Date : 24-May-21

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Cert B6: Calibration Certificate of Acoustic Calibrator **SVANTEK SV30A** (SN: 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	21-Aug-2020	**Certificate Number**	MLCN202127S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	21-Aug-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1351(MLTE049) / MLEC20/06/02 / 5-Jun-21		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 21-Aug-2020

Statements

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MAXLAB

Certificate No. MLCN202127S

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	94.1 dB	-0.1 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Kenneth
Date : 21-Aug-20

Checked By : K.O. Lo
Date : 21-Aug-20

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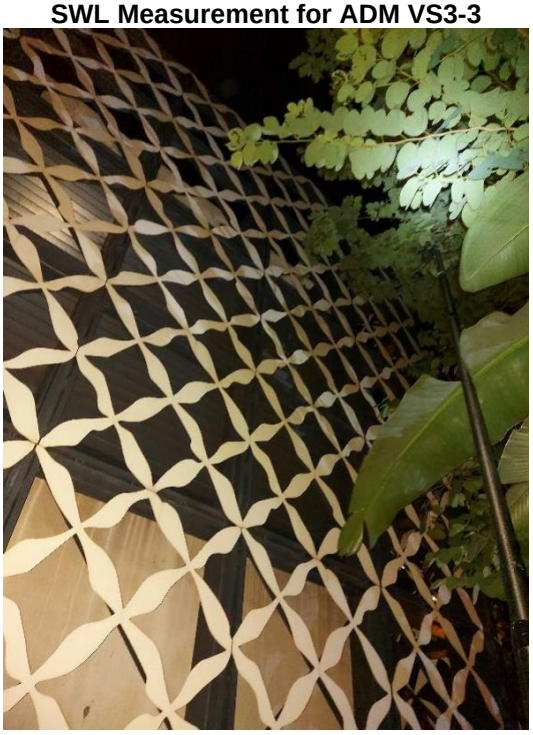
Appendix B3

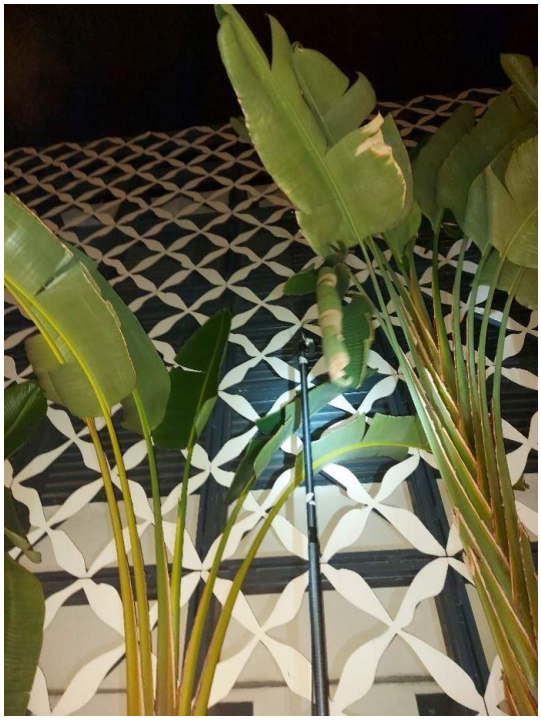
Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

Appendix B3 Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

SWL Measurement for ADM VS3-3

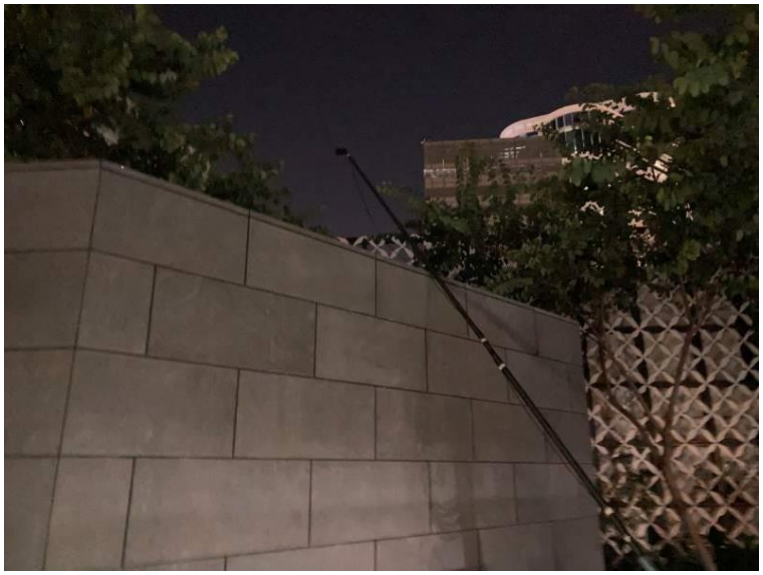


SWL Measurement for ADM VS2-1

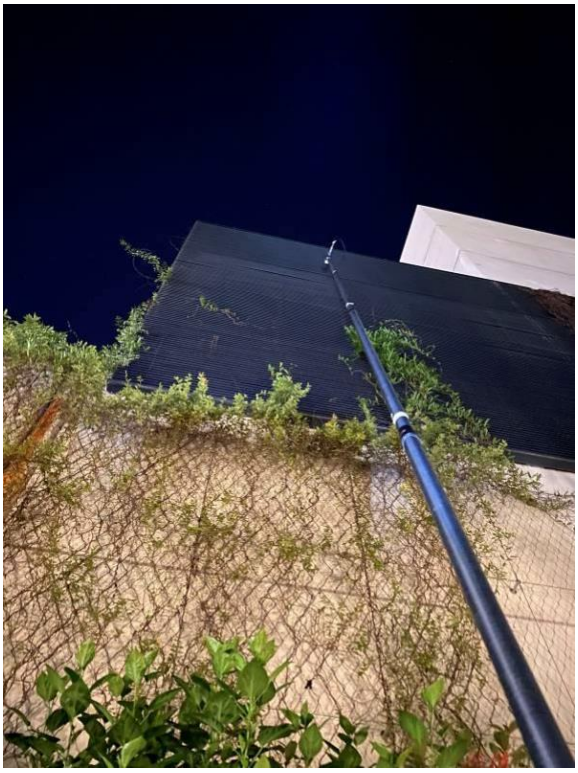


SWL Measurement for ADM VS7

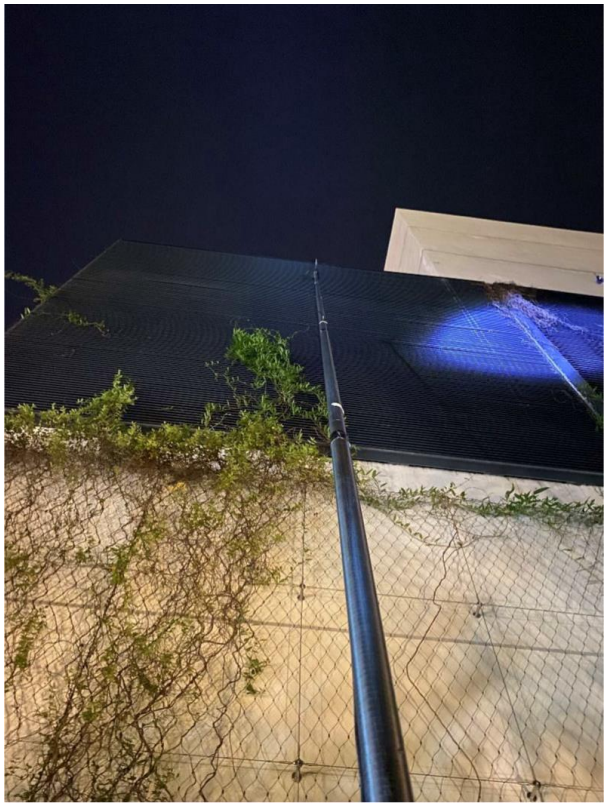
SWL Measurement for ADM VS5



SWL Measurement for ADM VS6-1



SWL Measurement for ADM VS6-2

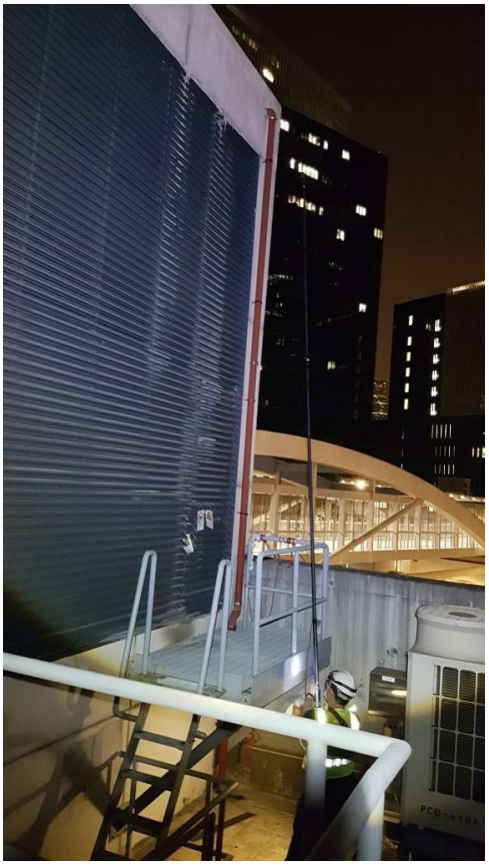


SWL Measurement for ADM VS6-3

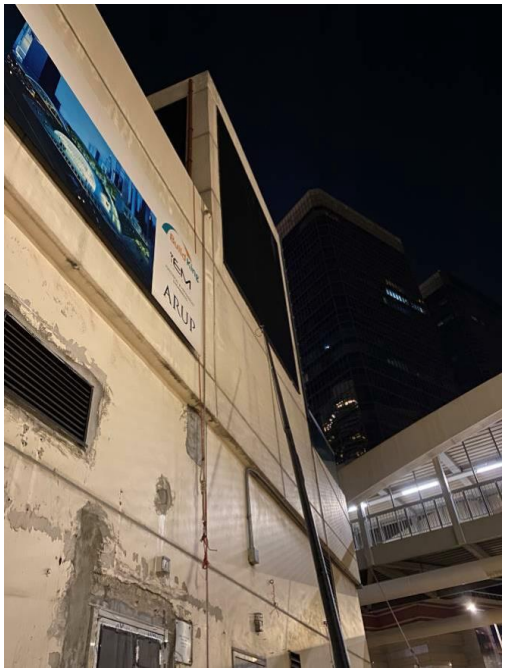
SWL Measurement for ADM VS6-7

SWL Measurement for ADM VS6-8

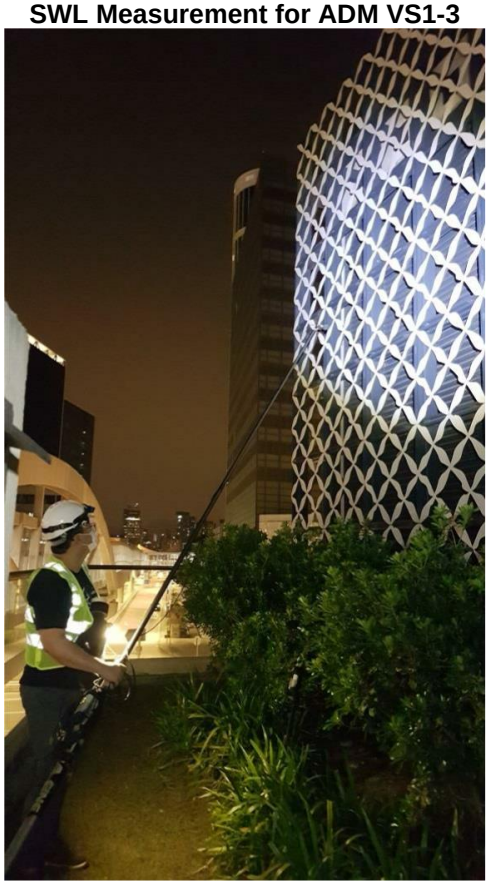
SWL Measurement for ADM VS1-1



SWL Measurement for ADM VS1-2



SWL Measurement for ADM VS1-3



Appendix B4

Noise Measurement Results

Appendix B4 Noise Measurement Results

Location	Fixed Plant Source ID	Plant Type	Method	Louvre/Cooling Tower Size (mm)			Averaged Measured L_{Aeq} ,dB(A) [a]	Background L_{Aeq} ,dB(A)	Difference L_{Aeq} ,dB(A)	Background Corrected L_{Aeq} ,dB(A) [b]	Calculated SWL, dB(A)
				Height	Width	Length					
ADM	ADM VS1-1	Ventilation Louver	2	5300	4420	N/A	68.5	67.6	0.9	65.5	84
	ADM VS1-2	Ventilation Louver	2	5300	4420	N/A	62.8	61.2	1.6	59.8	76
	ADM VS1-3	Ventilation Louver	2	5300	4600	N/A	60.9	58.4	2.5	57.9	77
	ADM VS1-7	Ventilation Louver	2	1050	1100	N/A	71.4	67.5	3.9	69.2	83
	ADM VS2-1	Ventilation Louver	2	3000	10120	N/A	61.1	59.9	1.2	58.1	78
	ADM VS2-2	Ventilation Louver	2	3700	3500	N/A	65.7	60.5	5.2	64.2	81
	ADM VS3-1 [c]	Ventilation Louver	2	2000	4650	N/A	58.9	56.5	2.4	55.9	73
							79.2	57.3	21.9	79.2	96
	ADM VS3-2 [c]	Ventilation Louver	2	5300	5100	N/A	66.4	64.8	1.6	63.4	82
							82.9	62.9	20.0	82.9	102
	ADM VS3-3	Ventilation Louver	2	2000	3450	N/A	80.3	62.7	17.6	80.3	96
	ADM VS4-1	Ventilation Louver	2	2000	5200	N/A	58.9	57.3	1.6	55.9	73
	ADM VS4-2	Ventilation Louver	2	2000	5200	N/A	58.7	56.6	2.1	55.7	73
	ADM VS4-4	Ventilation Louver	2	2000	3450	N/A	60.8	57.8	3.0	57.9	74
	ADM VS4-5	Ventilation Louver	2	10400	1900	N/A	64.6	58.0	6.6	63.6	83
	ADM VS5	Ventilation Louver	2	N/A	5000	7650	70.8	67.0	3.8	68.4	88
	ADM VS6-1	Ventilation Louver	2	4650	2110	N/A	60.5	58.5	2.0	57.5	74
	ADM VS6-2	Ventilation Louver	2	4650	2890	N/A	62.5	58.2	4.3	60.4	78
	ADM VS6-3	Ventilation Louver	2	4650	3230	N/A	59.5	58.5	1.0	56.5	74
	ADM VS6-4	Ventilation Louver	2	4450	12200	N/A	60.2	56.5	3.7	57.7	79
	ADM VS6-7	Ventilation Louver	2	6000	5680	N/A	66.1	58.3	7.8	65.3	85
	ADM VS6-8	Ventilation Louver	2	6000	5800	N/A	68.2	65.5	2.7	65.2	85
	ADM VS7	Ventilation Louver	2	N/A	8000	5800	69.1	63.2	5.9	67.8	88
	ADM VS8	Ventilation Louver	2	7625	3650	N/A	72.9	61.0	11.9	72.9	92
	ADM VS14-1	Ventilation Louver	2	400	250	N/A	70.1	62.6	7.5	69.3	81
	COT-4004	Cooling Tower	4	5000	4200	6800	73.4	61.5	11.9	73.4	92
	COT-4005	Cooling Tower	4	5000	4200	6800	72.5	59.7	12.8	72.5	91
	PCU-4203A	Packaged Condenser Unit	4	1650	920	740	66.7	61.3	5.4	65.2	81
	PCU-4203B	Packaged Condenser Unit	4	1650	920	740	67.7	61.1	6.6	66.6	82
	PCU-4101	Packaged Condenser Unit	4	1900	920	740	70.9	65.2	5.7	69.5	86
	PCU-4102	Packaged Condenser Unit	4	1900	920	740	68.2	64.2	4.0	66.1	82
	PCU-4103	Packaged Condenser Unit	4	1350	1000	350	65.9	64.9	1.0	62.9	78
	PCU-4204	Packaged Condenser Unit	4	1900	920	740	68.0	63.1	4.9	66.3	82
	PCU-4205	Packaged Condenser Unit	4	1900	920	740	67.9	63.2	4.7	66.1	82
	PCU-4206	Packaged Condenser Unit	4	1350	1000	350	68.2	65.0	3.2	65.4	80
	PCU-4501	Packaged Condenser Unit	4	760	2440	1710	71.5	65.2	6.3	70.3	87
HKB	HKB VS1-1	Ventilation Louver	2	6750	7580	N/A	64.0	53.0	11.0	64.0	85
	HKB VS1-2	Ventilation Louver	2	6750	2100	N/A	64.2	54.7	9.5	63.7	82
	HKB VS2-1	Ventilation Louver	2	6750	6260	N/A	62.8	52.9	9.9	62.4	83
	HKB VS2-2	Ventilation Louver	2	6750	2750	N/A	64.9	55.0	9.9	64.4	83
	PCU 101	Packaged Condenser Unit	4	1530	765	1680	68.3	59.7	8.6	67.7	78

Remarks:

a) Results are averaged from number of points in accordance with ISO3746.
b) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0dB
c) There will be two operation modes, namely daytime/evening and night-time modes.

Appendix C

Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Appendix C1

Calibration Certificates –
Noise Measurement at Representative NSRs

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0319 01-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2681366	2665582	17190
Adaptors used:	-	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Mar-2021

Date of test: 23-Mar-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2021	CIGISMEC
Signal generator	DS 360	33873	19-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 24-Mar-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0319 01-01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 23-Mar-2021

Checked by: Chan Yuk Yiu **Date:** 24-Mar-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0309 02 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone	Pream
Manufacturer:	B & K	,	B & K	B & K
Type/Model No.:	2270	,	4950	ZC0032
Serial/Equipment No.:	2644597	,	2879980	29398
Adaptors used:	-	,	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	09-Mar-2021

Date of test: 22-Mar-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2021	CIGISMEC
Signal generator	DS 360	33873	19-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 24-Mar-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0309 02 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	1.0	2.1
	Lin	Pass	2.0	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Uncertainty (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 22-Mar-2021

Checked by: Chan Yuk Yiu **Date:** 24-Mar-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0401 02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	3006428
Adaptors used:	-

Item submitted by

Curstomer:	AECOM
Address of Customer:	-
Request No.:	-
Date of receipt:	01-Apr-2021

Date of test: 05-Apr-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	11-May-2021	SCL
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI
Signal generator	DS 360	33873	19-May-2021	CEPREI
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI
Universal counter	53132A	MY40003662	18-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 07-Apr-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0401 02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.23	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.016 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 999.95 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.3 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 05-Apr-2021

Checked by: Chan Yuk Yiu **Date:** 07-Apr-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA1019 03-02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Rion Co., Ltd.
Type/Model No.:	NC-74
Serial/Equipment No.:	34246490 / N.004.10
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Oct-2021

Date of test: 21-Oct-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	04-May-2022	SCL
Preamplifier	B&K 2673	2239857	31-May-2022	CEPREI
Measuring amplifier	B&K 2610	2346941	01-Jun-2022	CEPREI
Signal generator	DS 360	33873	27-May-2022	CEPREI
Digital multi-meter	34401A	US36087050	27-May-2022	CEPREI
Audio analyzer	8903B	GB41300350	28-May-2022	CEPREI
Universal counter	53132A	MY40003662	02-Jun-2022	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 22-Oct-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA1019 03-02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.00	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.012 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 1002.1**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 1.7 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 21-Oct-2021

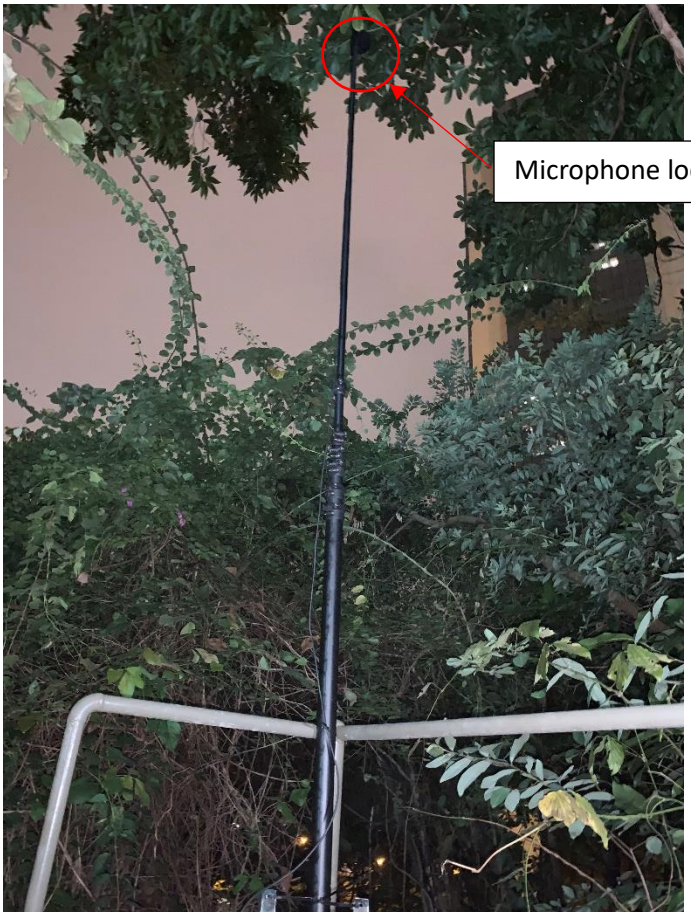
Checked by: Chan Yuk Yiu **Date:** 22-Oct-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Appendix C2

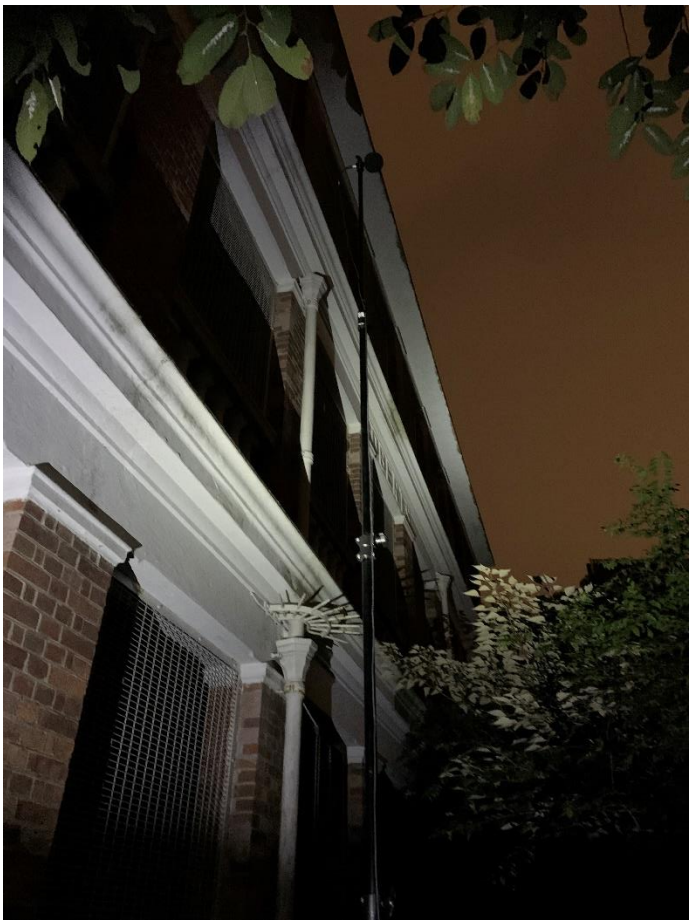
Photographs – Noise Measurement at Representative NSRs

Appendix C2 Photographs – Noise Measurement at Representative NSRs



NSR Measurement Location at AD1

NSR Measurement Location at AD2



NSR Measurement Location at AD3

Appendix C3

Measurement Results at Representative NSRs

Appendix C3 Noise Measurement Results at Measurement Locations

Measurement Location ID	Measurement Date	Operation Scenario [(1)(2)]	Fixed Plant Noise		Background Noise		Difference between Measured Noise Level and Background Level, dB(A)
			Measurement Time	Measured Noise Level, $L_{Aeq\ 30mins}$, dB(A)	Measurement Time	Background Noise Level, $L_{Aeq\ 5mins}$, dB(A)	
ADM							
AD1	2/19/2022	Daytime and Evening	01:50:00 - 02:20:00	61.8	01:03:40 - 01:08:40	61.9	-0.1
		Night-time	02:36:00 - 03:06:00	61.6	03:12:15 - 03:17:15	61.5	0.1
HKB							
AD2	2/18/2022	Night-time	02:53:16 - 03:23:15	50.7	03:30:00 - 03:35:00	49.3	1.4
AD3		Night-time	01:50:00 - 02:20:00	52.6	01:35:30 - 01:40:30	52.4	0.2

Note:

(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.

(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.

MTR Corporation Limited

Shatin to Central Link –
Hung Hom to Admiralty Section

Fixed Plant Noise Audit Report
(Batch 2 – South Ventilation Building (SOV) and Exhibition Centre Station (EXC))

(March 2022)

Verified by:	Claudine Lee 
Position:	Independent Environmental Checker
Date:	11 March 2022

MTR Corporation Limited

Shatin to Central Link –
Hung Hom to Admiralty Section

Fixed Plant Noise Audit Report
(Batch 2 – South Ventilation Building (SOV) and Exhibition Centre Station (EXC))

(March 2022)

Certified by:	Lisa Poon 
Position:	Environmental Team Leader
Date:	11 March 2022

MTR Corporation Limited

Consultancy Agreement No. C11033B

Shatin to Central Link – Hung Hom to Admiralty

[SCL (HUH-ADM)]

Fixed Plant Noise Audit Report (Batch 2 – South Ventilation Building (SOV) & Exhibition Centre Station (EXC))

March 2022

	Name	Signature
Prepared & Checked:	Isaac Chu	
Reviewed & Approved:	Freeman Cheung	

Version: A	Date: 10 March 2022

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 EIA Report for SCL – Hung Hom to Admiralty (HUH-ADM) Section (Register No.: AEIAR - 166/2012) was approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, the Environmental Permit (EP) (EP No: EP-436/2012), covering the construction and operation of SCL (HUH-ADM), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-436/2012 and the latest Environmental Permit (EP No: EP-436/2012/F) was issued by Director of Environmental Protection (DEP) on 29 January 2019.

1.1.3 Pursuant to EP Condition 2.31, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(HUH-ADM) EIA Report (Register No. AEIAR-166/2012) or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) having due regard to the characteristics of tonality, impulsiveness and intermittency.

1.1.4 Since the installation of fixed plant along the SCL (HUH – ADM) would be completed in stages, the fixed plant noise audit will be conducted in stages according to the testing and commissioning programmes in each area.

1.1.5 This Fixed Plant Noise Audit Report (Batch 2 – South Ventilation Building (SOV) and Exhibition Centre Station (EXC)) (hereinafter referred to as “the Report”) specifies the noise measurement methodology and measurement results at the fixed plant noise sources at SOV and EXC, and at the representative Noise Sensitive Receivers (NSRs) near SOV and EXC.

1.1.6 AECOM Asia Co. Ltd has been commissioned by the MTR to prepare this Report and to conduct noise measurement at the identified NSRs for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.

1.2 Purpose of This Report

1.2.1 This Report presents the noise measurement methodology and measurement results at the fixed plant noise sources at SOV and EXC, and at the representative NSRs near SOV and EXC.

1.2.2 This Report comprises the following sections:

- Section 1 presents the background information.
- Section 2 presents the noise criteria and the representative NSRs.
- Section 3 presents the latest information of fixed plant noise sources.
- Section 4 presents the noise measurement methodology.
- Section 5 presents the noise measurement results.
- Section 6 presents the conclusion.

2 NOISE CRITERIA AND REPRESENTATIVE NOISE SENSITIVE RECEIVERS

2.1 Environmental Legislation, Standard and Guidelines

2.1.1 The Noise Control Ordinance, Cap. 400 (NCO) and Environmental Impact Assessment Ordinance, Cap. 499 (EIAO) provide the statutory framework for noise control. Operational noise from fixed noise sources is controlled by Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM) under NCO. To plan for a better environment, the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) under EIAO has specified the following requirements:

- 5 dB below the appropriate ANLs in the IND-TM; or
- the prevailing background noise levels (for quiet areas with level 5dB or more below the ANL).

2.1.2 The Acceptable Noise Levels (ANLs) for different Area Sensitivity Ratings (ASRs) during different periods are summarized in the **Table 2.1**.

Table 2.1 ANLs for Assessment of Noise from Fixed Sources

Time Period	ANL, dB(A)		
	ASR "A"	ASR "B"	ASR "C"
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

2.2 Assessment Criteria and Representative Noise Sensitive Receivers

2.2.1 Table 9.7 of the approved SCL (HUH-ADM) EIA Report presents the identified Noise Sensitive Receivers (NSRs) and the adopted noise assessment criteria for fixed plant noise assessment. The assessment criteria at the NSRs selected for assessing the fixed plant noise impact from SOV and EXC are summarised in **Table 2.2**.

Table 2.2 Summary of Noise Criteria at Representative NSRs for Fixed Noise Sources (Reference from Table 9.7 of the approved EIA Report)

Description (NSR No.)	Time Period (1)	Prevailing Background Noise Levels, dB(A) (2)	ASR	ANL-5, dB(A) (3)	Criteria, dB(A) (4)
SOV					
Hoi Deen Court (CH1)	Day & evening	> 70	C	65	65
	Night	> 60		55	55
Hoi Kung Court (CH2)	Day & evening	> 70	C	65	65
	Night	> 60		55	55
Elizabeth House, Block C (CH3)	Day & evening	> 70	C	65	65
	Night	> 60		55	55
EXC					
Causeway Centre, Block A (EX1)	Day & evening	> 65	B	60	60
	Night	> 55	B	50	50

Notes:
(1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(2) Prevailing background noise levels are extracted from Table 9.6 of approved EIA Report.
(3) A 5 dB(A) is deducted from ANL as specified in requirement of EIAO-TM.
(4) The minimum of prevailing background noise level & ANL-5 is adopted.

2.3 Review of Area Sensitivity Rating

2.3.1 Area Sensitive Ratings (ASR) as defined in the approved EIA Report were determined by the existence of any influencing factors (IFs) (e.g. major road, industrial area) according to IND-TM at the time of preparation of the EIA Report. During the preparation of this Report, it is revealed that there was no major change on the land use in the vicinity of representative NSRs, and thus only the existence of any major road (i.e. annual average daily traffic flow in excess of 30,000) has been reviewed.

2.3.2 Based on best available information (i.e. The Annual Traffic Census 2020) during the preparation of this Report, Gloucester Road, Victoria Park Road and Cross Harbour Tunnel remain as IFs to the NSRs located in the vicinity of SOV, while there was no major road affecting the NSR located in the vicinity of EXC. Therefore, the ASRs defined in **Table 2.2** remain unchanged.

3 LATEST INFORMATION OF FIXED PLANT NOISE SOURCES

3.1.1 Based on the latest design information, the fixed plant sources including ventilation louvres, cooling towers and Packaged Condenser Unit (PCU) at SOV and EXC are shown in **Figure Nos. C11033B/C/SCL/ACM/M52/063** and **C11033B/C/SCL/ACM/M52/064** respectively. The information of the fixed plant sources and the associated updated maximum allowable Sound Power Levels (SWLs) are presented in **Table 3.1** and the predicted fixed plant noise levels are presented in **Appendix A**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test conducted at the representative NSRs.

Table 3.1 Updated Maximum Allowable SWLs for Fixed Plant Noise Sources at SOV and EXC

Location	Fixed Plant ID	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1]	
			Daytime & Evening[2]	Night-time[2]
SOV	SOV-01	Ventilation Louver	92	82
	SOV-02	Ventilation Louver	89	79
	SOV-04	Ventilation Louver	89	79
	SOV-05	Ventilation Louver	89	79
	SOV-06	Ventilation Louver	86	76
	SOV-08	Ventilation Louver	98	88
	SOV-10	Ventilation Louver	94	84
	SOV-11	Ventilation Louver	94	84
	SOV-12	Ventilation Louver	93	83
	SOV-13	Ventilation Louver	94	84
	SOV-21	Ventilation Louver	91	81
	SOV-22	Ventilation Louver	80	70
	SOV-23	Ventilation Louver	82	72
	SOV-24	Ventilation Louver	80	70
	SOV-25	Ventilation Louver	84	74
	SOV-26	Ventilation Louver	84	74
	SOV-27	Ventilation Louver	82	72
	SOV-28	Ventilation Louver	84	74
	SOV-29A	Ventilation Louver	80	70
	SOV-29B	Ventilation Louver	80	70
	SOV-30	Ventilation Louver	80	70
	SOV-31	Ventilation Louver	85	75
EXC	EXH VS1	Ventilation Louver	76	66
	EXH VS2	Ventilation Louver	98	88
	EXH VS3	Ventilation Louver	117	108
	EXH VS4	Ventilation Louver	82	73
	EXH VS5	Ventilation Louver	74	64
	EXH VS6	Ventilation Louver	75	65
	EXH VS7	Cooling Tower	94	84
	EXH VS8	Cooling Tower	92	82
	EXH VS12	Ventilation Louver	95	85

Location	Fixed Plant ID	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1]	
			Daytime & Evening[2]	Night-time[2]
	EXH VS15	Ventilation Louver	84	74
	EXH VS16	Ventilation Louver	79	69
	EXH VS20	Ventilation Louver	88	79
	EXH VS21	Ventilation Louver	85	75
	EXH VS22	Ventilation Louver	80	70
	EXH VS23	Ventilation Louver	77	68
	EXH VS25	Ventilation Louver	103	94
	EXH VS26	Ventilation Louver	99	90
	EXH VS28	Ventilation Louver	92	83
	EXH VS29	Ventilation Louver	94	85
	EXH VS30	Ventilation Louver	87	78
	EXH VS32	Ventilation Louver	88	79
	EXH VS35	Ventilation Louver	84	74
	EXH VS36	Ventilation Louver	84	75
	EXH VS37	Ventilation Louver	79	70
	EXH VS38	Ventilation Louver	83	74
	EXH VS39	Ventilation Louver	83	74
	EXH VS40	Ventilation Louver	82	73
	EXH VS41	Ventilation Louver	77	68
	EXH VS42	Ventilation Louver	81	72
	EXH VS43	Ventilation Louver	91	82
	EXH VS44	Ventilation Louver	78	69
	EXH VS45	Ventilation Louver	80	71
	EXH VS46	Ventilation Louver	100	91
	EXH VS47	Ventilation Louver	99	90
	EXH VS48	Ventilation Louver	82	73
	EXH VS49	Ventilation Louver	98	89
	EXH VS50	Ventilation Louver	87	78
	EXH VS51	Ventilation Louver	103	- [3]
	EXH VS52	Ventilation Louver	83	73
	EXH VS53	Ventilation Louver	71	61
	EXH VS54	Ventilation Louver	67	57
	EXH VS55	Ventilation Louver	78	68
	EXH VS56	Ventilation Louver	80	70
	EXH VS57	Ventilation Louver	71	61
	EXH VS58	Ventilation Louver	72	62
	EXH VS59	Ventilation Louver	81	71
	EXH VS60	Packaged Condenser Unit	77	67
	EXH VS66	Ventilation Louver	69	59
	EXH VS68	Ventilation Louver	74	64

Notes:
(1) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(3) This plant will not be operated during night-time period.

(4) The transformer room at SOV is managed by Hong Kong Electric Company and therefore was excluded in this fixed plant noise audit report.

4 MEASUREMENT METHODOLOGY

4.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

Measurement Methodology

4.1.1 Details of measurement methodology for SCL are presented in **Appendix B1**. Noise measurements to obtain the SWLs of the fixed plant noise sources followed **Appendix B1** and were conducted by Wilson Acoustics Limited and BeeXergy Consulting Limited.

Measurement Equipment

4.1.2 The sound level meters and calibrators used for noise measurements are listed in the **Table 4.1**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are provided in **Appendix B2**.

Table 4.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	SVANTEK 958	20890
	SVANTEK 958	28422
	SVANTEK 958	59120
	SVANTEK 958	59121
	SVANTEK 959	11228
	SVANTEK 979	46199
	Cirrus CR171B	G071909
Calibrator	SVANTEK SV30A	10814
	SVANTEK SV35A	58708

4.1.3 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Date and Time

4.1.4 The operation of fixed plant sources at SOV and EXC are identical during both daytime and night-time periods, except that there is one plant at EXC operating in daytime/evening period only. Nevertheless, the noise measurements at SOV and EXC were all conducted during night-time periods at the fixed plant noise sources in order to minimise influence from background noise on measurement data. Details of the noise measurement schedule are shown in **Table 4.2**.

Table 4.2 Measurement Schedule

Location	Date
SOV	3 August 2021
	8, 9, 12, 22 & 25 Nov 2021
EXC	29 Dec 2021
	4, 6, 11, 12 & 13 Jan 2022

4.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Measurement Parameters

4.2.1 L_{Aeq} (30min) was measured at each designated measurement location. 1/3 octave band spectrum and time history over the measurement period was also be logged for determination of tonal, impulsiveness and intermittency characteristic.

4.2.2 Background noise level was measured at the same measurement location in term of L_{Aeq} (5 min) immediate before or after the noise measurement when all Project's fixed plant equipment shut down. To minimise the measurement data being influenced by background noise, noise data obtained at an instance of minimal or no traffic on the road was used to evaluate the tonal characteristic. The corrections for tonality, impulsiveness or intermittency at the representative NSRs were determined in accordance with IND-TM. In addition, any noticeable characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources was recorded during the measurement.

Measurement Equipment

4.2.3 The sound level meters and calibrators used for noise measurements at representative NSRs are listed in the **Table 4.3**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are shown in **Appendix C1**.

Table 4.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250L	2681366
Calibrator	B&K 4231	3006428

4.2.4 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Locations

4.2.5 The proposed noise measurement locations which have direct line of sight to the noise sources and were accessible for noise measurement were selected to represent the representative NSRs. These measurement locations had been agreed with EPD prior to noise measurement. The measurement locations are summarised in **Table 4.4** and shown in **Figure Nos. C11033B/C/SCL/ACM/M52/063** and **C11033B/C/SCL/ACM/M52/064**. Photographs of measurement locations are shown in **Appendix C2**.

Table 4.4 Noise Measurement Locations

Measurement Location ID	NSR (NSR No.)	Type	Measurement Location and Height
SOV			
CH2	Hoi Kung Court (CH2)	Residential	Public area, pedestrian near Hoi Kung Court (1m from building façade)
EXC			
FN1	Causeway Centre, Block A (EX1)	Residential	Public area, pedestrian bridge near Great Eagle Centre and Harbour Centre (1m from the pedestrian bridge parapet wall)

Measurement Date and Time

4.2.6 The operation of fixed plant sources at SOV and EXC are identical during both daytime and night-time periods, except that there is one plant at EXC operating in daytime/evening period only. To minimise the influence from background noise in measurement data, noise measurements at representative NSRs were therefore only conducted during night-time period. The measurement schedule is presented in **Table 4.5.**

Table 4.5 Measurement Schedule

Location	Measurement Location ID	Date
SOV	CH2	24 Feb 2022
EXC	FN1	25 Feb 2022

5 MEASUREMENT RESULTS

5.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

5.1.1 The measured SWLs under conservative approach during daytime and evening, and night-time periods are presented in **Table 5.1**. The measurement results indicated all the fixed plant noise levels in SOV and EXC comply with the updated maximum allowable SWLs. Details of the measurement results are shown in **Appendix B4**.

Table 5.1 Summary of Measured SWLs for Fixed Plants

Plant Item	Measured SWL, dB(A)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)
SOV						
SOV-01	82	82	92	82	Y	Y
SOV-02	79	79	89	79	Y	Y
SOV-04	79	79	89	79	Y	Y
SOV-05	79	79	89	79	Y	Y
SOV-06	76	76	86	76	Y	Y
SOV-08	88	88	98	88	Y	Y
SOV-10	84	84	94	84	Y	Y
SOV-11	84	84	94	84	Y	Y
SOV-12	83	83	93	83	Y	Y
SOV-13	84	84	94	84	Y	Y
SOV-21	81	81	91	81	Y	Y
SOV-22	70	70	80	70	Y	Y
SOV-23	72	72	82	72	Y	Y
SOV-24	70	70	80	70	Y	Y
SOV-25	74	74	84	74	Y	Y
SOV-26	74	74	84	74	Y	Y
SOV-27	72	72	82	72	Y	Y
SOV-28	74	74	84	74	Y	Y
SOV-29A	70	70	80	70	Y	Y
SOV-29B	70	70	80	70	Y	Y
SOV-30	80	70	80	70	Y	Y
SOV-31	85	75	85	75	Y	Y
EXC						
EXH VS1	66	66	76	66	Y	Y
EXH VS2	88	88	98	88	Y	Y
EXH VS3	108	108	117	108	Y	Y
EXH VS4	73	73	82	73	Y	Y
EXH VS5	64	64	74	64	Y	Y
EXH VS6	65	65	75	65	Y	Y
EXH VS7	84	84	94	84	Y	Y
EXH VS8	82	82	92	82	Y	Y
EXH VS12	85	85	95	85	Y	Y
EXH VS15	74	74	84	74	Y	Y
EXH VS16	69	69	79	69	Y	Y

Plant Item	Measured SWL, dB(A)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)
EXH VS20	79	79	88	79	Y	Y
EXH VS21	75	75	85	75	Y	Y
EXH VS22	70	70	80	70	Y	Y
EXH VS23	68	68	77	68	Y	Y
EXH VS25	94	94	103	94	Y	Y
EXH VS26	90	90	99	90	Y	Y
EXH VS28	83	83	92	83	Y	Y
EXH VS29	85	85	94	85	Y	Y
EXH VS30	78	78	87	78	Y	Y
EXH VS32	79	79	88	79	Y	Y
EXH VS35	74	74	84	74	Y	Y
EXH VS36	75	75	84	75	Y	Y
EXH VS37	70	70	79	70	Y	Y
EXH VS38	74	74	83	74	Y	Y
EXH VS39	74	74	83	74	Y	Y
EXH VS40	73	73	82	73	Y	Y
EXH VS41	68	68	77	68	Y	Y
EXH VS42	72	72	81	72	Y	Y
EXH VS43	82	82	91	82	Y	Y
EXH VS44	69	69	78	69	Y	Y
EXH VS45	71	71	80	71	Y	Y
EXH VS46	91	91	100	91	Y	Y
EXH VS47	90	90	99	90	Y	Y
EXH VS48	73	73	82	73	Y	Y
EXH VS49	89	89	98	89	Y	Y
EXH VS50	78	78	87	78	Y	Y
EXH VS51 (2)	103	-	103	-	Y	Y
EXH VS52	73	73	83	73	Y	Y
EXH VS53	61	61	71	61	Y	Y
EXH VS54	57	57	67	57	Y	Y
EXH VS55	68	68	78	68	Y	Y
EXH VS56	70	70	80	70	Y	Y
EXH VS57	61	61	71	61	Y	Y
EXH VS58	62	62	72	62	Y	Y
EXH VS59	71	71	81	71	Y	Y
EXH VS60	67	67	77	67	Y	Y
EXH VS66	59	59	69	59	Y	Y
EXH VS68	64	64	74	64	Y	Y

Notes:
(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.
(2) This plant will not be operated during night-time period.

5.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at NSRs

5.2.1 Noise measurements to confirm any characteristics of tonality, impulsiveness and intermittency at the representative NSRs were conducted during night-time period. Measurement results are summarised in **Table 5.2** below. No characteristics of tonality, impulsiveness and intermittency was observed at the representative NSRs. Data analysis has been carried out to determine the characteristics of tonality, impulsiveness and intermittency by assessing the logged 1/3 octave band spectra and time history profile. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. Based on site observation and findings of data analysis, it is concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources. Detailed noise measurements results are presented in **Appendix C3**.

Table 5.2 Noise Measurement Results at Measurement Locations

Measurement Location ID	Representing NSRs	Time Period (1)(2)	Measurement Result			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$, dB(A)	Background Noise Level $L_{Aeq(5mins)}$, dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
SOV							
CH2	Hoi Kung Court (CH2)	Daytime & Evening / Night-time	71.3	71.5	-0.2	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location.	N
EXC							
FN1	Causeway Centre, Block A (EX1)	Daytime & Evening	51.7	50.4	1.3	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location.	N
		Night-time	50.4	49.4	1.0		

Notes:
(1) All noise measurement was conducted during night-time period (2300 to 0700 hours).
(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.

6 CONCLUSION

6.1.1 The fixed plant noise verifications were undertaken and the measurement results indicated all the fixed plant noise levels in SOV and EXC comply with the updated maximum allowable SWLs. No characteristics of tonality, impulsiveness and intermittency were observed at the representative NSRs. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. It is therefore concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources.

Figures

836600 E
836800 E
837000 E
837200 E
816000 N
815800 N

SOV-29B
SOV-23
SOV-27
SOV-05
SOV-26
SOV-30
SOV-24
SOV-25
SOV-11
SOV-12
SOV-31
SOV-06
SOV-08
SOV-29A
SOV
SOV-28
SOV-22
SOV-04
SOV-21
SOV-13
SOV-10
SOV-02
SOV-01
CH1
CH2
MEASUREMENT LOCATION FOR CH2
CH3

REPRESENTATIVE AIRBORNE NOISE SENSITIVE RECEIVERS - OPERATIONAL PHASE	
CH1	HOI DEEN COURT
CH2	HOI KUNG COURT
CH3	ELIZABETH HOUSE, BLOCK C

LEGEND:

- SCL ALIGNMENT
- SCL PROJECT BOUNDARY
- ABOVEGROUND STRUCTURE
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
- NOISE MEASUREMENT LOCATION
- APPROXIMATE NOISE SOURCE LOACTION (FACADE)
- ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
- APPROXIMATE NOISE SOURCE LOACTION (TOP)

ABBRVIATIONS:

SCL	SHATIN TO CENTRAL LINK
SOV	SOUTH VENTILATION BUILDING

0 10 20 30 40 50
METRES
1 : 2000 (A3)

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REV	DESCRIPTION	BY	DATE	APPROVED
A	-	---	04MAR22	---

DRAWN	ZLZ
DESIGNED	LCLL
CHECKED	LCLL
APPROVED	IMW
DATE	04/MAR/2022

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

AECOM

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TITLE

C11033B
SCL (HUH-ADM)
LOCATIONS OF NSRs AND FIXED NOISE SOURCES (SOUTH VENTILATION BUILDING)

SCALE	FIGURE NO.	REV.
1 : 2000 (A3)	C11033B/C/SCL/ACM/M52/063	A

835700 E

836000 E

836300 E

816200 N

815900 N

REPRESENTATIVE AIRBORNE NOISE SENSITIVE RECEIVER - OPERATIONAL PHASE	
EX1	CAUSEWAY CENTRE, BLOCK A

LEGEND:

- PROPOSED SCL ALIGNMENT
- ABOVEGROUND STRUCTURES
- REPRESENTATIVE NOISE SENSITIVE RECEIVER (NSR)
- PROPOSED STATION
- NOISE MEASUREMENT LOCATION
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
- APPROXIMATE NOISE SOURCE LOCATION (TOP)

ABBREVIATIONS:

SCL	SHATIN TO CENTRAL LINK
EXH	EXHIBITION STATION
EAP	EMERGENCY ACCESS POINT
SCL (HUH - ADM)	SHATIN TO CENTRAL LINK - HUNG HOM TO ADMIRALTY SECTION

EXH VS43
EXH VS50
EXH VS37
EXH VS36
EXH VS32
EXH VS52
EXH VS59
EXH VS68
EXH VS60
EXH VS3
EXH VS2
EXH VS4
EXH VS25
EXH VS26
EXH VS30
EXH VS29
EXH VS28
EXH VS55
EXH VS56
EAP
CONVENTION AVENUE
EXH
EXH VS6
EXH VS45
EXH VS44
EXH VS42
EXH VS41
EXH VS40
EXH VS35
EXH VS39
EXH VS38
FN1: ALTERNATIVE MEASUREMENT LOCATION FOR EX1
PLANT BUILDING
EXH VS54
EXH VS53
EXH VS5
EXH VS66
EXH VS46, 47
EXH VS48
EXH VS7
EXH VS8
EXH VS15
EXH VS49
EXH VS16
EXH VS12
EXH VS1
EXH VS58
EXH VS57
EXH VS51
EXH VS20
EXH VS23
EXH VS22
EXH VS21
EX1
GROUND LEVEL (+4.5)
VICTORIA HARBOUR
HARBOUR ROAD
GLOUCESTER ROAD
EXPO DRIVE CENTRAL
LONG KING STREET
HUNG HOM STATION
Hong Kong Convention and Exhibition Centre
The Hong Kong Academy for Performing Arts
Grand Hyatt
Harbour View International House
Wan Chai Sports Ground
Wan Chai Waterfront Promenade
Tamar Park
Central Plaza
Immigration Tower
Revenue Tower
Wesley Gardens
Gloucester Tower
Island Shangri-La
Cross-Harbour Tunnel Toll Plaza
Cross-Harbour Tunnel Footbridge
Tamar Basin Promenade
Tamar Basin Reclamation
Tamar Basin Reclamation Extension
Tamar Basin Reclamation Extension (Phase 2)
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Tamar Basin Reclamation Extension (Phase 100)

0 15 30 45 60 75
METRES
1 : 3000 (A3)

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FILENAME:

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	ZLZ
DESIGNED	---
CHECKED	LCR
APPROVED	---
DATE	04/MAR/2022

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

AECOM

CADD REF. C11033B_C_SCL_ACM_M52_064A.dgn

TITLE

C11033B
SCL (HUH - ADM)
LOCATIONS OF NSR AND FIXED NOISE SOURCES (EXHIBITION CENTRE STATION)

SCALE	FIGURE NO.	REV.
1 : 3000 (A3)	C11033B/C/SCL/ACM/M52/064	A

Appendix A

Detailed Calculation of Fixed Plant Noise Assessment

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - SOV (Daytime & Evening Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontial Distance , m	Vertical Distance relative to the assessment point, m	Slant Distance,m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source[2], dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	NCO Day-time Noise Criteria, dB(A)
SCL(HUH-ADM) - SOV													
CH1													
CH1	Hoi Deen Court, 276 - 279, Gloucester Road,	SOV-01	South	105	3	105	92	0	-48	3	47		
		SOV-02	South	110	3	110	89	0	-49	3	43		
		SOV-04	South	91	3	91	89	0	-47	3	45		
		SOV-05	North	96	4	96	89	-10	-48	3	34		
		SOV-06	Southeast	98	1	98	86	0	-48	3	41		
		SOV-08	East	93	1	93	98	0	-47	3	54		
		SOV-10	South	121	3	121	94	0	-50	3	47		
		SOV-11	West	127	3	127	94	-10	-50	3	37		
		SOV-12	West	130	3	130	93	-10	-50	3	36		
		SOV-13	Top	125	4	125	94	0	-50	3	47		
		SOV-21	South	97	1	97	91	0	-48	3	46		
		SOV-22	South	88	5	89	80	0	-47	3	36		
		SOV-23	North	93	1	93	82	-10	-47	3	28		
		SOV-24	North	119	1	119	80	-10	-50	3	23		
		SOV-25	North	120	0	120	84	-10	-50	3	27		
		SOV-26	North	99	0	99	84	-10	-48	3	29		
		SOV-27	North	93	2	93	82	-10	-47	3	28		
		SOV-28	South	89	0	89	84	0	-47	3	40		
		SOV-29A	North	88	0	88	80	-10	-47	3	26		
		SOV-29B	North	90	1	90	80	-10	-47	3	26		
		SOV-30	North	118	0	118	80	-10	-49	3	24		
		SOV-31	North	109	9	109	85	-10	-49	3	29	**57**	**65**
CH2													
CH2	Hoi Kung Court, 264 - 268, Gloucester Road,	SOV-01	South	62	3	62	92	0	-44	3	51		
		SOV-02	South	64	3	65	89	0	-44	3	48		
		SOV-04	South	55	3	55	89	0	-43	3	49		
		SOV-05	North	64	4	64	89	-10	-44	3	38		
		SOV-06	Southeast	86	1	86	86	0	-47	3	42		
		SOV-08	East	79	1	79	98	0	-46	3	55		
		SOV-10	South	73	3	73	94	0	-45	3	52		
		SOV-11	West	82	3	82	94	-10	-46	3	41		
		SOV-12	West	83	3	83	93	-10	-46	3	40		
		SOV-13	Top	79	4	79	94	0	-46	3	51		
		SOV-21	South	57	1	57	91	0	-43	3	51		
		SOV-22	South	54	5	54	80	0	-43	3	40		
		SOV-23	North	63	1	63	82	-10	-44	3	31		
		SOV-24	North	76	1	76	80	-10	-46	3	27		
		SOV-25	North	76	0	76	84	-10	-46	3	31		
		SOV-26	North	65	0	65	84	-10	-44	3	33		
		SOV-27	North	63	2	63	82	-10	-44	3	31		
		SOV-28	South	55	0	55	84	0	-43	3	44		
		SOV-29A	North	62	0	62	80	-10	-44	3	29		
		SOV-29B	North	62	1	62	80	-10	-44	3	29		
		SOV-30	North	75	0	75	80	-10	-46	3	27		
		SOV-31	North	69	9	70	85	-10	-45	3	33	**60**	**65**
CH3													
CH3	Elizabeth House, Block C, 250 - 254, Gloucester Road,	SOV-01	South	131	18	133	92	0	-50	3	45		
		SOV-02	South	127	18	129	89	0	-50	3	42		
		SOV-04	South	145	18	146	89	0	-51	3	41		
		SOV-05	North	150	18	151	89	-10	-52	3	30		
		SOV-06	Southeast	184	20	185	86	0	-53	3	36		
		SOV-08	East	178	20	179	98	0	-53	3	48		
		SOV-10	South	119	19	121	94	0	-50	3	47		
		SOV-11	West	124	19	125	94	0	-50	3	47		
		SOV-12	West	119	19	121	93	0	-50	3	46		
		SOV-13	Top	124	17	125	94	0	-50	3	47		
		SOV-21	South	139	20	140	91	0	-51	3	43		
		SOV-22	South	147	17	148	80	0	-51	3	32		
		SOV-23	North	154	22	156	82	-10	-52	3	23		
		SOV-24	North	130	22	132	80	-10	-50	3	23		
		SOV-25	North	129	22	131	84	-10	-50	3	27		
		SOV-26	North	147	22	149	84	-10	-51	3	26		
		SOV-27	North	154	23	156	82	-10	-52	3	23		
		SOV-28	South	148	22	150	84	0	-51	3	36		
		SOV-29A	North	159	22	160	80	-10	-52	3	21		
		SOV-29B	North	157	22	158	80	-10	-52	3	21		
		SOV-30	North	131	22	133	80	-10	-50	3	23		
		SOV-31	North	139	31	142	85	-10	-51	3	27	**56**	**65**

Remark:
[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.
[2] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - SOV (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	Vertical Distance relative to the assessment point, m	Slant Distance,m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source[2], dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	NCO Night-time Noise Criteria, dB(A)
SCL(HUH-ADM) - SOV													
CH1													
CH1	Hoi Deen Court, 276 - 279, Gloucester Road,	SOV-01	South	105	3	105	82	0	-48	3	37		
		SOV-02	South	110	3	110	79	0	-49	3	33		
		SOV-04	South	91	3	91	79	0	-47	3	35		
		SOV-05	North	96	4	96	79	-10	-48	3	24		
		SOV-06	Southeast	98	1	98	76	0	-48	3	31		
		SOV-08	East	93	1	93	88	0	-47	3	44		
		SOV-10	South	121	3	121	84	0	-50	3	37		
		SOV-11	West	127	3	127	84	-10	-50	3	27		
		SOV-12	West	130	3	130	83	-10	-50	3	26		
		SOV-13	Top	125	4	125	84	0	-50	3	37		
		SOV-21	South	97	1	97	81	0	-48	3	36		
		SOV-22	South	88	5	89	70	0	-47	3	26		
		SOV-23	North	93	1	93	72	-10	-47	3	18		
		SOV-24	North	119	1	119	70	-10	-50	3	13		
		SOV-25	North	120	0	120	74	-10	-50	3	17		
		SOV-26	North	99	0	99	74	-10	-48	3	19		
		SOV-27	North	93	2	93	72	-10	-47	3	18		
		SOV-28	South	89	0	89	74	0	-47	3	30		
		SOV-29A	North	88	0	88	70	-10	-47	3	16		
		SOV-29B	North	90	1	90	70	-10	-47	3	16		
		SOV-30	North	118	0	118	70	-10	-49	3	14		
		SOV-31	North	109	9	109	75	-10	-49	3	19	**47**	**55**
CH2													
CH2	Hoi Kung Court, 264 - 268, Gloucester Road,	SOV-01	South	62	3	62	82	0	-44	3	41		
		SOV-02	South	64	3	65	79	0	-44	3	38		
		SOV-04	South	55	3	55	79	0	-43	3	39		
		SOV-05	North	64	4	64	79	-10	-44	3	28		
		SOV-06	Southeast	86	1	86	76	0	-47	3	32		
		SOV-08	East	79	1	79	88	0	-46	3	45		
		SOV-10	South	73	3	73	84	0	-45	3	42		
		SOV-11	West	82	3	82	84	-10	-46	3	31		
		SOV-12	West	83	3	83	83	-10	-46	3	30		
		SOV-13	Top	79	4	79	84	0	-46	3	41		
		SOV-21	South	57	1	57	81	0	-43	3	41		
		SOV-22	South	54	5	54	70	0	-43	3	30		
		SOV-23	North	63	1	63	72	-10	-44	3	21		
		SOV-24	North	76	1	76	70	-10	-46	3	17		
		SOV-25	North	76	0	76	74	-10	-46	3	21		
		SOV-26	North	65	0	65	74	-10	-44	3	23		
		SOV-27	North	63	2	63	72	-10	-44	3	21		
		SOV-28	South	55	0	55	74	0	-43	3	34		
		SOV-29A	North	62	0	62	70	-10	-44	3	19		
		SOV-29B	North	62	1	62	70	-10	-44	3	19		
		SOV-30	North	75	0	75	70	-10	-46	3	17		
		SOV-31	North	69	9	70	75	-10	-45	3	23	**50**	**55**
CH3													
CH3	Elizabeth House, Block C, 250 - 254, Gloucester Road,	SOV-01	South	131	18	133	82	0	-50	3	35		
		SOV-02	South	127	18	129	79	0	-50	3	32		
		SOV-04	South	145	18	146	79	0	-51	3	31		
		SOV-05	North	150	18	151	79	-10	-52	3	20		
		SOV-06	Southeast	184	20	185	76	0	-53	3	26		
		SOV-08	East	178	20	179	88	0	-53	3	38		
		SOV-10	South	119	19	121	84	0	-50	3	37		
		SOV-11	West	124	19	125	84	0	-50	3	37		
		SOV-12	West	119	19	121	83	0	-50	3	36		
		SOV-13	Top	124	17	125	84	0	-50	3	37		
		SOV-21	South	139	20	140	81	0	-51	3	33		
		SOV-22	South	147	17	148	70	0	-51	3	22		
		SOV-23	North	154	22	156	72	-10	-52	3	13		
		SOV-24	North	130	22	132	70	-10	-50	3	13		
		SOV-25	North	129	22	131	74	-10	-50	3	17		
		SOV-26	North	147	22	149	74	-10	-51	3	16		
		SOV-27	North	154	23	156	72	-10	-52	3	13		
		SOV-28	South	148	22	150	74	0	-51	3	26		
		SOV-29A	North	159	22	160	70	-10	-52	3	11		
		SOV-29B	North	157	22	158	70	-10	-52	3	11		
		SOV-30	North	131	22	133	70	-10	-50	3	13		
		SOV-31	North	139	31	142	75	-10	-51	3	17	**46**	**55**

Remark:
[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.
[2] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - EXC (Daytime & Evening Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	NCO Daytime Noise Criteria, dB(A)
Exhibition Station											
EX 1											
Daytime											
EX 1	Causeway Centre, Block A	EXH VS1	South	116	76	0	-49	3	30		
		EXH VS2	Top	294	98	-10	-57	3	34		
		EXH VS3	Top	287	117	-10	-57	3	53		
		EXH VS4	Top	273	82	-10	-57	3	18		
		EXH VS5	North	136	74	-10	-51	3	16		
		EXH VS6	North	131	75	-10	-50	3	18		
		EXH VS7	Top	124	94	0	-50	3	47		
		EXH VS8	Top	117	92	0	-49	3	46		
		EXH VS12	East	125	95	-10	-50	3	38		
		EXH VS15	Top	128	84	0	-50	3	37		
		EXH VS16	East	117	79	-10	-49	3	23		
		EXH VS20	South	103	88	0	-48	3	43		
		EXH VS21	South	95	85	0	-48	3	40		
		EXH VS22	South	93	80	0	-47	3	36		
		EXH VS23	West	93	77	0	-47	3	33		
		EXH VS25	Top	274	103	-10	-57	3	39		
		EXH VS26	Top	264	99	-10	-56	3	36		
		EXH VS28	South	205	92	-10	-54	3	31		
		EXH VS29	South	205	94	-10	-54	3	33		
		EXH VS30	West	209	87	-10	-54	3	26		
		EXH VS32	North	196	88	-10	-54	3	27		
		EXH VS35	South	184	84	-10	-53	3	24		
		EXH VS36	North	190	84	-10	-54	3	23		
		EXH VS37	East	187	79	-10	-53	3	19		
		EXH VS38	South	188	83	-10	-53	3	23		
		EXH VS39	South	188	83	-10	-53	3	23		
		EXH VS40	East	184	82	-10	-53	3	22		
		EXH VS41	East	166	77	-10	-52	3	18		
		EXH VS42	East	166	81	-10	-52	3	22		
		EXH VS43	North	177	91	-10	-53	3	31		
		EXH VS44	South	166	78	-10	-52	3	19		
		EXH VS45	South	167	80	-10	-52	3	21		
		EXH VS46	East	140	100	-10	-51	3	42		
		EXH VS47	Top	140	99	0	-51	3	51		
		EXH VS48	Top	131	82	0	-50	3	35		
		EXH VS49	East	122	98	-10	-50	3	41		
		EXH VS50	South	174	87	-10	-53	3	27		
		EXH VS51	South	102	103	0	-48	3	58		
		EXH VS52	North	225	83	-10	-55	3	21		
		EXH VS53	North	135	71	-10	-51	3	13		
		EXH VS54	North	133	67	0	-50	3	20		
		EXH VS55	West	191	78	0	-54	3	27		
		EXH VS56	West	189	80	0	-54	3	29		
		EXH VS57	West	103	71	0	-48	3	26		
		EXH VS58	West	98	72	0	-48	3	27		
		EXH VS59	North	208	81	0	-54	3	30		
		EXH VS60	Top	280	77	-10	-57	3	13		
		EXH VS66	North	138	69	-10	-51	3	11		
		EXH VS68	North	210	74	-10	-54	3	13	**60**	**60**

Remark:
[1] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.
[2] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.

Appendix A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - EXC (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	NCO Daytime Noise Criteria, dB(A)
Exhibition Station											
EX 1											
Night-time											
EX 1	Causeway Centre, Block A	EXH VS1	South	116	66	0	-49	3	20		
		EXH VS2	Top	294	88	-10	-57	3	24		
		EXH VS3	Top	287	108	-10	-57	3	44		
		EXH VS4	Top	273	73	-10	-57	3	9		
		EXH VS5	North	136	64	-10	-51	3	6		
		EXH VS6	North	131	65	-10	-50	3	8		
		EXH VS7	Top	124	84	0	-50	3	37		
		EXH VS8	Top	117	82	0	-49	3	36		
		EXH VS12	East	125	85	-10	-50	3	28		
		EXH VS15	Top	128	74	0	-50	3	27		
		EXH VS16	East	117	69	-10	-49	3	13		
		EXH VS20	South	103	79	0	-48	3	34		
		EXH VS21	South	95	75	0	-48	3	30		
		EXH VS22	South	93	70	0	-47	3	26		
		EXH VS23	West	93	68	0	-47	3	24		
		EXH VS25	Top	274	94	-10	-57	3	30		
		EXH VS26	Top	264	90	-10	-56	3	27		
		EXH VS28	South	205	83	-10	-54	3	22		
		EXH VS29	South	205	85	-10	-54	3	24		
		EXH VS30	West	209	78	-10	-54	3	17		
		EXH VS32	North	196	79	-10	-54	3	18		
		EXH VS35	South	184	74	-10	-53	3	14		
		EXH VS36	North	190	75	-10	-54	3	14		
		EXH VS37	East	187	70	-10	-53	3	10		
		EXH VS38	South	188	74	-10	-53	3	14		
		EXH VS39	South	188	74	-10	-53	3	14		
		EXH VS40	East	184	73	-10	-53	3	13		
		EXH VS41	East	166	68	-10	-52	3	9		
		EXH VS42	East	166	72	-10	-52	3	13		
		EXH VS43	North	177	82	-10	-53	3	22		
		EXH VS44	South	166	69	-10	-52	3	10		
		EXH VS45	South	167	71	-10	-52	3	12		
		EXH VS46	East	140	91	-10	-51	3	33		
		EXH VS47	Top	140	90	0	-51	3	42		
		EXH VS48	Top	131	73	0	-50	3	26		
		EXH VS49	East	122	89	-10	-50	3	32		
		EXH VS50	South	174	78	-10	-53	3	18		
		EXH VS51	South	102	-	0	-48	3	-		
		EXH VS52	North	225	73	-10	-55	3	11		
		EXH VS53	North	135	61	-10	-51	3	3		
		EXH VS54	North	133	57	0	-50	3	10		
		EXH VS55	West	191	68	0	-54	3	17		
		EXH VS56	West	189	70	0	-54	3	19		
		EXH VS57	West	103	61	0	-48	3	16		
		EXH VS58	West	98	62	0	-48	3	17		
		EXH VS59	North	208	71	0	-54	3	20		
		EXH VS60	Top	280	67	-10	-57	3	3		
		EXH VS66	North	138	59	-10	-51	3	1		
		EXH VS68	North	210	64	-10	-54	3	3	**48**	**50**

Remark:
[1] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.
[2] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louver.

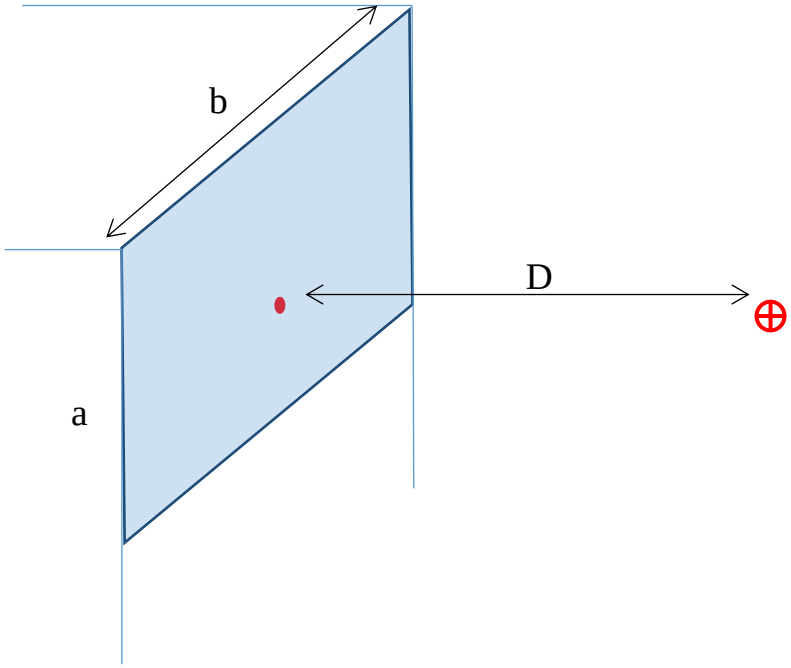
Appendix B

Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

Appendix B1

Measurement Methodology

Method 1: Far-Field Testing Method for Louver



a: Short side of the louver
b: Long side of the louver
D: Measurement distance (separation between louver and microphone), where D must be greater than (2b) and rounded up to interger.

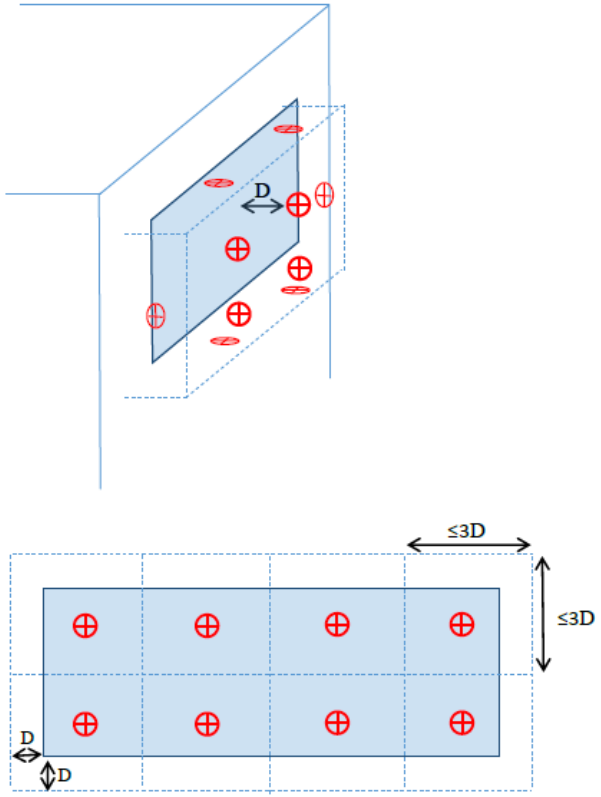
Louver opening
Proposed measurement point (microphone pointing perpendicular to the center of the louvre)

For method 1,

- "D" must be greater than 2b and round up to integer.
- The microphone must point to the center of the louver.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained.
- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with Method 2.
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0dB(A), noise measurement should then be conducted at near field in accordance with Method 2.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20log(D) + 8 + background noise correction factor

Method 2: Near-Field Testing Method for Louver



D: Measurement distance

Louver opening
Measurement box
Proposed measurement point (microphone pointing perpendicular to the louvre)

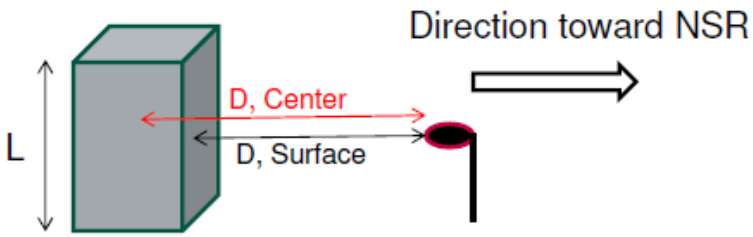
For method 2 (developed based on the principle of ISO3746:2010),

- First step is to determine a hypothetical measurement surfaces with at least 1m separation (D, measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- For louvre with largest dimension ≤3D, at least one measurement at the centre of the measurement surface parallel to the louvre should be conducted.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Extra localized microphone positions on the measurement surfaces in the region of high radiation should be considered. In this case follow the procedures of ISO3744.
- For louver with largest dimension > 3D, measurement surface and measurement position should follow ISO3746.
- Background noise level should be taken at each measurement point for determining the background correction (K1A).
- If the difference between the background noise and the measured noise level is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results, D should be reduced according to ISO3746 to obtain higher measured noise levels.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean LAeq over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Far Field Testing Method for Plant Item



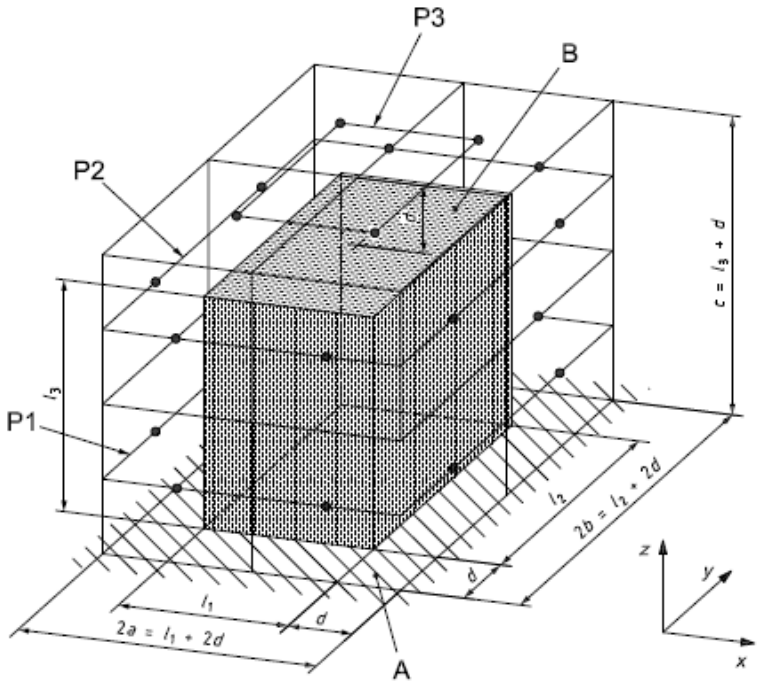
"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

- "D, Surface" must be greater than twice of L (2L) and roundup to integer (e.g 6m ,7m, 8m…).
- The microphone must be pointing to the center of the plant.
- Measurement should be carried out at the direction toward all NSRs.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained at each the measurement point.

- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0 dB(A), noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20 log (D,Center) + 8 + background noise correction factor

Method 4 – Near Field Testing Method for Plant Item



Key

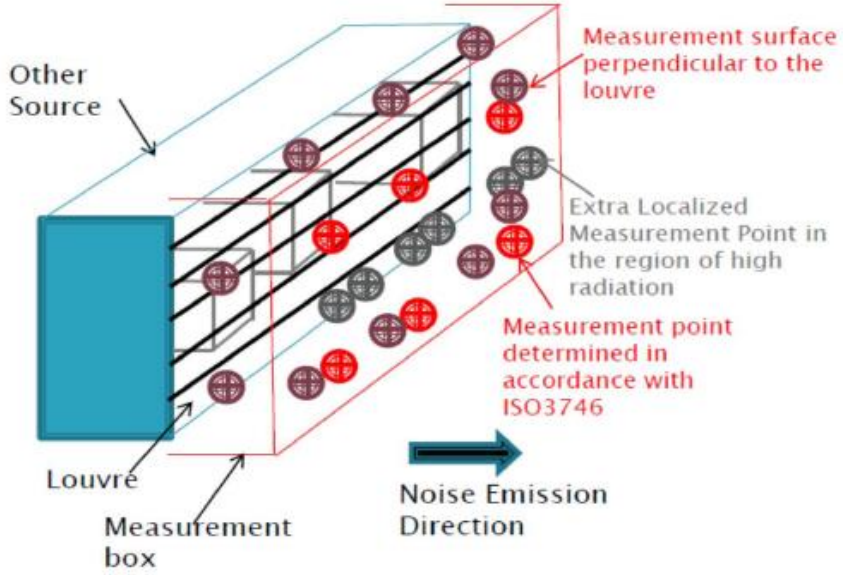
For Method 4 (based on ISO3746:2010),

- Please refer to latest edition of ISO3746 for measurement requirement.
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalized (see figure for example)
- Background noise measurement should be obtained for determination of background correction factor (K1A).According to ISO3746, if the source under test radiates noise predominantly in one direction or if the noise from a large source is emitted only from a small portion of the source, the usage of extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case, follow the procedures specified in ISO3744.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Detail calculation of the SWL should refer to the latest edition of ISO3746.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 5 – Near Field Testing Method for Plant Room or other source



For Method 5 (developed based on the principle of ISO3746 -2010),

- First step is to determine a measurement box with at least 1m separation (measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- Secondly, is to determine the location of measurement points on the measurement surface of the hypothetical box.
- Extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case follow the procedures of ISO 3744.
- Background noise level should be taken for determination of background correction (K1A.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- If the difference between the BGL and the measured noise level (MNL) is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results. D should be reduced according to ISO3746 to obtain higher MNLs.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Appendix B2

Calibration Certificates –
Noise Measurement for Fixed Plant Noise

Appendix B2 Calibration Certificates – Noise Measurement for Fixed Plant Noise

Cert B1: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 20890)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	23-Jul-2021	**Certificate Number**	MLCN211814S

Customer Information

Company Name	Wilson Ho and Associates Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, NT

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	20890
Equipment Number	--

Calibration Particular

Date of Calibration	23-Jul-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 23-Jul-2021

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.

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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	23-Jul-2021	**Certificate Number**	MLCN211814S

Customer Information

Company Name	Wilson Ho and Associates Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, NT

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	20890
Equipment Number	--

Calibration Particular

Date of Calibration	23-Jul-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 23-Jul-2021

Statements

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Cert B2: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 28422)

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	12-May-2020	**Certificate Number**	MLCN201165S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	28422
Equipment Number	--

Calibration Particular

Date of Calibration	12-May-2020		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 12-May-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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Certificate No. MLCN201165S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 12-May-2020

Checked By : K.O. Lo
Date : 12-May-2020

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香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B 室
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Cert B3: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 59120)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	17-Nov-2020	**Certificate Number**	MLCN203076S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59120
Equipment Number	--

Calibration Particular

Date of Calibration	17-Nov-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 17-Nov-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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Certificate No. MLCN203076S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 17-Nov-2020

Checked By : K.O. Lo
Date : 17-Nov-2020

萬儀校正中心有限公司
MaxLab Calibration Centre Limited
香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B 室
Unit B, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

Cert B4: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 59121)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	31-Oct-2020	**Certificate Number**	MLCN202867S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59121
Equipment Number	--

Calibration Particular

Date of Calibration	31-Oct-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 31-Oct-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
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MAXLAB

Certificate No. MLCN202867S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 31-Oct-2020

Checked By : K.O. Lo
Date : 31-Oct-2020

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香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B 室
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Cert B5: Calibration Certificate of Sound Level Meter **SVAN959** (SN: 11228)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	12-May-2020	**Certificate Number**	MLCN201166S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 959
Serial Number	11228
Equipment Number	--

Calibration Particular

Date of Calibration	12-May-2020		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 12-May-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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Certificate No. MLCN201166S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
A / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB

- END -

Calibrated By : Dan
Date : 12-May-2020

Checked By : K.O. Lo
Date : 12-May-2020

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MaxLab Calibration Centre Limited
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Cert B6: Calibration Certificate of Sound Level Meter **SVANTEK979** (SN: 46199)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 110716 Page 1 of 4 Pages

Customer : Beexergy Consulting Limited

Address : Unit 2001-05, Apec Plaza, 49 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Order No. : Q14208 **Date of receipt :** 1-Nov-21

Item Tested

Description : Sound Level Meter & Vibration Meter with Vibration Sensor
Manufacturer : SVANTEK **I.D.** : --
Model : SVAN 979, SV 80 **Serial No.** : 46199

Test Conditions

Date of Test : 16-Nov-21 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: Z01, IEC 61672, M41, JJG 676-2000.

Test Results

All results were within the IEC 61672 Type 1 or manufacturer's specification. (where applicable)
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C211339	SCL-HKSAR
S240	Sound Level Calibrator	106446	NIM-PRC & SCL-HKSAR
S012	Function Generator	911721	SCL-HKSAR
S187A	Std. Vibration Meter	011344	NIM-PRC
S187B	Std. Accelerometer	011343	SCL-HKSAR, NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong **Approved by :** Kin Wong

Date: 16-Nov-21

This Certificate is issued by
Hong Kong Calibration Ltd
Unit 9B, 24/F., Wah Fung Industrial Centre, No. 58-78, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong
Tel: 2425 9801 Fax: 2425 9646

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Results :

1. **Sound Level Meter**

1.1 Self-generated noise: 16.0 dBA

1.2 Acoustical signal test

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Level Range	Octave Filter	Weight	Response		
Low	OFF	A	Fast	94.0	94.0
			Slow		94.0
		C	Fast		94.0
		Z			94.0
	OFF	A	Fast	114.0	114.0
			Slow		114.0
		C	Fast		114.0
		Z			114.0
	1/1 1/3	A			114.1
					114.1

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.1 dB

1.3 Electrical signal tests of frequency weightings (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 2 dB
63 Hz	-26.2	- 26.2 dB, ± 1.5 dB
125 Hz	-16.2	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.6 dB
4 kHz	+1.0	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.0	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-6.9	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

1.4 Frequency & Time weightings at 1 kHz

1.4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	--	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

1.4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	--	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

2. Vibration Meter (Sensitivity Setting : 10.28 mV/m/s²)

2.1 Acceleration (159.2 Hz, RMS, HP 10)

UUT Range	Applied Value (m/s²)	UUT Reading (m/s²)	Mfr's Spec.
Low	5.00	4.98	± 5 %.
	10.00	9.98	
	20.00	19.91	
	50.0	49.8	
	90.0	89.6	
High	100.0	99.5	

2.2 Velocity (159.2 Hz, RMS, Vel 10)

Applied Value (mm/s)	UUT Reading (mm/s)
5.00	4.97
10.00	9.94
20.00	19.88
50.0	49.8
90.0	89.6

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Calibration Certificate

2.3 Displacement (40 Hz, P-P, Dil 10)

Applied Value	UUT Reading
200 μm	203 μm
500 μm	509 μm
1.000 mm	1.015 mm

2.4 Frequency Response (10 m/s², HP 10)

Frequency (Hz)	UUT Reading (m/s²)	Mfr's Spec.
10	9.2	± 3 dB (0.5 Hz ~ 14 kHz)
20	10.1	
40	10.1	
80 (Ref.)	10.0 (Ref.)	
160	9.9	
500	9.7	
1 000	9.7	

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 009 hPa.
4. Preamplifier model : SV 17 , S/N : 57845.
5. Microphone model: PCB 377B02, S/N: 308202.
6. Firmware Version: 3.03.1
7. Power Supply Check: OK
8. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.
9. Accelerometer type : Svantek SV80, S/N : E3662.

---------- END ----------

Cert B7: Calibration Certificate of Sound Level Meter **Cirrus CR171B** (SN: G071909)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 011566 Page 1 of 4 Pages

Customer : Beexergy Consulting Limited

Address : Unit 2001-05, Apec Plaza, 49 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Order No. : Q04316 **Date of receipt :** 17-Nov-20

Item Tested

Description : Sound Level Meter
Manufacturer : Cirrus **I.D.** : --
Model : CR:171B **Serial No.** : G071909

Test Conditions

Date of Test : 25-Nov-20 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 class 1 or IEC 61260 Class 1 specification (where applicable)
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C190926	SCL-HKSAR
S240	Sound Level Calibrator	003053	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Kin Wong

Date: 25-Nov-20

This Certificate is issued by
Hong Kong Calibration Ltd
Unit 05, 24/F., Wah Fung Industrial Centre, No. 56-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong
Tel: 2425 6801 Fax: 2425 8646

E

Calibration Certificate

Results :

Acoustical signal test

1. **Self-generated noise:** 19.7dBA

2. **Reference Sound Pressure Level**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
20-140	A	F	OFF	94.0	94.0
		S	OFF		94.0
	C	F	OFF		94.0
	Z	F	OFF		94.0
	A	F	OFF	114.0	114.0
		S	OFF		114.0
	C	F	OFF		114.0
	Z	F	OFF		114.0

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.1 dB

Electrical signal tests

3. **Frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.2	- 39.4 dB, ± 2 dB
63 Hz	-25.9	- 26.2 dB, ± 1.5 dB
125 Hz	-15.9	- 16.1 dB, ± 1.5 dB
250 Hz	-8.4	- 8.6 dB, ± 1 dB
500 Hz	-3.1	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.1	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.7	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.6	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-6.4	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	--	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	--	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

5. Filter Charneteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 Spec. (dB)
125 Hz	-61.0	< - 61
250 Hz	-56.2	< - 42
500 Hz	-52.2	< - 17.5
707 Hz	-3.3	- 2 ~ - 5
1 kHz (Ref)	--	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-64.5	< - 17.5
4 kHz	-69.4	< - 42
8 kHz	-68.8	< - 61

Uncertainty : ± 0.25 dB

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Calibration Certificate

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 Spec.(dB)
326 Hz	-65.6	< - 61
530 Hz	-55.1	< - 42
772 Hz	-28.8	< - 17.5
891 Hz	-3.3	+ 0.3 ~ - 5.0
1 kHz (Ref)	--	--
1.122 kHz	-3.7	+ 0.3 ~ - 5.0
1.296 kHz	-27.9	< - 17.5
1.887 kHz	-66.3	< - 42
3.070 kHz	-74.3	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 009hPa.
4. Preamplifier model : MV200F, S/N :5332F
5. Microphone model: MK224 , S/N : 608035B
6. Power Supply Check: OK
7. Firmware : V2.4.1569 (1529)
8. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

---------- END ----------

Cert B8: Calibration Certificate of Acoustic Calibrator **SVANTEK SV30A** (SN: 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	28-Sep-2021	**Certificate Number**	MLCN212726S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	28-Sep-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1351(MLTE049) / MLEC21/06/02 / 5-Jun-22		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 28-Sep-2021

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MaxLab Calibration Centre Limited
香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B 室
Unit B, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

MAXLAB

Certificate No. MLCN212726S

Calibration Data

EUT Setting	Standard Reading	EUT Error from Setting	Calibration Uncertainty	EUT Specification
94 dB	94.0 dB	0.0 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 28-Sep-21

Checked By : K.O. Lo
Date : 28-Sep-21

Page 2 of 2

萬儀校正中心有限公司
MaxLab Calibration Centre Limited
香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B 室
Unit B, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

Cert B9: Calibration Certificate of Acoustic Calibrator **SVANTEK SV35A** (SN: 58708)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 104111 Page 1 of 2 Pages

Customer : Beexergy Consulting Limited

Address : Unit 2001-05, Apec Plaza, 49 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Order No. : Q11504 **Date of receipt :** 30-Apr-21

Item Tested

Description : Acoustic Calibrator
Manufacturer : Svantek **I.D.** : 217698
Model : SV35A **Serial No.** : 58708

Test Conditions

Date of Test : 12-May-21 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: F21, Z02, IEC 60942

Test Results

All results were within the IEC 60942 Class 1 specifications.
The results are shown in the attached page(s).

Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	005016	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	003053	NIM-PRC & SCL-HKSAR
S041	Universal Counter	101743	SCL-HKSAR
S206	Sound Level Meter	007031	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only.

Calibrated by : Elva Chong

Approved by : Kin Wong

Date: 12-May-21

This Certificate is issued by
Hong Kong Calibration Ltd
Unit 6B, 24/F., Wei Fung Industrial Centre, No. 58-78, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong
Tel: 2425 6801 Fax: 2425 6546

E

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Results :

1. **Generated Sound Pressure Level**

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.1	± 0.4 dB
114.0	114.1	

Uncertainty : ± 0.2 dB

2. **Short-term Level Fluctuation** : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. **Frequency**

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : $\pm 3.6 \times 10^{-6}$

4. **Total Distortion** : < 0.3%
IEC 60942 Class 1 Spec. : < 4 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 996hPa.

---------- END ----------

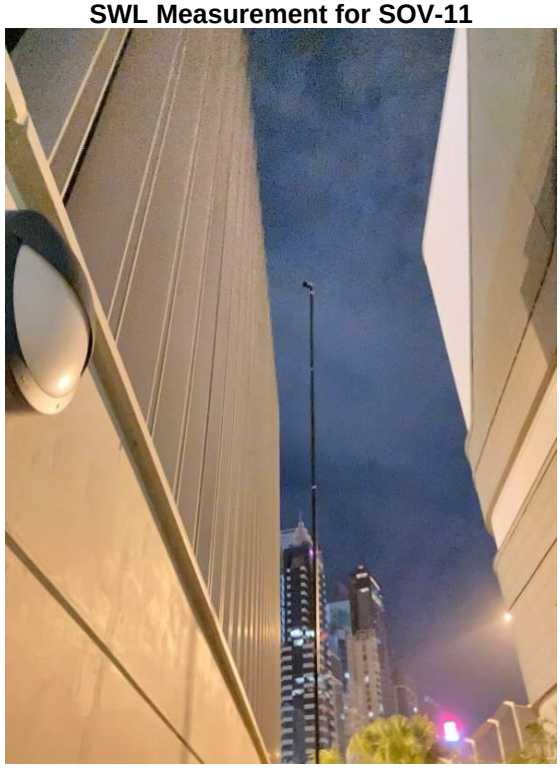
Appendix B3

Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

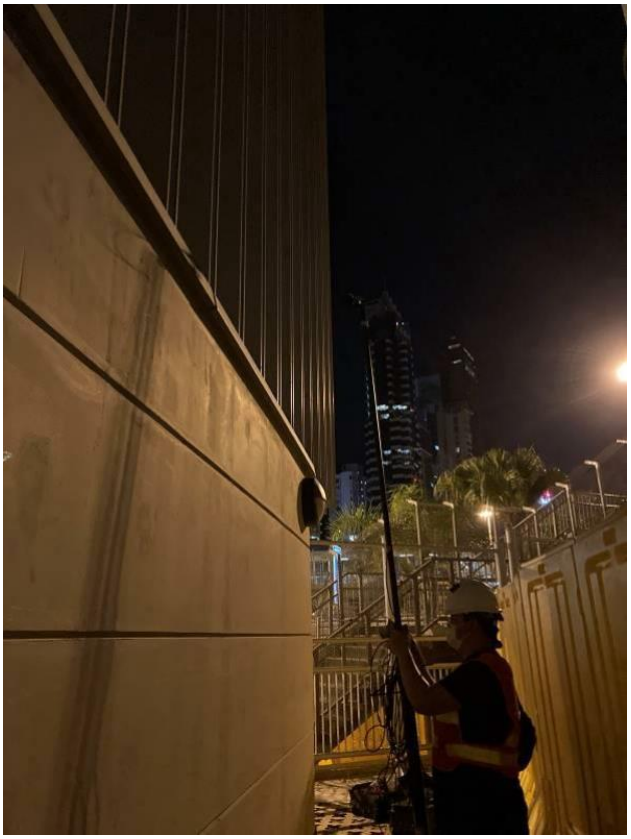
Appendix B3 Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

SWL Measurement for SOV-10

SWL Measurement for SOV-11



SWL Measurement for SOV-12



SWL Measurement for SOV-13

Appendix B4

Noise Measurement Results

Appendix B4 Noise Measurement Results

Location	Fixed Plant Source ID	Plant Type	Method	Louvre/Cooling Tower Size (mm)			Averaged Measured L_{Aeq} ,dB(A) [(a)]	Background L_{Aeq} ,dB(A)	Difference L_{Aeq} ,dB(A)	Background Corrected L_{Aeq} ,dB(A) [(b)]	Calculated SWL, dB(A)
				Height	Width	Length					
SOV	SOV-01	Ventilation Louver	2	N/A	3650	6210	65.8	63.3	2.5	62.8	82
	SOV-02	Ventilation Louver	2	N/A	3650	2990	65.5	63.3	2.2	62.5	79
	SOV-04	Ventilation Louver	2	N/A	3440	3440	65.1	63.8	1.3	62.1	79
	SOV-05	Ventilation Louver	2	N/A	3950	3500	63.1	61.3	1.8	60.1	79
	SOV-06	Ventilation Louver	2	N/A	1500	1600	67.7	64.3	3.4	65.1	76
	SOV-08	Ventilation Louver	2	N/A	4000	5310	70.1	63.7	6.4	69.0	88
	SOV-10	Ventilation Louver	2	5650	10950	N/A	65.2	64.2	1.0	62.2	84
	SOV-11	Ventilation Louver	2	5650	3900	N/A	66.3	59.5	6.8	65.3	84
	SOV-12	Ventilation Louver	2	5650	4450	N/A	66.9	66.6	0.3	63.9	83
	SOV-13	Ventilation Louver	2	N/A	6000	4650	65.5	58.7	6.8	64.4	84
	SOV-21	Ventilation Louver	2	N/A	1800	1400	69.2	66.2	3.0	66.2	81
	SOV-22	Ventilation Louver	2	N/A	500	250	64.0	60.0	4.0	61.8	70
	SOV-23	Ventilation Louver	2	N/A	400	400	63.0	62.1	0.9	60.0	72
	SOV-24	Ventilation Louver	2	N/A	400	400	61.3	60.8	0.5	58.3	70
	SOV-25	Ventilation Louver	2	N/A	400	400	67.0	60.0	7.0	66.0	74
	SOV-26	Ventilation Louver	2	N/A	400	400	65.2	62.4	2.8	62.2	74
	SOV-27	Ventilation Louver	2	N/A	500	900	62.0	58.6	3.4	59.4	72
	SOV-28	Ventilation Louver	2	N/A	400	400	66.3	64.5	1.8	63.3	74
	SOV-29A	Ventilation Louver	2	N/A	500	500	61.2	58.8	2.4	58.2	70
	SOV-29B	Ventilation Louver	2	N/A	500	500	60.5	61.2	-0.7	57.5	70
	SOV-30	Ventilation Louver	2	N/A	400	400	61.2	60.8	0.4	58.2	70
	SOV-31	Ventilation Louver	2	N/A	780	5420	62.1	58.2	3.9	59.9	75
EXC	EXH VS1	Ventilation Louver	2	N/A	5600	600	56.0	54.2	1.8	53.0	66
	EXH VS2	Ventilation Louver	2	N/A	1720	1530	74.1	62.7	11.4	74.1	88
	EXH VS3	Ventilation Louver	2	N/A	3250	4620	90.7	57.6	33.1	90.7	108
	EXH VS4	Ventilation Louver	2	N/A	2000	2000	59.9	55.8	4.1	57.8	73
	EXH VS5	Ventilation Louver	2	N/A	300	1400	54.5	51.8	2.7	51.5	64
	EXH VS6	Ventilation Louver	2	N/A	550	4000	52.1	47.3	4.8	50.3	65
	EXH VS7	Cooling Tower	4	3650	2990	4890	64.5	57.8	6.7	63.5	84
	EXH VS8	Cooling Tower	4	3650	2990	4890	62.3	57.8	4.5	60.3	82
	EXH VS12	Ventilation Louver	2	4600	9700	N/A	65.3	54.9	10.4	64.9	85
	EXH VS15	Ventilation Louver	2	N/A	5100	2900	56.8	49.3	7.5	56.0	74
	EXH VS16	Ventilation Louver	2	N/A	5600	2400	56.6	54.2	2.4	53.6	69
	EXH VS20	Ventilation Louver	2	N/A	1580	6400	61.3	49.0	12.3	61.3	79
	EXH VS21	Ventilation Louver	2	N/A	4330	6900	58.1	55.9	2.2	55.1	75
	EXH VS22	Ventilation Louver	2	N/A	4330	2090	55.9	54.2	1.7	52.9	70
	EXH VS23	Ventilation Louver	2	N/A	4330	3530	53.4	54.2	-0.8	50.4	68
	EXH VS25	Ventilation Louver	2	N/A	6000	6000	73.8	49.9	23.9	73.8	94
	EXH VS26	Ventilation Louver	2	N/A	6000	6000	70.1	49.9	20.2	70.0	90
	EXH VS28	Ventilation Louver	2	1600	6630	N/A	65.7	50.8	14.9	65.5	83
	EXH VS29	Ventilation Louver	2	2700	7530	N/A	66.4	50.8	15.6	66.2	85
	EXH VS30	Ventilation Louver	2	2400	2600	N/A	62.8	50.8	12.0	62.5	78
	EXH VS32	Ventilation Louver	2	2450	9110	N/A	60.6	50.8	9.8	60.1	79
	EXH VS35	Ventilation Louver	2	N/A	2400	6050	58.4	54.8	3.6	55.9	74
	EXH VS36	Ventilation Louver	2	N/A	2400	7080	58.6	53.2	5.4	57.1	75
	EXH VS37	Ventilation Louver	2	N/A	2400	2450	56.9	55.2	1.7	53.9	70
	EXH VS38	Ventilation Louver	2	N/A	3130	5780	58.4	55.5	2.9	55.4	74
	EXH VS39	Ventilation Louver	2	N/A	2400	6080	59.0	55.8	3.2	56.2	74
	EXH VS40	Ventilation Louver	2	N/A	2400	8400	57.1	55.8	1.3	54.1	73
	EXH VS41	Ventilation Louver	2	N/A	3000	2900	54.0	50.9	3.1	51.1	68
	EXH VS42	Ventilation Louver	2	N/A	1800	7830	56.0	52.5	3.5	53.5	72
	EXH VS43	Ventilation Louver	2	N/A	1800	10330	63.5	55.3	8.2	62.8	82
	EXH VS44	Ventilation Louver	2	N/A	1600	2180	56.6	52.9	3.7	54.3	69
	EXH VS45	Ventilation Louver	2	N/A	1800	4930	56.2	51.8	4.4	54.3	71
	EXH VS46	Ventilation Louver	2	6240	8600	N/A	70.2	54.9	15.3	70.2	91
	EXH VS47	Ventilation Louver	2	N/A	9700	4600	69.0	49.3	19.7	69.0	90
	EXH VS48	Ventilation Louver	2	N/A	5900	1500	57.1	49.3	7.8	56.4	73
	EXH VS49	Ventilation Louver	2	N/A	3100	2740	77.4	55.7	21.7	77.7	89
	EXH VS50	Ventilation Louver	2	N/A	1800	1800	63.4	50.9	12.5	63.4	78
	EXH VS51 [(c)]	Ventilation Louver	2	N/A	1050	3300	89.5	51.1	38.4	89.5	103
	EXH VS52	Ventilation Louver	2	N/A	730	3200	62.7	54.7	8.0	62.0	73
	EXH VS53	Ventilation Louver	2	N/A	730	730	53.6	51.8	1.8	50.6	61
	EXH VS54	Ventilation Louver	2	N/A	600	700	50.3	47.3	3.0	47.3	57
	EXH VS55	Ventilation Louver	2	N/A	480	980	58.7	57.6	1.1	55.7	68
	EXH VS56	Ventilation Louver	2	N/A	480	980	60.2	57.6	2.6	57.2	70
	EXH VS57	Ventilation Louver	2	N/A	480	980	51.5	51.0	0.5	48.5	61
	EXH VS58	Ventilation Louver	2	N/A	480	980	52.1	51.0	1.1	49.1	62
	EXH VS59	Ventilation Louver	2	N/A	760	800	59.8	54.4	5.4	58.3	71
	EXH VS60	Packaged Condenser Unit	4	930	770	1660	57.6	54.9	2.7	54.6	67
	EXH VS66	Ventilation Louver	2	N/A	710	1800	48.1	47.3	0.8	45.1	59
	EXH VS68	Ventilation Louver	2	N/A	710	2600	54.5	51.5	3.0	51.6	64

Remarks:

(a) Results are averaged from number of points in accordance with ISO3746.

(b) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0dB

(c) This plant will only operate during night-time period.

Appendix C

Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Appendix C1

Calibration Certificates –
Noise Measurement at Representative NSRs

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0319 01-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2681366	2665582	17190
Adaptors used:	-	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Mar-2021

Date of test: 23-Mar-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2021	CIGISMEC
Signal generator	DS 360	33873	19-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 24-Mar-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0319 01-01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 23-Mar-2021

Checked by: Chan Yuk Yiu **Date:** 24-Mar-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0401 02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	3006428
Adaptors used:	-

Item submitted by

Curstomer:	AECOM
Address of Customer:	-
Request No.:	-
Date of receipt:	01-Apr-2021

Date of test: 05-Apr-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	11-May-2021	SCL
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI
Signal generator	DS 360	33873	19-May-2021	CEPREI
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI
Universal counter	53132A	MY40003662	18-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 07-Apr-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0401 02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.23	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.016 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 999.95 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.3 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 05-Apr-2021

Checked by: Chan Yuk Yiu **Date:** 07-Apr-2021

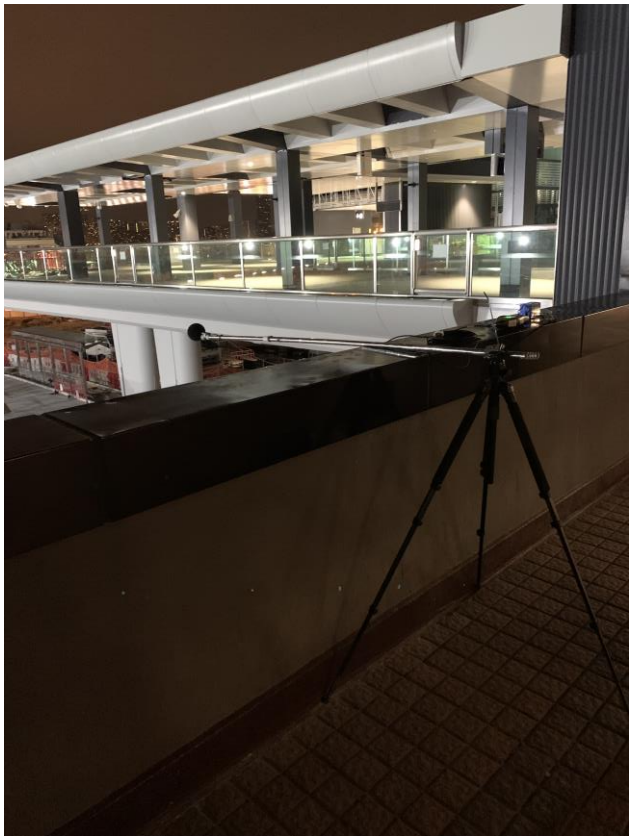
The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Appendix C2

Photographs – Noise Measurement at Representative NSRs

Appendix C2 Photographs – Noise Measurement at Representative NSRs

NSR Measurement Location at CH2



NSR Measurement Location at EX1

Appendix C3

Measurement Results at Representative NSRs

Appendix C3 Noise Measurement Results at Measurement Locations

Measurement Location ID	Measurement Date	Operation Scenario [1][2]	Fixed Plant Noise		Background Noise		Difference between Measured Noise Level and Background Level, dB(A)
			Measurement Time	Measured Noise Level, $L_{Aeq\ 30mins}$, dB(A)	Measurement Time	Background Noise Level, $L_{Aeq\ 5mins}$, dB(A)	
SOV							
CH2	2/24/2022	Daytime & Evening / Night-time	02:30:00 - 02:59:59	71.3	01:29:20 - 01:34:19	71.5	-0.2
EXC							
EX1	2/25/2022	Daytime & Evening	01:58:00 - 02:27:59	51.7	01:20:10 - 01:25:09	50.4	1.3
		Night-time	03:17:00 - 03:46:59	50.4	04:01:00 - 04:05:59	49.4	1.0

Note:

(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.

(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.

MTR Corporation Limited

Shatin to Central Link –
Hung Hom to Admiralty Section

Fixed Plant Noise Audit Report

(Batch 3 – North Ventilation Building (NOV))

(March 2022)

Verified by:	Claudine Lee
Position:	Independent Environmental Checker
Date:	11 March 2022

MTR Corporation Limited

Shatin to Central Link –
Hung Hom to Admiralty Section

Fixed Plant Noise Audit Report

(Batch 3 – North Ventilation Building (NOV))

(March 2022)

Certified by:	Lisa Poon 
Position:	Environmental Team Leader
Date:	11 March 2022

MTR Corporation Limited

Consultancy Agreement No. C11033B

Shatin to Central Link – Hung Hom to Admiralty

[SCL (HUH-ADM)]

Fixed Plant Noise Audit Report (Batch 3 – North Ventilation Building (NOV))

March 2022

	Name	Signature
Prepared & Checked:	Isaac Chu	
Reviewed & Approved:	Freeman Cheung	

Version:	A	Date:	10 March 2022

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 EIA Report for SCL – Hung Hom to Admiralty (HUH-ADM) Section (Register No.: AEIAR - 166/2012) was approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, the Environmental Permit (EP) (EP No: EP-436/2012), covering the construction and operation of SCL (HUH-ADM) (hereinafter referred to as "the Project"), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-436/2012 and the latest Environmental Permit (EP No: EP-436/2012/F) was issued by Director of Environmental Protection (DEP) on 29 January 2019.

1.1.3 Pursuant to EP Condition 2.31, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(HUH-ADM) EIA Report (Register No. AEIAR-166/2012) or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) having due regard to the characteristics of tonality, impulsiveness and intermittency.

1.1.4 Since the installation of fixed plant along the SCL (HUH – ADM) would be completed in stages, the fixed plant noise audit will be conducted in stages according to the testing and commissioning programmes in each area.

1.1.5 This Fixed Plant Noise Audit Report (Batch 3 – North Ventilation Building (NOV) (hereinafter referred to as "the Report")) specifies the noise measurement methodology and measurement results at the fixed plant noise sources of the Project at NOV and HUH, and at the representative Noise Sensitive Receivers (NSRs) near NOV and HUH.

1.1.6 AECOM Asia Co. Ltd has been commissioned by the MTR to prepare this Report and to conduct noise measurement at the identified NSRs for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.

1.2 Purpose of This Report

1.2.1 This Report presents the noise measurement methodology and measurement results at the fixed plant noise sources at NOV and HUH, and at the representative NSRs near NOV and HUH.

1.2.2 This Report comprises the following sections:

- Section 1 presents the background information.
- Section 2 presents the noise criteria and the representative NSRs.
- Section 3 presents the latest information of fixed plant noise sources.
- Section 4 presents the noise measurement methodology.
- Section 5 presents the noise measurement results.
- Section 6 presents the conclusion.

2 NOISE CRITERIA AND REPRESENTATIVE NOISE SENSITIVE RECEIVERS

2.1 Environmental Legislation, Standard and Guidelines

2.1.1 The Noise Control Ordinance, Cap. 400 (NCO) and Environmental Impact Assessment Ordinance, Cap. 499 (EIAO) provide the statutory framework for noise control. Operational noise from fixed noise sources is controlled by Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM) under NCO. To plan for a better environment, the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) under EIAO has specified the following requirements:

- 5 dB below the appropriate ANLs in the IND-TM; or
- the prevailing background noise levels (for quiet areas with level 5dB or more below the ANL).

2.1.2 The Acceptable Noise Levels (ANLs) for different Area Sensitivity Ratings (ASRs) during different periods are summarized in the **Table 2.1**.

Table 2.1 ANLs for Assessment of Noise from Fixed Sources

Time Period	ANL, dB(A)		
	ASR "A"	ASR "B"	ASR "C"
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

2.2 Assessment Criteria and Representative Noise Sensitive Receivers

2.2.1 Harbourfront Horizon was identified as a representative NSR for fixed plant noise assessment of NOV in the approved SCL (HUH – ADM) EIA Report. Other than Harbourfront Horizon, The Metropolis Residence Tower 2, as identified in SCL(HHS) EIA Report, is also considered as a representative NSR for the fixed plant sources installed at the north of HUH. The assessment criteria at the NSRs selected for assessing the fixed plant noise impact from NOV and HUH are summarised in **Table 2.2**.

Table 2.2 Summary of Noise Criteria at Representative NSRs for Fixed Noise Sources

NSR (NSR No.)	Time Period (1)	Prevailing Background Noise Levels, dB(A)	ASR	ANL-5, dB(A) (2)	Criteria, dB(A)
Harbourfront Horizon (HH9b)	Day & Evening	> 70 (3)	B	60	60
	Night	> 60 (3)		50	50
The Metropolis Residence Tower 2 (HUH-4-1)	Day & Evening	72 (4)	C(5)	65	65
	Night	65 (4)		55	55

Notes:
(1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(2) A 5 dB(A) has been deducted from ANL as specified in requirement of EIAO-TM.
(3) Prevailing background noise levels are extracted from Table 9.6 of approved SCL (HUH-ADM) EIA Report.
(4) Prevailing background noise levels are extracted from Table 8.8 of approved SCL(HHS) EIA Report.
(5) HUH-4-1 are indirectly affected by major roads (i.e. Cross Harbour Tunnel N Approach and Hong Chong Road with annual average daily traffic exceeding 30,000). As HUH-4-1 is located in "Urban Area", the ASR for these NSRs is identified as ASR "C" in accordance with the IND-TM.

2.3 Review of Area Sensitivity Rating

2.3.1 Area Sensitive Ratings (ASRs) as defined in the approved SCL(HUH-ADM) and SCL(HHS) EIA Reports were determined by the existence of any influencing factors (e.g. major road, industrial area) according to IND-TM at the time of preparation of the EIA Reports. During the preparation of this Report, it is revealed that there was no major change on the land use in the vicinity of representative NSRs, and thus only the existence of any major road (i.e. annual average daily traffic (AADT) flow in excess of 30,000) has been reviewed.

2.3.2 Based on latest information (i.e. Annual Traffic Census 2020) during the preparation of this Plan, no IF is located in the vicinity of HH9b, while IFs (Cross Harbour Tunnel N Approach and Hong Chong Road with AADT exceeding 30,000) are located in the vicinity of HUH-4-1. Therefore, the ASRs defined in **Table 2.2** remain unchanged.

3 LATEST INFORMATION OF FIXED PLANT NOISE SOURCES

3.1.1 Based on the latest design information, the fixed plant sources including ventilation louvres and Packaged Condenser Unit (PCU) at NOV and HUH are shown in **Figure No. C11033B/C/SCL/ACM/M52/065**. The information of the fixed plant sources and the associated updated maximum allowable Sound Power Levels (SWLs) are presented in **Table 3.1** and the predicted fixed plant noise levels are presented in **Appendix A**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test conducted at the representative NSRs.

Table 3.1 Updated Maximum Allowable SWLs for Fixed Plant Noise Sources at NOV and HUH

Location	Fixed Plant ID	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1]	
			Daytime & Evening[2]	Night-time[2]
NOV	NOV-VS1	Ventilation Louver	93	79
	NOV-VS2	Ventilation Louver	98	85
	NOV-LV-03	Ventilation Louver	78	68
	NOV-LV-04	Ventilation Louver	78	68
	NOV-LV-05	Ventilation Louver	76	66
	NOV-LV-06	Ventilation Louver	82	72
	NOV-LV-07	Ventilation Louver	81	71
	NOV-LV-09	Ventilation Louver	88	78
	NOV-LV-10	Ventilation Louver	89	79
	NOV-LV-12	Ventilation Louver	81	71
	NOV-LV-13	Ventilation Louver	77	67
	NOV-LV-19	Ventilation Louver	77	67
	NOV-LV-22	Ventilation Louver	88	78
	NOV-LV-24	Ventilation Louver	75	65
	NOV-LV-26	Ventilation Louver	79	69
	NOV-VCU-001	Packaged Condenser Unit	77	67
	NOV-VCU-002	Packaged Condenser Unit	80	70
	NOV-VCU-003	Packaged Condenser Unit	79	69
	NOV-VCU-004	Packaged Condenser Unit	72	62
HUH	HUH-7a	Ventilation Louver	100 [3]	90[3]
	HUH-7b	Ventilation Louver	100 [3]	90[3]
	HUH-8a	Ventilation Louver	100 [3]	90[3]
	HUH-8b	Ventilation Louver	100 [3]	90[3]
	HUH-17	Ventilation Louver	105 [3]	95[3]
	HUH-18	Ventilation Louver	105 [3]	95[3]
	HUH-19a	Ventilation Louver	105 [3]	95[3]
	HUH-19b	Ventilation Louver	105 [3]	95[3]
	HUH-21a	Ventilation Louver	105 [3]	95[3]
	HUH-21b	Ventilation Louver	105 [3]	95[3]

Notes:

(1) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(3) Reference has been made to the approved Fixed Plant Noise Audit Report (Updated Batch 7 – Hung Hom Station and Hung Hom Siding (HUH & HHS)) for SCL (TAW-HUH) & SCL (MKK-HUH).

4 MEASUREMENT METHODOLOGY

4.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

Measurement Methodology

4.1.1 Details of measurement methodology for SCL are presented in **Appendix B1**. Noise measurements to obtain the SWLs of the fixed plant noise sources followed **Appendix B1** and were conducted by Wilson Acoustics Limited.

Measurement Equipment

4.1.2 The sound level meters and calibrators used for noise measurements are listed in the **Table 4.1**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are provided in **Appendix B2**.

Table 4.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	SVANTEK 958	69082
	SVANTEK 958	28422
	SVANTEK 959	11228
	SVANTEK 959A	59120
	SVANTEK 959A	59121
Calibrator	SVANTEK SV30A	29088
	SVANTEK SV30A	10814

4.1.3 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Date and Time

4.1.4 There will be daytime/evening and night-time operation modes for fixed plant sources at NOV, and the operation of fixed plant sources at HUH are identical during both daytime and night-time periods. Nevertheless, the noise measurements at NOV and HUH were all conducted during night-time periods at the fixed plant noise sources in order to minimise influence from background noise on measurement data. Details of the noise measurement schedule are shown in **Table 4.2**.

Table 4.2 Measurement Schedule

Location	Date
NOV & HUH	27, 28 & 29 November 2019 6, 10, 11 & 20 January 2022

4.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Measurement Parameters

4.2.1 L_{Aeq} (30min) was measured at each designated measurement location. 1/3 octave band spectrum and time history over the measurement period was also be logged for determination of tonal, impulsiveness and intermittency characteristic.

4.2.2 Background noise level was measured at the same measurement location in term of L_{Aeq} (5 min) immediate before or after the noise measurement when all Project's fixed plant equipment shut down. To minimise the measurement data being influenced by background noise, noise data obtained at an instance of minimal or no traffic on the road was used to evaluate the tonal characteristic. The corrections for tonality, impulsiveness or intermittency at the representative NSRs were determined in accordance with IND-TM. In addition, any noticeable characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources was recorded during the measurement.

Measurement Equipment

4.2.3 The sound level meters and calibrators used for noise measurements at representative NSRs are listed in the **Table 4.3**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are shown in **Appendix C1**.

Table 4.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250L	2681366
	B&K 2250	3001291
Calibrator	B&K 4231	3006428
	Rion NC-74	34246490

4.2.4 Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

Measurement Locations

4.2.5 The proposed noise measurement locations, which have direct line of sight to the noise sources and were accessible for noise measurement, were selected to represent the representative NSRs. These measurement locations had been agreed with EPD prior to noise measurement. The measurement locations are summarised in **Table 4.4** and shown in **Figure No. C11033B/C/SCL/ACM/M52/065**. Photographs of measurement locations are shown in **Appendix C2**.

Table 4.4 Noise Measurement Locations

Measurement Location ID	NSR (NSR No.)	Type	Measurement Location and Height
FN1	Harbourfront Horizon (HH9b)	Residential	On the footbridge near HH9b (1.2m above the footbridge level in free-field condition)
FN2	The Metropolis Residence Tower 2	Residential	On the footbridge near The Metropolis Tower (1m from the footbridge parapet

Measurement Location ID	NSR (NSR No.)	Type	Measurement Location and Height
	(HUH-4-1)		wall)

Measurement Date and Time

4.2.6 There will be daytime/evening and night-time operation modes for fixed plant sources at NOV, and the operation of fixed plant sources of the Project at HUH are identical during both daytime and night-time periods. To minimise the influence from background noise in measurement data, noise measurements at representative NSRs were therefore only conducted during night-time period. The measurement schedule is presented in **Table 4.5.**

Table 4.5 Measurement Schedule

Location	NSR ID	Date
NOV & HUH	FN1 & FN2	2 March 2022

5 MEASUREMENT RESULTS

5.1 Noise Measurement to Obtain the SWLs of Fixed Plant Noise Sources

5.1.1 The measured SWLs under conservative approach during daytime and evening, and night-time periods are presented in **Table 5.1**. The measurement results indicated the fixed plant noise levels in NOV and HUH comply with the updated maximum allowable SWLs. Details of the measurement results are shown in **Appendix B4**.

Table 5.1 Summary of Measured SWLs for Fixed Plants

Plant Item	Measured SWL, dB(A)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)	Daytime & Evening (1)	Night-time (1)
NOV						
NOV-VS1(2)	93	79	93	79	Y	Y
NOV-VS2 (2)	98	85	98	85	Y	Y
NOV-LV-03	68	68	78	68	Y	Y
NOV-LV-04	68	68	78	68	Y	Y
NOV-LV-05	66	66	76	66	Y	Y
NOV-LV-06	72	72	82	72	Y	Y
NOV-LV-07	71	71	81	71	Y	Y
NOV-LV-09	78	78	88	78	Y	Y
NOV-LV-10	79	79	89	79	Y	Y
NOV-LV-12	71	71	81	71	Y	Y
NOV-LV-13	67	67	77	67	Y	Y
NOV-LV-19	67	67	77	67	Y	Y
NOV-LV-22	78	78	88	78	Y	Y
NOV-LV-24	65	65	75	65	Y	Y
NOV-LV-26	69	69	79	69	Y	Y
NOV-VCU-001	67	67	77	67	Y	Y
NOV-VCU-002	70	70	80	70	Y	Y
NOV-VCU-003	69	69	79	69	Y	Y
NOV-VCU-004	62	62	72	62	Y	Y
HUH						
HUH-7a	77	77	100	90	Y	Y
HUH-7b	78	78	100	90	Y	Y
HUH-8a	70	70	100	90	Y	Y
HUH-8b	69	69	100	90	Y	Y
HUH-17	93	93	105	95	Y	Y
HUH-18	88	88	105	95	Y	Y
HUH-19a	83	83	105	95	Y	Y
HUH-19b	79	79	105	95	Y	Y
HUH-21a	73	73	105	95	Y	Y
HUH-21b	85	85	105	95	Y	Y

Notes:
(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.
(2) As discussed in **Section 4.1.4**, some plants will be operated in different modes, namely daytime/evening and night-time operation modes. Therefore, the measured SWLs for these plants will be different at different operation modes. For those plants operating in the same mode during both daytime/evening and night-time periods, the measured SWL is same for both daytime/evening and night-time periods.

5.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at NSRs

5.2.1 Noise measurements to confirm any characteristics of tonality, impulsiveness and intermittency at the representative NSRs were conducted during night-time period. Measurement results are summarised in **Table 5.2** below. No characteristics of tonality, impulsiveness and intermittency was observed at the representative NSR. Data analysis has been carried out to determine the characteristics of tonality, impulsiveness and intermittency by assessing the logged 1/3 octave band spectra and time history profile. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. Based on site observation and findings of data analysis, it is concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources. Detailed noise measurements results are presented in **Appendix C3**.

Table 5.2 Noise Measurement Results at Measurement Locations

NSR ID	Description	Time Period[(1)(2)]	Measurement Result			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$, dB(A)	Background Noise Level $L_{Aeq(5mins)}$, dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
FN1	On the footbridge near Harbourfront Horizon	Daytime & Evening	62.8	62.6	0.2	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location.	N
		Night-time	63.1	63.6	-0.5		
FN2	On the footbridge near The Metropolis Tower	Daytime & Evening	57.9	56.9	1.0	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement location	N
		Night-time	58.8	58.2	0.6		

Notes:
(1) All noise measurement was conducted during night-time period (2300 to 0700 hours).
(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.

6 CONCLUSION

6.1.1 The fixed plant noise verifications were undertaken and the measurement results indicated all the fixed plant noise levels in NOV and HUH comply with the updated maximum allowable SWLs, No characteristics of tonality, impulsiveness and intermittency were observed at the representative NSRs. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. It is therefore concluded that no characteristics of tonality, impulsiveness and intermittency are expected from the fixed plant sources.

Figure

DETAIL '2'
A3 1 : 1000

NOV-LV-07
NOV-VS1
NOV-VCU-001
NOV-LV-22
NOV-VCU-002
NOV-LV-09
NOV-VCU-003
NOV-VCU-004
NOV-LV-10
NOV-LV-12
NOV-VS2
NOV-LV-19
NOV-LV-13
NOV-LV-24
NOV-LV-06
NOV-LV-05
NOV-LV-04
NOV-LV-26
NOV-LV-03

817900 N
836800 E
818000 N

SCL (HUH - ADM) SCL (MKK - HUH)
CHEONG WAN ROAD
HONG CHONG ROAD
SALISBURY ROAD
ON WAN ROAD

DETAIL '1'
A3 1 : 1000

818400 N
836800 E
HUH
17
18
19a
19b
21a & 21b
CHEONG WAN ROAD
Bus Terminus
Railway

DETAIL '2'
7a & 7b
8a & 8b
HUH
DETAIL '1'
837200 E

SOUTH SIDE VENTILATION SHAFTS
UNDER SCL(MKK-HUH) ASSESSED
IN SCL(HHS) ETA REPORT

FN1
FN2
ELEVATED ROAD
HUH-4-1
HUH-4-1a
HH9b

0 15 30 45 60 75
METRES
1 : 3000

REPRESENTATIVE NOISE SENSITIVE RECEIVERS	
HH9b	HARBOURFRONT HORIZON
HUH-4-1	THE METROPOLIS RESIDENCE TOWER 2

LEGEND:

- SCL ALIGNMENT
- HUNG HOM STATION
- TRANSFORMER ROOM
- COOLING TOWER
- NORTH VENTILATION BUILDING (NOV)
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
- NOISE MEASUREMENT LOCATION
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
- APPROXIMATE NOISE SOURCE LOCATION (TOP)
- APPROXIMATE DIRECTION OF NOISE SOURCE(FACADE)

ABBREVIATIONS:

SCL	SHATIN TO CENTRAL LINK
SCL (MKK - HUH)	SHATIN TO CENTRAL LINK - MONG KOK EAST TO HUNG HOM SECTION
SCL (HUH - ADM)	SHATIN TO CENTRAL LINK - HUNG HOM TO ADMIRALTY SECTION
SCL (HHS)	SHATIN TO CENTRAL LINK - STABLING SIDINGS AT HUNG HOM FREIGHT YARD

PLOT DRV: V:\ustnset\MTR\PLOTDRIVER\WINDOWS\A3 COLOUR.pltPRINTED BY: ZHLZ 2022/3/10 11:22:47
MODELNAME: DefaultFILENAME: P:\PROJECTS\60280235\DRAWINGS\000\X\ENSR\C11033B_C_SCL_ACM_M52_065A.dgn

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	ZLZ
DESIGNED	---
CHECKED	---
APPROVED	---
DATE	03/MAR/2022

MTR
SHATIN TO CENTRAL LINK
ORIGINATOR
AECOM
CADD REF. C11033B_C_SCL_ACM_M52_065A.dgn

TITLE
C11033B
SCL (HUH - ADM)
LOCATIONS OF NSRS AND FIXED NOISE SOURCES
(NORTH VENTILATION BUILDING AND HUNG HOM STATION)

SCALE 1 : 3000 (A3)
FIGURE NO. C11033B/C/SCL/ACM/M52/065
REV. A

Appendix A

Detailed Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - HH9b

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A) [3]	Total SPL, dB(A)	Daytime / Evening Noise Criteria, dB(A)
NOV											
HH9b											
Daytime and Evening											
HH9b	Harbourfront Horizon	HUH-4-2	North	304	76	0	-58	3	N/A		
		HUH-7a	Top	246	100	0	-56	3	47		
		HUH-7b	South	246	100	0	-56	3	47		
		HUH-8a	Top	238	100	0	-56	3	47		
		HUH-8b	South	238	100	0	-56	3	47		
		HUH-9a	Top	209	80	0	-54	3	29		
		HUH-9b	South	209	82	0	-54	3	31		
		HUH-9c	East	209	77	0	-54	3	26		
		HUH-10a	Top	201	78	0	-54	3	27		
		HUH-10b	South	201	81	0	-54	3	30		
		HUH-10c	East	201	70	0	-54	3	19		
		HUH-11a	Top	194	68	0	-54	3	17		
		HUH-11b	South	194	70	0	-54	3	19		
		HUH-12a	Top	186	66	0	-53	3	16		
		HUH-12b	South	186	68	0	-53	3	18		
		HUH-13a	Top	178	64	0	-53	3	14		
		HUH-14-1-1	South	192	75	0	-54	3	24		
		HUH-14-1-2	South	192	88	0	-54	3	37		
		HUH-14-2	South	184	91	0	-53	3	41		
		HUH-14-3	South	177	87	0	-53	3	37		
		HUH-15	West	528	84	-10	-62	3	N/A		
		HUH-16a	Top	526	80	-10	-62	3	N/A		
		HUH-16b	East	526	85	-10	-62	3	N/A		
		HUH-17	North	518	105	-10	-62	3	N/A		
		HUH-18	Top	511	105	-10	-62	3	N/A		
		HUH-19a	Top	540	105	-10	-63	3	N/A		
		HUH-19b	North	540	105	-10	-63	3	N/A		
		HUH-20	Top	504	71	-10	-62	3	N/A		
		HUH-21a	Top	500	105	-10	-62	3	N/A		
		HUH-21b	North	500	105	-10	-62	3	N/A		
		HUH-22a-1	Top	497	83	-10	-62	3	N/A		
		HUH-22a-2	North	497	83	-10	-62	3	N/A		
		HUH-22b	North	497	85	-10	-62	3	N/A		
		HUH-26H	East	579	88	-10	-63	3	N/A		
		HUH-27H	East	570	81	-10	-63	3	N/A		
		HUH-29	East	556	70	-10	-63	3	N/A		
		HUH-30H	West	571	84	-10	-63	3	N/A		
		HUH-32H	West	566	83	-10	-63	3	N/A		
		HUH-33H	West	575	88	-10	-63	3	N/A		
		HUH-37H	East	574	85	-10	-63	3	N/A		
		HHS-38	South	163	64	0	-52	3	15		
		HHS-40	South	152	88	-10	-52	3	29		
		HHS-41-1	West	145	54	-10	-51	3	negligible*		
		HHS-41-2	West	145	66	-10	-51	3	8		
		HHS-42-1	West	141	66	-10	-51	3	8		
		HHS-42-2	West	141	64	-10	-51	3	6		
		HHS-42-3	West	141	63	-10	-51	3	5		
		HHS-45-1	West	135	85	-10	-51	3	27		
		HHS-45-2	West	135	60	-10	-51	3	2		
		HHS-49-2	East	109	78	0	-49	3	32		
		HHS-49-3	East	109	71	0	-49	3	25		
		HHS-49-6	East	109	67	0	-49	3	21		
		HHS-49-8	East	109	70	0	-49	3	24		
		HHS-50-1	East	105	75	0	-48	3	30		
		HHS-50-2	East	105	69	0	-48	3	24		
		HHS-51	East	92	86	0	-47	3	42		
		HHS-52-1	East	90	63	0	-47	3	19		
		HHS-53-1	East	92	68	0	-47	3	24		
		HHS-53-2	East	92	75	0	-47	3	31		
		HHS-53-3	East	92	59	0	-47	3	15		
		HHS-53-4	East	92	67	0	-47	3	23		
		HHS-53-5	East	92	69	0	-47	3	25		
		HHS-53-6	East	92	66	0	-47	3	22		
		HHS-56	East	107	73	0	-49	3	27		
		HHS-57-2	East	129	61	0	-50	3	14		
		HHS-58-1	East	141	68	0	-51	3	20		
		HHS-58-2	East	141	69	0	-51	3	21		
		HHS-62-2	East	234	69	0	-55	3	17		
		HHS-67-1	East	303	71	0	-58	3	N/A		
		HHS-67-3	East	303	73	0	-58	3	N/A		
		HHS-68-1	East	329	72	0	-58	3	N/A		
		HHS-68-2	East	329	71	0	-58	3	N/A		
		HHS-68-3	East	329	70	0	-58	3	N/A		
		HHS-70-3	East	356	59	0	-59	3	N/A		
		HHS-71-1	East	370	54	0	-59	3	N/A		
		HHS-71-2	East	370	56	0	-59	3	N/A		
		HHS-71-3	East	370	67	0	-59	3	N/A		
		HHS-73	East	433	53	-10	-61	3	N/A		
		HHS-77-1	East	440	54	-10	-61	3	N/A		
		HHS-77-2	East	440	55	-10	-61	3	N/A		
		HHS-77-3	East	440	55	-10	-61	3	N/A		
		HHS-78	North	470	87	-10	-61	3	N/A		
		HUH-80-1	Top	311	92	0	-58	3	N/A		
		HUH-80-2	Top	311	92	0	-58	3	N/A		
		HUH-80-3	Top	310	93	0	-58	3	N/A		
		HUH-81	Top	308	99	0	-58	3	N/A		
		HUH-82-1	South	320	76	0	-58	3	N/A		
		HUH-82-6	South	320	88	0	-58	3	N/A		
		HHS-84	East	193	72	0	-54	3	21		
		HUH-85b	North	508	87	-10	-62	3	N/A		
		HUH-86-4	North	438	67	-10	-61	3	N/A		
		HUH-86-13	North	438	72	-10	-61	3	N/A		
		HHS-87-2	East	107	75	0	-49	3	29		
		HHS-88-2	East	105	58	0	-48	3	13		
		HUH-95b	South	236	92	0	-55	3	40		
		HHS-100-2	Top	162	62	-10	-52	3	3		
		HHS-101-1	Top	166	76	-10	-52	3	17		
		HHS-102-1	Top	97	69	0	-48	3	24		
		HHS-102-2	Top	97	71	0	-48	3	26		
		HHS-102-3	Top	97	75	0	-48	3	30		
		HHS-102-6	Top	97	71	0	-48	3	26		
		HHS-102-7	Top	97	73	0	-48	3	28		
		HHS-102-9	Top	97	71	0	-48	3	26		
		HHS-102-11	Top	97	72	0	-48	3	27		
		HUH-103-1	Top	524	70	-10	-62	3	N/A		
		HUH-103-2	Top	524	69	-10	-62	3	N/A		
		HUH-103-3	Top	524	76	-10	-62	3	N/A		
		HUH-103-4	Top	524	75	-10	-62	3	N/A		
		HUH-103-5	Top	524	74	-10	-62	3	N/A		
		HUH-103-6	Top	524	71	-10	-62	3	N/A		
		HUH-103-7	Top	524	74	-10	-62	3	N/A		
		HUH-103-8	Top	524	72	-10	-62	3	N/A		
		HUH-103-9	Top	524	73	-10	-62	3	N/A		
		HUH-103-10	Top	524	72	-10	-62	3	N/A		
		HUH-103-11	Top	524	73	-10	-62	3	N/A		
		HUH-103-12	Top	524	72	-10	-62	3	N/A		
		HUH-103-13	Top	524	70	-10	-62	3	N/A		
		HUH-103-14	Top	524	72	-10	-62	3	N/A		
		HUH-104-1	Top	513	65	-10	-62	3	N/A		
		HUH-104-2	Top	513	70	-10	-62	3	N/A		
		HUH-104-3	Top	513	76	-10	-62	3	N/A		
		HUH-104-4	Top	513	77	-10	-62	3	N/A		
		HUH-104-5	Top	513	69	-10	-62	3	N/A		
		HUH-104-6	Top	513	69	-10	-62	3	N/A		
		HUH-104-7	Top	513	72	-10	-62	3	N/A		
		HUH-107b	South	243	94	0	-56	3	41		
		HUH-108	South	200	58	0	-54	3	7		
		HUH-109	Top	554	75	-10	-63	3	N/A		
		HUH-110	Top	554	76	-10	-63	3	N/A		
		HUH-111	Top	555	76	-10	-63	3	N/A		
		HUH-112	Top	555	76	-10	-63	3	N/A		
		HUH-113	Top	555	75	-10	-63	3	N/A		
		HUH-115	North	531	73	-10	-62	3	N/A		
		HUH-116	North	528	70	-10	-62	3	N/A		
		HUH-117	North	526	70	-10	-62	3	N/A		
		HUH-118	North	524	68	-10	-62	3	N/A		
		HUH-119	Top	323	65	-10	-58	3	N/A		
		HUH-120	Top	319	71	-10	-58	3	N/A		
		HHS-121	East	436	60	-10	-61	3	N/A		
		NOV-VS1	Top	240	93	0	-56	3	40		
		NOV-VS2	Top	228	98	0	-55	3	46		
		NOV-LV-03	East	218	78	0	-55	3	26		
		NOV-LV-04	North	220	78	-10	-55	3	16		
		NOV-LV-05	North	247	76	0	-56	3	23		
		NOV-LV-06	West	250	82	-10	-56	3	19		
		NOV-LV-07	West	253	81	-10	-56	3	18		
		NOV-LV-09	South	237	88	0	-55	3	36		
		NOV-LV-10	North	231	89	0	-55	3	37		
		NOV-LV-12	South	229	81	0	-55	3	29		
		NOV-LV-13	South-East	219	77	0	-55	3	25		
		NOV-LV-19	South	220	77	0	-55	3	25		
		NOV-LV-22	South	241	88	0	-56	3	35		
		NOV-LV-24	East	218	75	0	-55	3	23		
		NOV-LV-26	North	218	79	0	-55	3	27		
		NOV-VCU-001	South	238	77	0	-56	3	24		
		NOV-VCU-002	South	235	80	0	-55	3	28		
		NOV-VCU-003	South	233	79	0	-55	3	27		
		NOV-VCU-004	South	232	72	0	-55	3	20	**56**	**60**

Fixed Plant Noise Calculation - HH9b

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A) [3]	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Hung Hom Station Ventilation Shaft											
HH9b											
Night-time											
HH9b	Harbourfront Horizon	HUH-4-2	North	304	76	0	-58	3	N/A		
		HUH-7a	Top	246	90	0	-56	3	37		
		HUH-7b	South	246	90	0	-56	3	37		
		HUH-8a	Top	238	90	0	-56	3	37		
		HUH-8b	South	238	90	0	-56	3	37		
		HUH-9a	Top	209	80	0	-54	3	29		
		HUH-9b	South	209	82	0	-54	3	31		
		HUH-9c	East	209	77	0	-54	3	26		
		HUH-10a	Top	201	78	0	-54	3	27		
		HUH-10b	South	201	81	0	-54	3	30		
		HUH-10c	East	201	70	0	-54	3	19		
		HUH-11a	Top	194	68	0	-54	3	17		
		HUH-11b	South	194	70	0	-54	3	19		
		HUH-12a	Top	186	66	0	-53	3	16		
		HUH-12b	South	186	68	0	-53	3	18		
		HUH-13a	Top	178	64	0	-53	3	14		
		HUH-14-1-1	South	192	75	0	-54	3	24		
		HUH-14-1-2	South	192	88	0	-54	3	37		
		HUH-14-2	South	184	91	0	-53	3	41		
		HUH-14-3	South	177	87	0	-53	3	37		
		HUH-15	West	528	84	-10	-62	3	N/A		
		HUH-16a	Top	526	80	-10	-62	3	N/A		
		HUH-16b	East	526	85	-10	-62	3	N/A		
		HUH-17	North	518	95	-10	-62	3	N/A		
		HUH-18	Top	511	95	-10	-62	3	N/A		
		HUH-19a	Top	540	95	-10	-63	3	N/A		
		HUH-19b	North	540	95	-10	-63	3	N/A		
		HUH-20	Top	504	71	-10	-62	3	N/A		
		HUH-21a	Top	500	95	-10	-62	3	N/A		
		HUH-21b	North	500	95	-10	-62	3	N/A		
		HUH-22a-1	Top	497	83	-10	-62	3	N/A		
		HUH-22a-2	North	497	83	-10	-62	3	N/A		
		HUH-22b	North	497	85	-10	-62	3	N/A		
		HUH-26H	East	579	88	-10	-63	3	N/A		
		HUH-27H	East	570	81	-10	-63	3	N/A		
		HUH-29	East	556	70	-10	-63	3	N/A		
		HUH-30H	West	571	84	-10	-63	3	N/A		
		HUH-32H	West	566	83	-10	-63	3	N/A		
		HUH-33H	West	575	88	-10	-63	3	N/A		
		HUH-37H	East	574	85	-10	-63	3	N/A		
		HHS-38	South	163	64	0	-52	3	15		
		HHS-40	South	152	-	-10	-52	3	-		
		HHS-41-1	West	145	54	-10	-51	3	negligible*		
		HHS-41-2	West	145	66	-10	-51	3	8		
		HHS-42-1	West	141	66	-10	-51	3	8		
		HHS-42-2	West	141	64	-10	-51	3	6		
		HHS-42-3	West	141	63	-10	-51	3	5		
		HHS-45-1	West	135	85	-10	-51	3	27		
		HHS-45-2	West	135	60	-10	-51	3	2		
		HHS-49-2	East	109	78	0	-49	3	32		
		HHS-49-3	East	109	71	0	-49	3	25		
		HHS-49-6	East	109	67	0	-49	3	21		
		HHS-49-8	East	109	70	0	-49	3	24		
		HHS-50-1	East	105	75	0	-48	3	30		
		HHS-50-2	East	105	69	0	-48	3	24		
		HHS-51	East	92	85	0	-47	3	41		
		HHS-52-1	East	90	63	0	-47	3	19		
		HHS-53-1	East	92	68	0	-47	3	24		
		HHS-53-2	East	92	75	0	-47	3	31		
		HHS-53-3	East	92	59	0	-47	3	15		
		HHS-53-4	East	92	67	0	-47	3	23		
		HHS-53-5	East	92	69	0	-47	3	25		
		HHS-53-6	East	92	66	0	-47	3	22		
		HHS-56	East	107	73	0	-49	3	27		
		HHS-57-2	East	129	61	0	-50	3	14		
		HHS-58-1	East	141	68	0	-51	3	20		
		HHS-58-2	East	141	69	0	-51	3	21		
		HHS-62-2	East	234	69	0	-55	3	17		
		HHS-67-1	East	303	71	0	-58	3	N/A		
		HHS-67-3	East	303	73	0	-58	3	N/A		
		HHS-68-1	East	329	72	0	-58	3	N/A		
		HHS-68-2	East	329	71	0	-58	3	N/A		
		HHS-68-3	East	329	70	0	-58	3	N/A		
		HHS-70-3	East	356	59	0	-59	3	N/A		
		HHS-71-1	East	370	54	0	-59	3	N/A		
		HHS-71-2	East	370	56	0	-59	3	N/A		
		HHS-71-3	East	370	67	0	-59	3	N/A		
		HHS-73	East	433	53	-10	-61	3	N/A		
		HHS-77-1	East	440	54	-10	-61	3	N/A		
		HHS-77-2	East	440	55	-10	-61	3	N/A		
		HHS-77-3	East	440	55	-10	-61	3	N/A		
		HHS-78	North	470	79	-10	-61	3	N/A		
		HUH-80-1	Top	311	92	0	-58	3	N/A		
		HUH-80-2	Top	311	92	0	-58	3	N/A		
		HUH-80-3	Top	310	93	0	-58	3	N/A		
		HUH-81	Top	308	99	0	-58	3	N/A		
		HUH-82-1	South	320	76	0	-58	3	N/A		
		HUH-82-6	South	320	88	0	-58	3	N/A		
		HHS-84	East	193	72	0	-54	3	21		
		HUH-85b	North	508	87	-10	-62	3	N/A		
		HUH-86-4	North	438	67	-10	-61	3	N/A		
		HUH-86-13	North	438	72	-10	-61	3	N/A		
		HHS-87-2	East	107	75	0	-49	3	29		
		HHS-88-2	East	105	58	0	-48	3	13		
		HUH-95b	South	236	92	0	-55	3	40		
		HHS-100-2	Top	162	62	-10	-52	3	3		
		HHS-101-1	Top	166	76	-10	-52	3	17		
		HHS-102-1	Top	97	69	0	-48	3	24		
		HHS-102-2	Top	97	71	0	-48	3	26		
		HHS-102-3	Top	97	75	0	-48	3	30		
		HHS-102-6	Top	97	71	0	-48	3	26		
		HHS-102-7	Top	97	73	0	-48	3	28		
		HHS-102-9	Top	97	71	0	-48	3	26		
		HHS-102-11	Top	97	72	0	-48	3	27		
		HUH-103-1	Top	524	70	-10	-62	3	N/A		
		HUH-103-2	Top	524	69	-10	-62	3	N/A		
		HUH-103-3	Top	524	76	-10	-62	3	N/A		
		HUH-103-4	Top	524	75	-10	-62	3	N/A		
		HUH-103-5	Top	524	74	-10	-62	3	N/A		
		HUH-103-6	Top	524	71	-10	-62	3	N/A		
		HUH-103-7	Top	524	74	-10	-62	3	N/A		
		HUH-103-8	Top	524	72	-10	-62	3	N/A		
		HUH-103-9	Top	524	73	-10	-62	3	N/A		
		HUH-103-10	Top	524	72	-10	-62	3	N/A		
		HUH-103-11	Top	524	73	-10	-62	3	N/A		
		HUH-103-12	Top	524	72	-10	-62	3	N/A		
		HUH-103-13	Top	524	70	-10	-62	3	N/A		
		HUH-103-14	Top	524	72	-10	-62	3	N/A		
		HUH-104-1	Top	513	65	-10	-62	3	N/A		
		HUH-104-2	Top	513	70	-10	-62	3	N/A		
		HUH-104-3	Top	513	76	-10	-62	3	N/A		
		HUH-104-4	Top	513	77	-10	-62	3	N/A		
		HUH-104-5	Top	513	69	-10	-62	3	N/A		
		HUH-104-6	Top	513	69	-10	-62	3	N/A		
		HUH-104-7	Top	513	72	-10	-62	3	N/A		
		HUH-107b	South	243	94	0	-56	3	41		
		HUH-108	South	200	58	0	-54	3	7		
		HUH-109	Top	554	75	-10	-63	3	N/A		
		HUH-110	Top	554	76	-10	-63	3	N/A		
		HUH-111	Top	555	76	-10	-63	3	N/A		
		HUH-112	Top	555	76	-10	-63	3	N/A		
		HUH-113	Top	555	75	-10	-63	3	N/A		
		HUH-115	North	531	73	-10	-62	3	N/A		
		HUH-116	North	528	70	-10	-62	3	N/A		
		HUH-117	North	526	70	-10	-62	3	N/A		
		HUH-118	North	524	68	-10	-62	3	N/A		
		HUH-119	Top	323	65	-10	-58	3	N/A		
		HUH-120	Top	319	71	-10	-58	3	N/A		
		HHS-121	East	436	60	-10	-61	3	N/A		
		NOV-VS1	Top	240	79	0	-56	3	26		
		NOV-VS2	Top	228	85	0	-55	3	33		
		NOV-LV-03	East	218	68	0	-55	3	16		
		NOV-LV-04	North	220	68	-10	-55	3	6		
		NOV-LV-05	North	247	66	0	-56	3	13		
		NOV-LV-06	West	250	72	-10	-56	3	9		
		NOV-LV-07	West	253	71	-10	-56	3	8		
		NOV-LV-09	South	237	78	0	-55	3	26		
		NOV-LV-10	North	231	79	0	-55	3	27		
		NOV-LV-12	South	229	71	0	-55	3	19		
		NOV-LV-13	South-East	219	67	0	-55	3	15		
		NOV-LV-19	South	220	67	0	-55	3	15		
		NOV-LV-22	South	241	78	0	-56	3	25		
		NOV-LV-24	East	218	65	0	-55	3	13		
		NOV-LV-26	North	218	69	0	-55	3	17		
		NOV-VCU-001	South	238	67	0	-56	3	14		
		NOV-VCU-002	South	235	70	0	-55	3	18		
		NOV-VCU-003	South	233	69	0	-55	3	17		
		NOV-VCU-004	South	232	62	0	-55	3	10	**50**	**50**

Remark:
[1] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.
[2] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings.
[3] Only noise sources within 300m from the NSRs are included in the assessment.
*The sum of correction factor is larger than the measured SWL, therefore, the predicted sound pressure level is consider negligible.

Fixed Plant Noise Calculation - HUH-4-1a

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A) [3]	Total SPL, dB(A)	Daytime / Evening Noise Criteria, dB(A)
NOV											
HUH-4-1a											
Daytime and Evening											
HUH-4-1a	The Metropolis Residence Tower 2	HUH-4-2	North	397	76	-10	-60	3	N/A		
		HUH-7a	Top	350	100	-10	-59	3	N/A		
		HUH-7b	South	350	100	-10	-59	3	N/A		
		HUH-8a	Top	347	100	-10	-59	3	N/A		
		HUH-8b	South	347	100	-10	-59	3	N/A		
		HUH-9a	Top	338	80	-10	-59	3	N/A		
		HUH-9b	South	338	82	-10	-59	3	N/A		
		HUH-9c	East	338	77	-10	-59	3	N/A		
		HUH-10a	Top	335	78	-10	-59	3	N/A		
		HUH-10b	South	335	81	-10	-59	3	N/A		
		HUH-10c	East	335	70	-10	-59	3	N/A		
		HUH-11a	Top	334	68	-10	-58	3	N/A		
		HUH-11b	South	334	70	-10	-58	3	N/A		
		HUH-12a	Top	332	66	-10	-58	3	N/A		
		HUH-12b	South	332	68	-10	-58	3	N/A		
		HUH-13a	Top	330	64	-10	-58	3	N/A		
		HUH-14-1-1	South	326	75	-10	-58	3	N/A		
		HUH-14-1-2	South	326	88	-10	-58	3	N/A		
		HUH-14-2	South	324	91	-10	-58	3	N/A		
		HUH-14-3	South	322	87	-10	-58	3	N/A		
		HUH-15	West	175	84	-10	-53	3	24		
		HUH-16a	Top	166	80	0	-52	3	31		
		HUH-16b	East	166	85	0	-52	3	36		
		HUH-17	North	159	105	-10	-52	3	46		
		HUH-18	Top	146	105	0	-51	3	57		
		HUH-19a	Top	167	105	0	-52	3	56		
		HUH-19b	North	167	105	-10	-52	3	46		
		HUH-20	Top	136	71	0	-51	3	23		
		HUH-21a	Top	128	105	0	-50	3	58		
		HUH-21b	North	128	105	-10	-50	3	48		
		HUH-22a-1	Top	123	83	0	-50	3	36		
		HUH-22a-2	North	123	83	-10	-50	3	26		
		HUH-22b	North	123	85	-10	-50	3	28		
		HUH-26H	East	205	88	0	-54	3	37		
		HUH-27H	East	198	81	0	-54	3	30		
		HUH-29	East	185	70	0	-53	3	20		
		HUH-30H	West	203	84	-10	-54	3	23		
		HUH-32H	West	198	83	-10	-54	3	22		
		HUH-33H	West	205	88	-10	-54	3	27		
		HUH-37H	East	201	85	0	-54	3	34		
		HHS-38	South	321	64	-10	-58	3	N/A		
		HHS-40	South	319	88	-10	-58	3	N/A		
		HHS-41-1	West	328	54	-10	-58	3	N/A		
		HHS-41-2	West	328	66	-10	-58	3	N/A		
		HHS-42-1	West	339	66	-10	-59	3	N/A		
		HHS-42-2	West	339	64	-10	-59	3	N/A		
		HHS-42-3	West	339	63	-10	-59	3	N/A		
		HHS-45-1	West	362	85	-10	-59	3	N/A		
		HHS-45-2	West	362	60	-10	-59	3	N/A		
		HHS-49-2	East	352	78	-10	-59	3	N/A		
		HHS-49-3	East	352	71	-10	-59	3	N/A		
		HHS-49-6	East	352	67	-10	-59	3	N/A		
		HHS-49-8	East	352	70	-10	-59	3	N/A		
		HHS-50-1	East	347	75	-10	-59	3	N/A		
		HHS-50-2	East	347	69	-10	-59	3	N/A		
		HHS-51	East	332	86	-10	-58	3	N/A		
		HHS-52-1	East	319	63	-10	-58	3	N/A		
		HHS-53-1	East	309	68	-10	-58	3	N/A		
		HHS-53-2	East	309	75	-10	-58	3	N/A		
		HHS-53-3	East	309	59	-10	-58	3	N/A		
		HHS-53-4	East	309	67	-10	-58	3	N/A		
		HHS-53-5	East	309	69	-10	-58	3	N/A		
		HHS-53-6	East	309	66	-10	-58	3	N/A		
		HHS-56	East	284	73	-10	-57	3	9		
		HHS-57-2	East	260	61	-10	-56	3	negligible*		
		HHS-58-1	East	249	68	-10	-56	3	5		
		HHS-58-2	East	249	69	-10	-56	3	6		
		HHS-62-2	East	156	69	-10	-52	3	10		
		HHS-67-1	East	92	71	-10	-47	3	17		
		HHS-67-3	East	92	73	-10	-47	3	19		
		HHS-68-1	East	70	72	-10	-45	3	20		
		HHS-68-2	East	70	71	-10	-45	3	19		
		HHS-68-3	East	70	70	-10	-45	3	18		
		HHS-70-3	East	52	59	-10	-42	3	10		
		HHS-71-1	East	46	54	-10	-41	3	6		
		HHS-71-2	East	46	56	-10	-41	3	8		
		HHS-71-3	East	46	67	-10	-41	3	19		
		HHS-73	East	55	53	-10	-43	3	3		
		HHS-77-1	East	59	54	-10	-43	3	4		
		HHS-77-2	East	59	55	-10	-43	3	5		
		HHS-77-3	East	59	55	-10	-43	3	5		
		HHS-78	North	81	87	-10	-46	3	34		
		HUH-80-1	Top	433	92	0	-61	3	N/A		
		HUH-80-2	Top	428	92	0	-61	3	N/A		
		HUH-80-3	Top	423	93	0	-61	3	N/A		
		HUH-81	Top	401	99	0	-60	3	N/A		
		HUH-82-1	South	193	76	-10	-54	3	15		
		HUH-82-6	South	193	88	-10	-54	3	27		
		HHS-84	East	197	72	-10	-54	3	11		
		HUH-85b	North	136	87	-10	-51	3	29		
		HUH-86-4	North	120	67	0	-50	3	20		
		HUH-86-13	North	120	72	0	-50	3	25		
		HHS-87-2	East	284	75	-10	-57	3	11		
		HHS-88-2	East	347	58	-10	-59	3	N/A		
		HUH-95b	South	339	92	-10	-59	3	N/A		
		HHS-100-2	Top	321	62	-10	-58	3	N/A		
		HHS-101-1	Top	312	76	-10	-58	3	N/A		
		HHS-102-1	Top	297	69	-10	-57	3	5		
		HHS-102-2	Top	297	71	-10	-57	3	7		
		HHS-102-3	Top	297	75	-10	-57	3	11		
		HHS-102-6	Top	297	71	-10	-57	3	7		
		HHS-102-7	Top	297	73	-10	-57	3	9		
		HHS-102-9	Top	297	71	-10	-57	3	7		
		HHS-102-11	Top	297	72	-10	-57	3	8		
		HUH-103-1	Top	178	70	-10	-53	3	10		
		HUH-103-2	Top	178	69	-10	-53	3	9		
		HUH-103-3	Top	178	76	-10	-53	3	16		
		HUH-103-4	Top	178	75	-10	-53	3	15		
		HUH-103-5	Top	178	74	-10	-53	3	14		
		HUH-103-6	Top	178	71	-10	-53	3	11		
		HUH-103-7	Top	178	74	-10	-53	3	14		
		HUH-103-8	Top	178	72	-10	-53	3	12		
		HUH-103-9	Top	178	73	-10	-53	3	13		
		HUH-103-10	Top	178	72	-10	-53	3	12		
		HUH-103-11	Top	178	73	-10	-53	3	13		
		HUH-103-12	Top	178	72	-10	-53	3	12		
		HUH-103-13	Top	178	70	-10	-53	3	10		
		HUH-103-14	Top	178	72	-10	-53	3	12		
		HUH-104-1	Top	141	65	0	-51	3	17		
		HUH-104-2	Top	141	70	0	-51	3	22		
		HUH-104-3	Top	141	76	0	-51	3	28		
		HUH-104-4	Top	141	77	0	-51	3	29		
		HUH-104-5	Top	141	69	0	-51	3	21		
		HUH-104-6	Top	141	69	0	-51	3	21		
		HUH-104-7	Top	141	72	0	-51	3	24		
		HUH-107b	South	345	94	-10	-59	3	N/A		
		HUH-108	South	328	58	-10	-58	3	N/A		
		HUH-109	Top	185	75	0	-53	3	25		
		HUH-110	Top	186	76	0	-53	3	26		
		HUH-111	Top	187	76	0	-53	3	26		
		HUH-112	Top	188	76	0	-53	3	26		
		HUH-113	Top	188	75	0	-54	3	24		
		HUH-115	North	191	73	0	-54	3	22		
		HUH-116	North	186	70	0	-53	3	20		
		HUH-117	North	182	70	0	-53	3	20		
		HUH-118	North	178	68	0	-53	3	18		
		HUH-119	Top	426	65	-10	-61	3	N/A		
		HUH-120	Top	425	71	-10	-61	3	N/A		
		HHS-121	East	57	60	-10	-43	3	10		
		NOV-VS1	Top	415	93	-10	-60	3	N/A		
		NOV-VS2	Top	413	98	-10	-60	3	N/A		
		NOV-LV-03	East	405	78	-10	-60	3	N/A		
		NOV-LV-04	North	401	78	-10	-60	3	N/A		
		NOV-LV-05	North	409	76	-10	-60	3	N/A		
		NOV-LV-06	West	414	82	-10	-60	3	N/A		
		NOV-LV-07	West	428	81	-10	-61	3	N/A		
		NOV-LV-09	South	425	88	-10	-61	3	N/A		
		NOV-LV-10	North	421	89	-10	-60	3	N/A		
		NOV-LV-12	South	423	81	-10	-61	3	N/A		
		NOV-LV-13	South-East	417	77	-10	-60	3	N/A		
		NOV-LV-19	South	417	77	-10	-60	3	N/A		
		NOV-LV-22	South	427	88	-10	-61	3	N/A		
		NOV-LV-24	East	407	75	-10	-60	3	N/A		
		NOV-LV-26	North	400	79	-10	-60	3	N/A		
		NOV-VCU-001	South	422	77	-10	-60	3	N/A		
		NOV-VCU-002	South	421	80	-10	-60	3	N/A		
		NOV-VCU-003	South	420	79	-10	-60	3	N/A		
		NOV-VCU-004	South	420	72	-10	-60	3	N/A	**62**	**65**

Fixed Plant Noise Calculation - HUH-4-1a

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m [1]	SWL, dB(A)	Correction for line of sight [2], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A) [3]	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Hung Hom Station Ventilation Shaft											
HUH-4-1a											
Night-time											
HUH-4-1a	The Metropolis Residence Tower 2	HUH-4-2	North	397	76	-10	-60	3	N/A		
		HUH-7a	Top	350	90	-10	-59	3	N/A		
		HUH-7b	South	350	90	-10	-59	3	N/A		
		HUH-8a	Top	347	90	-10	-59	3	N/A		
		HUH-8b	South	347	90	-10	-59	3	N/A		
		HUH-9a	Top	338	80	-10	-59	3	N/A		
		HUH-9b	South	338	82	-10	-59	3	N/A		
		HUH-9c	East	338	77	-10	-59	3	N/A		
		HUH-10a	Top	335	78	-10	-59	3	N/A		
		HUH-10b	South	335	81	-10	-59	3	N/A		
		HUH-10c	East	335	70	-10	-59	3	N/A		
		HUH-11a	Top	334	68	-10	-58	3	N/A		
		HUH-11b	South	334	70	-10	-58	3	N/A		
		HUH-12a	Top	332	66	-10	-58	3	N/A		
		HUH-12b	South	332	68	-10	-58	3	N/A		
		HUH-13a	Top	330	64	-10	-58	3	N/A		
		HUH-14-1-1	South	326	75	-10	-58	3	N/A		
		HUH-14-1-2	South	326	88	-10	-58	3	N/A		
		HUH-14-2	South	324	91	-10	-58	3	N/A		
		HUH-14-3	South	322	87	-10	-58	3	N/A		
		HUH-15	West	175	84	-10	-53	3	24		
		HUH-16a	Top	166	80	0	-52	3	31		
		HUH-16b	East	166	85	0	-52	3	36		
		HUH-17	North	159	95	-10	-52	3	36		
		HUH-18	Top	146	95	0	-51	3	47		
		HUH-19a	Top	167	95	0	-52	3	46		
		HUH-19b	North	167	95	-10	-52	3	36		
		HUH-20	Top	136	71	0	-51	3	23		
		HUH-21a	Top	128	95	0	-50	3	48		
		HUH-21b	North	128	95	-10	-50	3	38		
		HUH-22a-1	Top	123	83	0	-50	3	36		
		HUH-22a-2	North	123	83	-10	-50	3	26		
		HUH-22b	North	123	85	-10	-50	3	28		
		HUH-26H	East	205	88	0	-54	3	37		
		HUH-27H	East	198	81	0	-54	3	30		
		HUH-29	East	185	70	0	-53	3	20		
		HUH-30H	West	203	84	-10	-54	3	23		
		HUH-32H	West	198	83	-10	-54	3	22		
		HUH-33H	West	205	88	-10	-54	3	27		
		HUH-37H	East	201	85	0	-54	3	34		
		HHS-38	South	321	64	-10	-58	3	N/A		
		HHS-40	South	319	-	-10	-58	3	-		
		HHS-41-1	West	328	54	-10	-58	3	N/A		
		HHS-41-2	West	328	66	-10	-58	3	N/A		
		HHS-42-1	West	339	66	-10	-59	3	N/A		
		HHS-42-2	West	339	64	-10	-59	3	N/A		
		HHS-42-3	West	339	63	-10	-59	3	N/A		
		HHS-45-1	West	362	85	-10	-59	3	N/A		
		HHS-45-2	West	362	60	-10	-59	3	N/A		
		HHS-49-2	East	352	78	-10	-59	3	N/A		
		HHS-49-3	East	352	71	-10	-59	3	N/A		
		HHS-49-6	East	352	67	-10	-59	3	N/A		
		HHS-49-8	East	352	70	-10	-59	3	N/A		
		HHS-50-1	East	347	75	-10	-59	3	N/A		
		HHS-50-2	East	347	69	-10	-59	3	N/A		
		HHS-51	East	332	85	-10	-58	3	N/A		
		HHS-52-1	East	319	63	-10	-58	3	N/A		
		HHS-53-1	East	309	68	-10	-58	3	N/A		
		HHS-53-2	East	309	75	-10	-58	3	N/A		
		HHS-53-3	East	309	59	-10	-58	3	N/A		
		HHS-53-4	East	309	67	-10	-58	3	N/A		
		HHS-53-5	East	309	69	-10	-58	3	N/A		
		HHS-53-6	East	309	66	-10	-58	3	N/A		
		HHS-56	East	284	73	-10	-57	3	9		
		HHS-57-2	East	260	61	-10	-56	3	negligible*		
		HHS-58-1	East	249	68	-10	-56	3	5		
		HHS-58-2	East	249	69	-10	-56	3	6		
		HHS-62-2	East	156	69	-10	-52	3	10		
		HHS-67-1	East	92	71	-10	-47	3	17		
		HHS-67-3	East	92	73	-10	-47	3	19		
		HHS-68-1	East	70	72	-10	-45	3	20		
		HHS-68-2	East	70	71	-10	-45	3	19		
		HHS-68-3	East	70	70	-10	-45	3	18		
		HHS-70-3	East	52	59	-10	-42	3	10		
		HHS-71-1	East	46	54	-10	-41	3	6		
		HHS-71-2	East	46	56	-10	-41	3	8		
		HHS-71-3	East	46	67	-10	-41	3	19		
		HHS-73	East	55	53	-10	-43	3	3		
		HHS-77-1	East	59	54	-10	-43	3	4		
		HHS-77-2	East	59	55	-10	-43	3	5		
		HHS-77-3	East	59	55	-10	-43	3	5		
		HHS-78	North	81	79	-10	-46	3	26		
		HUH-80-1	Top	433	92	0	-61	3	N/A		
		HUH-80-2	Top	428	92	0	-61	3	N/A		
		HUH-80-3	Top	423	93	0	-61	3	N/A		
		HUH-81	Top	401	99	0	-60	3	N/A		
		HUH-82-1	South	193	76	-10	-54	3	15		
		HUH-82-6	South	193	88	-10	-54	3	27		
		HHS-84	East	197	72	-10	-54	3	11		
		HUH-85b	North	136	87	-10	-51	3	29		
		HUH-86-4	North	120	67	0	-50	3	20		
		HUH-86-13	North	120	72	0	-50	3	25		
		HHS-87-2	East	284	75	-10	-57	3	11		
		HHS-88-2	East	347	58	-10	-59	3	N/A		
		HUH-95b	South	339	92	-10	-59	3	N/A		
		HHS-100-2	Top	321	62	-10	-58	3	N/A		
		HHS-101-1	Top	312	76	-10	-58	3	N/A		
		HHS-102-1	Top	297	69	-10	-57	3	5		
		HHS-102-2	Top	297	71	-10	-57	3	7		
		HHS-102-3	Top	297	75	-10	-57	3	11		
		HHS-102-6	Top	297	71	-10	-57	3	7		
		HHS-102-7	Top	297	73	-10	-57	3	9		
		HHS-102-9	Top	297	71	-10	-57	3	7		
		HHS-102-11	Top	297	72	-10	-57	3	8		
		HUH-103-1	Top	178	70	-10	-53	3	10		
		HUH-103-2	Top	178	69	-10	-53	3	9		
		HUH-103-3	Top	178	76	-10	-53	3	16		
		HUH-103-4	Top	178	75	-10	-53	3	15		
		HUH-103-5	Top	178	74	-10	-53	3	14		
		HUH-103-6	Top	178	71	-10	-53	3	11		
		HUH-103-7	Top	178	74	-10	-53	3	14		
		HUH-103-8	Top	178	72	-10	-53	3	12		
		HUH-103-9	Top	178	73	-10	-53	3	13		
		HUH-103-10	Top	178	72	-10	-53	3	12		
		HUH-103-11	Top	178	73	-10	-53	3	13		
		HUH-103-12	Top	178	72	-10	-53	3	12		
		HUH-103-13	Top	178	70	-10	-53	3	10		
		HUH-103-14	Top	178	72	-10	-53	3	12		
		HUH-104-1	Top	141	65	0	-51	3	17		
		HUH-104-2	Top	141	70	0	-51	3	22		
		HUH-104-3	Top	141	76	0	-51	3	28		
		HUH-104-4	Top	141	77	0	-51	3	29		
		HUH-104-5	Top	141	69	0	-51	3	21		
		HUH-104-6	Top	141	69	0	-51	3	21		
		HUH-104-7	Top	141	72	0	-51	3	24		
		HUH-107b	South	345	94	-10	-59	3	N/A		
		HUH-108	South	328	58	-10	-58	3	N/A		
		HUH-109	Top	185	75	0	-53	3	25		
		HUH-110	Top	186	76	0	-53	3	26		
		HUH-111	Top	187	76	0	-53	3	26		
		HUH-112	Top	188	76	0	-53	3	26		
		HUH-113	Top	188	75	0	-54	3	24		
		HUH-115	North	191	73	0	-54	3	22		
		HUH-116	North	186	70	0	-53	3	20		
		HUH-117	North	182	70	0	-53	3	20		
		HUH-118	North	178	68	0	-53	3	18		
		HUH-119	Top	426	65	-10	-61	3	N/A		
		HUH-120	Top	425	71	-10	-61	3	N/A		
		HHS-121	East	57	60	-10	-43	3	10		
		NOV-VS1	Top	415	79	-10	-60	3	N/A		
		NOV-VS2	Top	413	85	-10	-60	3	N/A		
		NOV-LV-03	East	405	68	-10	-60	3	N/A		
		NOV-LV-04	North	401	68	-10	-60	3	N/A		
		NOV-LV-05	North	409	66	-10	-60	3	N/A		
		NOV-LV-06	West	414	72	-10	-60	3	N/A		
		NOV-LV-07	West	428	71	-10	-61	3	N/A		
		NOV-LV-09	South	425	78	-10	-61	3	N/A		
		NOV-LV-10	North	421	79	-10	-60	3	N/A		
		NOV-LV-12	South	423	71	-10	-61	3	N/A		
		NOV-LV-13	South-East	417	67	-10	-60	3	N/A		
		NOV-LV-19	South	417	67	-10	-60	3	N/A		
		NOV-LV-22	South	427	78	-10	-61	3	N/A		
		NOV-LV-24	East	407	65	-10	-60	3	N/A		
		NOV-LV-26	North	400	69	-10	-60	3	N/A		
		NOV-VCU-001	South	422	67	-10	-60	3	N/A		
		NOV-VCU-002	South	421	70	-10	-60	3	N/A		
		NOV-VCU-003	South	420	69	-10	-60	3	N/A		
		NOV-VCU-004	South	420	62	-10	-60	3	N/A	**53**	**55**

Remark:
[1] As a conservative approach, only horizontal distance has been considered in the calculation of distance correction.
[2] A negative correction of 10 dB(A) has been adopted to the direction facing of the louver totally screened by buildings.
[3] Only noise sources within 300m from the NSRs are included in the assessment.
*The sum of correction factor is larger than the measured SWL, therefore, the predicted sound pressure level is consider negligible.

DETAIL '2'
A3 1 : 1000

NOV-LV-07
NOV-VS1
NOV-VCU-001
NOV-LV-22
NOV-VCU-002
NOV-LV-09
NOV-VCU-003
NOV-VCU-004
NOV-LV-10
NOV-LV-12
NOV-VS2
NOV-LV-19
NOV-LV-13
NOV-LV-24
NOV-LV-06
NOV-LV-05
NOV-LV-04
NOV-LV-26
NOV-LV-03

817900 N
836800 E

SCL (HUH - ADM) SCL (MKK - HUH)
CHEONG WAN ROAD
HONG CHONG ROAD
SALISBURY ROAD
ON WAN ROAD

119
120
80-2
81
80-1
14-2
80-3

DETAIL '2'

7a & 7b
107b
8a & 8b
95b
9a, 9b & 9c
10a, 10b & 10c
11a & 11b
108
14-1-1 & 2
12a & 12b
14-2
13a
14-3
SOUTH SIDE VENTILATION SHAFTS UNDER SCL(MKK-HUH) ASSESSED IN SCL(HHS) ETA REPORT

82-1 & 82-6
HUH
86-4 & 86-13

38
100-2
101-1
40
45-1 & 2
41-1 & 2
42-1, 2 & 3
49-2,3,6 & 8
88-2, 50-1 & 2
ELEVATED ROAD
51
52-1
53-1 TO 53-6
102-1,2,3,6,7,9,11
56 & 87-2
84
57-2
58-1 & 2
62-2
67-1& 3
68-1 TO 3
70-3
71-1, 2 & 3
FN1
FN2
HUH-4-1
HUH-4-1a
78
121
73
77-1, 2 & 3
HH9b

DETAIL '1'

818400 N
836800 E

115
116
117
103-1 TO 103-14
118
15
ONWAN ROAD
32H
33H
30H
113
112
111
110
109
26H
27H
37H
29
16a
16b
17
HUH
18
19a
19b
20
CHEONG WAN ROAD
104-1 TO 104-7
85b
21a & 21b
22b
22a-1 & 22a-2

DETAIL '1'
A3 1 : 1000

837200 E

0 15 30 45 60 75
METRES
1 : 3000

REPRESENTATIVE NOISE SENSITIVE RECEIVERS	
HH9b	HARBOURFRONT HORIZON
HUH-4-1	THE METROPOLIS RESIDENCE TOWER 2

LEGEND:

- SCL ALIGNMENT
- HUNG HOM STATION
- TRANSFORMER ROOM
- COOLING TOWER
- NORTH VENTILATION BUILDING (NOV)
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
- NOISE MEASUREMENT LOCATION
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
- APPROXIMATE NOISE SOURCE LOCATION (TOP)
- APPROXIMATE DIRECTION OF NOISE SOURCE(FACADE)

ABBREVIATIONS:

SCL	SHATIN TO CENTRAL LINK
SCL (MKK - HUH)	SHATIN TO CENTRAL LINK - MONG KOK EAST TO HUNG HOM SECTION
SCL (HUH - ADM)	SHATIN TO CENTRAL LINK - HUNG HOM TO ADMIRALTY SECTION
SCL (HHS)	SHATIN TO CENTRAL LINK - STABLING SIDINGS AT HUNG HOM FREIGHT YARD

PLOT DRV: V:\ustrlsef\MTR\PLOTDRV\ERWINDOWS\A3 COLOUR.pltr
MODELNAME: Default
FILENAME: P:\PROJECTS\60280233\DRAWINGS\SKETCH\SK7024.dgn
PRINTED BY: ZHLZ 2022/3/9 16:48:44

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	ZLZ
DESIGNED	---
CHECKED	---
APPROVED	---
DATE	09/MAR/2022

MTR
SHATIN TO CENTRAL LINK
ORIGINATOR
AECOM
CADD REF. SK7024.dgn

TITLE
C11033B
SCL (HUH - ADM)
LOCATIONS OF NSRS AND FIXED NOISE SOURCES
(NORTH VENTILATION BUILDING AND HUNG HOM STATION)

SCALE 1 : 3000 (A3)
FIGURE NO. SK7024
REV. A

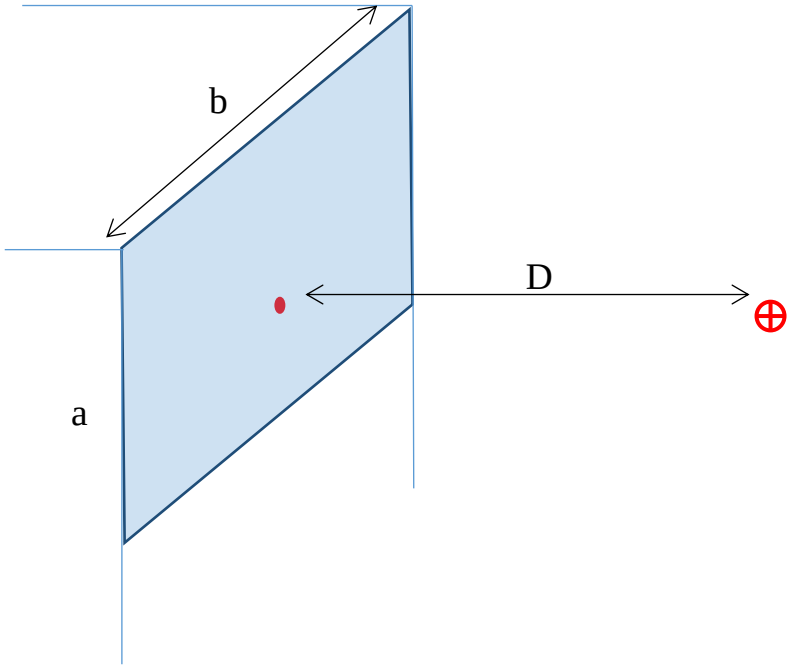
Appendix B

Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

Appendix B1

Measurement Methodology

Method 1: Far-Field Testing Method for Louver



a: Short side of the louver
b: Long side of the louver
D: Measurement distance (separation between louver and microphone), where D must be greater than (2b) and rounded up to interger.

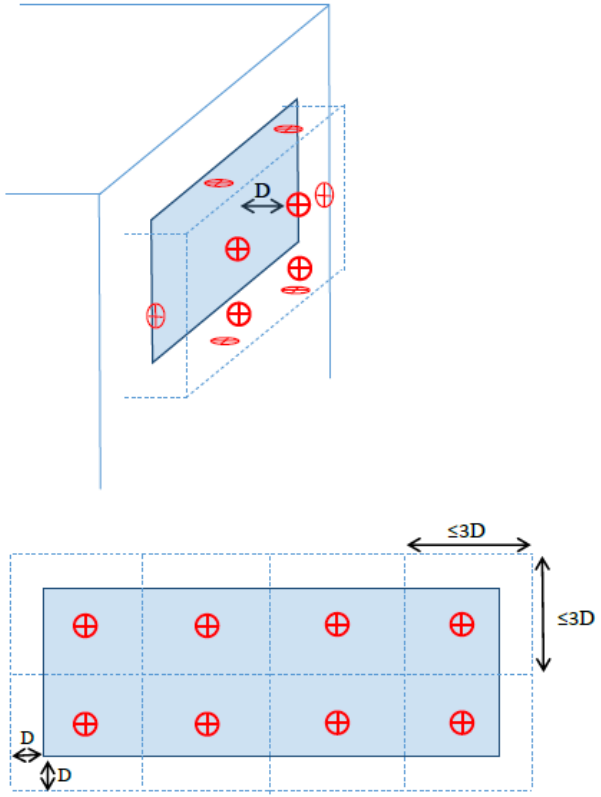
Louver opening
Proposed measurement point (microphone pointing perpendicular to the center of the louvre)

For method 1,

- "D" must be greater than 2b and round up to integer.
- The microphone must point to the center of the louver.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained.
- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with Method 2.
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0dB(A), noise measurement should then be conducted at near field in accordance with Method 2.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20log(D) + 8 + background noise correction factor

Method 2: Near-Field Testing Method for Louver



D: Measurement distance

Louver opening
Measurement box
Proposed measurement point (microphone pointing perpendicular to the louvre)

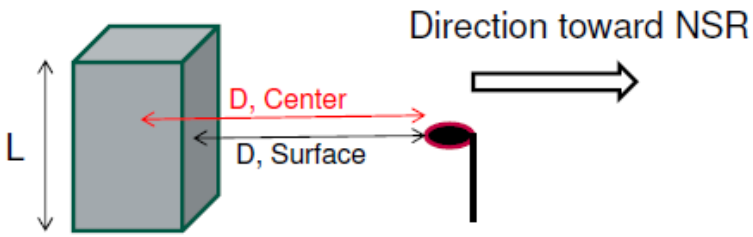
For method 2 (developed based on the principle of ISO3746:2010),

- First step is to determine a hypothetical measurement surfaces with at least 1m separation (D, measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- For louvre with largest dimension ≤3D, at least one measurement at the centre of the measurement surface parallel to the louvre should be conducted.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Extra localized microphone positions on the measurement surfaces in the region of high radiation should be considered. In this case follow the procedures of ISO3744.
- For louver with largest dimension > 3D, measurement surface and measurement position should follow ISO3746.
- Background noise level should be taken at each measurement point for determining the background correction (K1A).
- If the difference between the background noise and the measured noise level is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results, D should be reduced according to ISO3746 to obtain higher measured noise levels.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean LAeq over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Far Field Testing Method for Plant Item



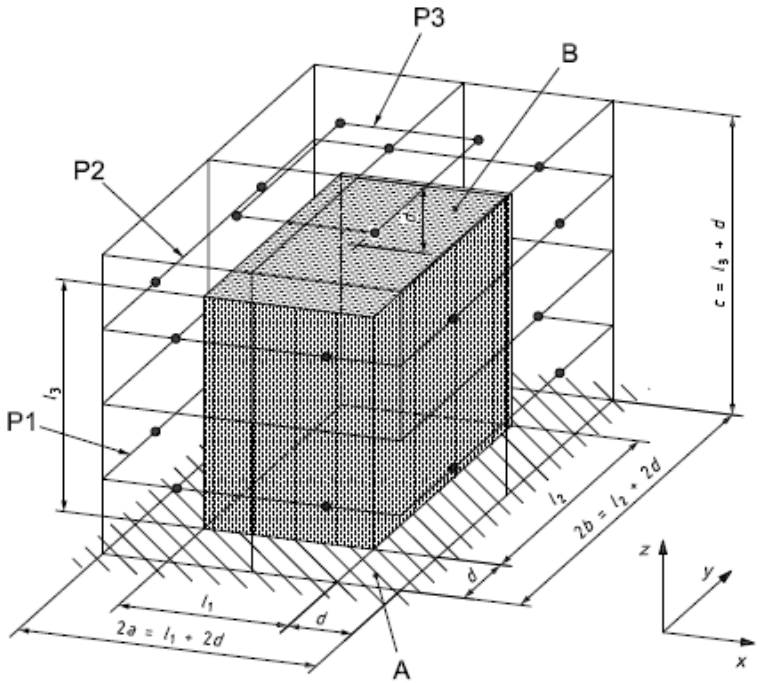
"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

- "D, Surface" must be greater than twice of L (2L) and roundup to integer (e.g 6m ,7m, 8m…).
- The microphone must be pointing to the center of the plant.
- Measurement should be carried out at the direction toward all NSRs.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained at each the measurement point.

- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0 dB(A), noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20 log (D,Center) + 8 + background noise correction factor

Method 4 – Near Field Testing Method for Plant Item



Key

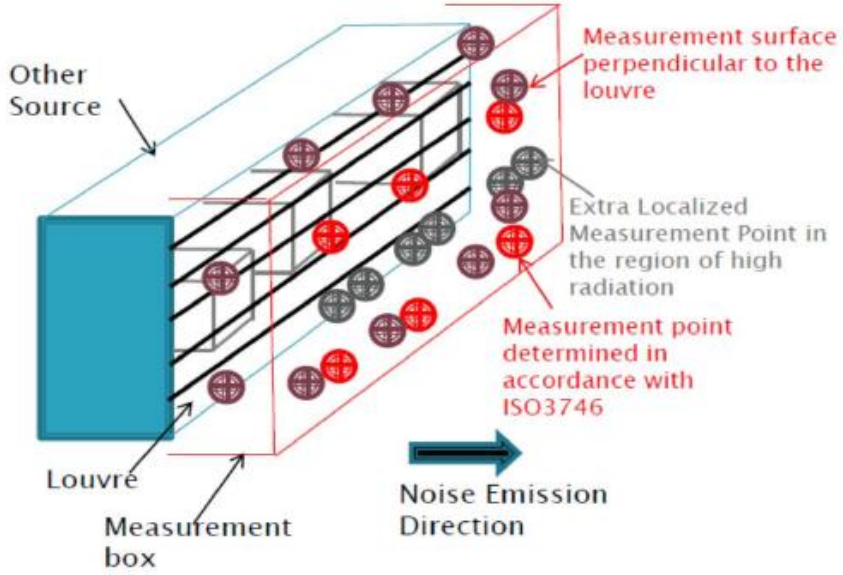
For Method 4 (based on ISO3746:2010),

- Please refer to latest edition of ISO3746 for measurement requirement.
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalized (see figure for example)
- Background noise measurement should be obtained for determination of background correction factor (K1A).According to ISO3746, if the source under test radiates noise predominantly in one direction or if the noise from a large source is emitted only from a small portion of the source, the usage of extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case, follow the procedures specified in ISO3744.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Detail calculation of the SWL should refer to the latest edition of ISO3746.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 5 – Near Field Testing Method for Plant Room or other source



For Method 5 (developed based on the principle of ISO3746 -2010),

- First step is to determine a measurement box with at least 1m separation (measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- Secondly, is to determine the location of measurement points on the measurement surface of the hypothetical box.
- Extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case follow the procedures of ISO 3744.
- Background noise level should be taken for determination of background correction (K1A.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- If the difference between the BGL and the measured noise level (MNL) is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results. D should be reduced according to ISO3746 to obtain higher MNLs.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Appendix B2

Calibration Certificates –
Noise Measurement for Fixed Plant Noise

Appendix B2 Calibration Certificates – Noise Measurement for Fixed Plant Noise

Cert B1: Calibration Certificate of Sound Level Meter **SVAN958** (SN: 69082)

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 *No. 69082*

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, f_{ref}=1kHz

	Range 105dB		Range 130dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.98	-0.02	114.03	0.03
Channel 2	113.98	-0.02	114.02	0.02
Channel 3	113.98	-0.02	114.02	0.02
Channel 4	113.98	-0.02	114.02	0.02

2. CALIBRATION* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.8	-0.2	113.8	-0.2	113.8	-0.2
Channel 2	113.8	-0.2	113.8	-0.2	113.8	-0.2
Channel 3	113.8	-0.2	113.8	-0.2	113.8	-0.2
Channel 4	113.8	-0.2	113.8	-0.2	113.8	-0.2

Calibration measured with the microphone SVANTEK type SV 22 No. 4010479. Calibration factor: 0.6dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f_{ref}= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	Error [dB]	0.19	0.10	0.05	0.00	0.00	0.00	0.00
Channel 2	Error [dB]	0.21	0.11	0.04	-0.01	0.00	0.00	0.00
Channel 3	Error [dB]	0.14	0.08	0.03	0.00	0.00	0.01	0.01
Channel 4	Error [dB]	0.11	0.07	0.03	0.00	0.00	0.00	0.01

LEVEL METER; Range: 130 dB; Filter: A; f_{ref}= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.11	0.15	0.06	0.00	0.00	0.00	0.01
Channel 2	Error [dB]	0.13	0.14	0.05	0.00	0.00	-0.01	0.01
Channel 3	Error [dB]	0.07	0.07	0.04	-0.00	0.01	-0.00	0.02
Channel 4	Error [dB]	0.08	0.07	0.03	-0.00	-0.00	-0.01	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f_{ref}= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.44	0.11	0.07	0.00	0.00	-0.01	0.01
Channel 2	Error [dB]	0.42	0.12	0.07	-0.00	-0.00	-0.00	0.01
Channel 3	Error [dB]	0.34	0.11	0.04	-0.00	-0.00	-0.01	0.01
Channel 4	Error [dB]	0.35	0.12	0.04	0.00	0.01	0.00	0.01

*** SVAN958 No. 69082 page 1 ***

4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{ton}= 4000 Hz; Burst duration: 2s;

Range: **105dB**; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	91.0	87.9	84.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	91.0	87.9	84.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		3	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	Indication [dB]	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		3	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **105dB**; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.9	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
		3	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.9	38.0
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.0	0.0
		4	Indication [dB]	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
	Slow	1	Indication [dB]	49.8	47.9	44.6	41.8	38.9	35.0	32.0	29.0
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	49.8	47.9	44.6	41.8	38.9	35.0	32.0	29.0
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		3	Indication [dB]	49.9	48.0	44.6	41.8	38.9	35.0	32.0	29.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		4	Indication [dB]	49.8	47.9	44.6	41.8	38.9	34.9	32.0	29.0
			Error [dB]	-0.2	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
SEL	-	1	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.1	29.1
			Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.1	0.1
		2	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.0	29.1
			Error [dB]	-0.3	-0.0	0.0	-0.0	0.0	0.0	0.1	0.1
		3	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.1	32.1	29.1
			Error [dB]	-0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.1
		4	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.0	29.1
			Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.1	0.1

Range: **105dB**; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	Indication [dB]	34.1	34.0
			Error [dB]	0.0	0.1
		2	Indication [dB]	34.0	34.0
			Error [dB]	0.0	0.0
		3	Indication [dB]	34.0	34.0
			Error [dB]	-0.0	0.0
		4	Indication [dB]	34.0	33.9
			Error [dB]	0.0	0.1
	Slow	1	Indication [dB]	31.9	30.1
			Error [dB]	-0.1	0.1
		2	Indication [dB]	31.9	30.0
			Error [dB]	-0.1	0.1
		3	Indication [dB]	31.9	30.1
			Error [dB]	-0.1	0.1
		4	Indication [dB]	31.8	30.0
			Error [dB]	-0.1	0.1
SEL	-	1	Indication [dB]	33.8	31.1
			Error [dB]	-0.2	0.1
		2	Indication [dB]	33.8	31.1
			Error [dB]	-0.2	0.1
		3	Indication [dB]	33.8	31.1
			Error [dB]	-0.2	0.0
		4	Indication [dB]	33.8	31.1
			Error [dB]	-0.2	0.1

Range: **130dB**; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	113.0	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		3	Indication [dB]	134.0	133.9	133.1	131.4	129.2	125.7	122.9	119.9	116.0	113.0	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		4	Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	129.2	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	1	Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	Indication [dB]	131.9	130.0	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	-0.3	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		3	Indication [dB]	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	-0.3	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

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Range: **130dB**; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	59.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	59.9
			Error [dB]	0.0	0.0	73.0	0.0	-0.0	-0.0	-0.0	-0.0
		3	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	60.0
			Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
		4	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	Indication [dB]	71.9	70.0	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
		2	Indication [dB]	71.8	69.9	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
		3	Indication [dB]	71.9	70.0	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		4	Indication [dB]	71.8	69.9	66.6	63.8	60.9	56.9	54.0	51.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
SEL	-	1	Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.0	0.0	0.1
		2	Indication [dB]	73.7	71.0	67.0	64.0	61.0	57.0	54.1	51.0
			Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	0.1	0.0
		3	Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.1	51.1
			Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1
		4	Indication [dB]	73.7	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.1

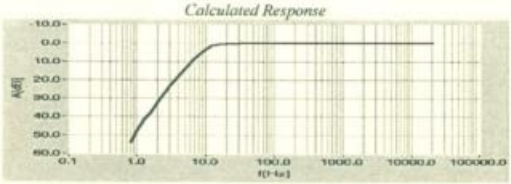
Range: **130dB**; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	Indication [dB]	54.1	54.0
			Error [dB]	0.0	0.0
		2	Indication [dB]	54.1	54.0
			Error [dB]	0.0	0.0
		3	Indication [dB]	54.1	54.0
			Error [dB]	0.0	0.1
		4	Indication [dB]	54.0	53.9
			Error [dB]	0.0	0.0
	Slow	1	Indication [dB]	52.0	50.1
			Error [dB]	-0.1	0.1
		2	Indication [dB]	51.9	50.0
			Error [dB]	-0.1	0.1
		3	Indication [dB]	51.9	50.0
			Error [dB]	-0.1	0.1
		4	Indication [dB]	51.9	50.0
			Error [dB]	-0.1	0.1
SEL	-	1	Indication [dB]	53.9	51.1
			Error [dB]	-0.2	0.1
		2	Indication [dB]	53.8	51.1
			Error [dB]	-0.2	0.1
		3	Indication [dB]	53.8	51.1
			Error [dB]	-0.2	0.1
		4	Indication [dB]	53.8	51.0
			Error [dB]	-0.2	0.0

6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;

Calculated Response



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	-0.0	0.0	0.0	-0.0
12.5	1.4	1.4	1.4	1.4	500	-0.0	0.0	0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	-0.0	0.0	0.0	-0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	-0.0
125	-0.0	0.0	0.0	-0.0	20000	0.0	0.0	0.0	-0.0

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB; Back-light – off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	Level [dB]	14.4	11.2	12.0
Channel 2	Level [dB]	15.0	10.9	11.1
Channel 3	Level [dB]	13.9	10.6	11.2
Channel 4	Level [dB]	13.3	10.2	11.3

* measured with preamplifier SVANTEK type SV 12L No. 17701.

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s^2), f_{ref}=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.98	-0.02	140.04	0.04
Channel 2	139.98	-0.02	140.03	0.03
Channel 3	139.98	-0.02	140.03	0.03
Channel 4	139.98	-0.02	140.03	0.03

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

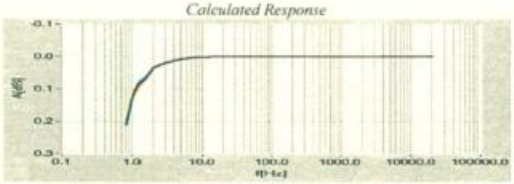
Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 2	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 3	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 4	120.0	0.0	120.0	0.0	106.2	0.0	102.0	-0.0	110.5	-0.0

Calibration measured with the accelerometer SVANTEK type SV80 No. H0413. Calibration factor: -0.56dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB,

Calculated Response



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.19	0.19	0.19	0.19	5	0.02	0.01	0.01	0.01	500	-0.01	-0.01	-0.01	-0.01
1	0.10	0.10	0.10	0.10	6.3	0.00	-0.00	-0.00	-0.00	1000	0.00	-0.00	-0.00	-0.01
1.25	0.08	0.08	0.08	0.08	8	-0.01	-0.01	-0.01	-0.01	2000	0.00	-0.00	-0.00	-0.00
1.6	0.06	0.06	0.06	0.06	16	-0.02	-0.02	-0.02	-0.02	4000	0.01	0.01	-0.00	-0.00
2	0.02	0.02	0.02	0.02	31.5	0.00	-0.00	-0.00	-0.00	8000	0.03	0.04	0.02	0.02
2.5	0.01	0.01	0.01	0.01	63	-0.01	-0.01	-0.01	-0.01	16000	0.02	0.02	-0.01	-0.02
3.15	-0.01	-0.01	-0.01	-0.01	125	-0.01	-0.01	-0.01	-0.01	20000	0.02	0.01	0.01	-0.01
4	0.02	0.02	0.02	0.02	250	-0.01	-0.01	-0.01	-0.01					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	Indication [dB]	54.8	52.0	42.6	38.8	36.2
Channel 2	Indication [dB]	55.0	52.4	42.6	39.0	36.8
Channel 3	Indication [dB]	55.5	53.3	42.8	39.1	36.1
Channel 4	Indication [dB]	54.8	52.4	42.4	39.0	36.2

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
26 °C	47 %	1000 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	127	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound &Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1376	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Traceability of the calibration is guaranteed by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubeł ..... Test date: 2018-08-13

Cert B2: Calibration Certificate of Sound Level Meter **SVANTEK 958** (SN: 28422)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	12-May-2020	**Certificate Number**	MLCN201165S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	28422
Equipment Number	--

Calibration Particular

Date of Calibration	12-May-2020		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 12-May-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
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Page 1 of 2

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MAXLAB

Certificate No. MLCN2011655

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 12-May-2020

Checked By : K.O. Lo
Date : 12-May-2020

Cert B3: Calibration Certificate of Sound Level Meter **SVANTEK 959** (SN: 11228)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	12-May-2020	**Certificate Number**	MLCN201166S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 959
Serial Number	11228
Equipment Number	--

Calibration Particular

Date of Calibration	12-May-2020		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 12-May-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No. MLCN201166S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
A / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	114.0 dB	114.0 dB	0.0 dB	0.2 dB	± 0.7 dB
C / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB

- END -

Calibrated By : Dan
Date : 12-May-2020

Checked By : K.O. Lo
Date : 12-May-2020

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Cert B4: Calibration Certificate of Acoustic Calibrator **SVANTEK SV30A** (SN: 29088)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	18-Mar-2019	**Certificate Number**	MLCN190639S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	29088
Equipment Number	--

Calibration Particular

Date of Calibration	18-Mar-2019		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-20 1351(MLTE049) / MLEC18/06/02 / 6-Jun-19		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results exceeded the EUT error limit.		

Approved By & Date

K.O. Lo 18-Mar-2019

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No. MLCN190639S

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	93.5 dB	0.5 dB *	0.15 dB	± 0.3 dB
114 dB	113.6 dB	0.4 dB *	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 18-Mar-19

Checked By : K.O. Lo
Date : 18-Mar-19

Cert B5: Calibration Certificate of Acoustic Calibrator **SVANTEK SV30A** (SN: 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	21-Aug-2020	**Certificate Number**	MLCN202127S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	21-Aug-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1351(MLTE049) / MLEC20/06/02 / 5-Jun-21		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 21-Aug-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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MAXLAB

Certificate No. MLCN2021275

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	94.1 dB	-0.1 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Kenneth
Date : 21-Aug-20

Checked By : K.O. Lo
Date : 21-Aug-20

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Cert B6: Calibration Certificate of Sound Level Meter **SVANTEK 958A** (SN: 59120)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	17-Nov-2020	**Certificate Number**	MLCN203076S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59120
Equipment Number	--

Calibration Particular

Date of Calibration	17-Nov-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 17-Nov-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No. MLCN2030765

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
	(1 kHz Input)	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 17-Nov-2020

Checked By : K.O. Lo
Date : 17-Nov-2020

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Cert B7: Calibration Certificate of Sound Level Meter **SVANTEK 958A** (SN: 59121)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	31-Oct-2020	**Certificate Number**	MLCN202867S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	59121
Equipment Number	--

Calibration Particular

Date of Calibration	31-Oct-2020		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-2023		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 31-Oct-2020

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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Certificate No. MLCN202867S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 31-Oct-2020

Checked By : K.O. Lo
Date : 31-Oct-2020

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Cert B8: Calibration Certificate of Acoustic Calibrator **SVANTEK SV30A** (SN: 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	28-Sep-2021	**Certificate Number**	MLCN212726S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	28-Sep-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1351(MLTE049) / MLEC21/06/02 / 5-Jun-22		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 28-Sep-2021

Statements

- Calibration equipment used for this calibration are traceable to national / international standards.
- The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No. MLCN2127265

Calibration Data

EUT Setting	Standard Reading	EUT Error from Setting	Calibration Uncertainty	EUT Specification
94 dB	94.0 dB	0.0 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 28-Sep-21

Checked By : K.O. Lo
Date : 28-Sep-21

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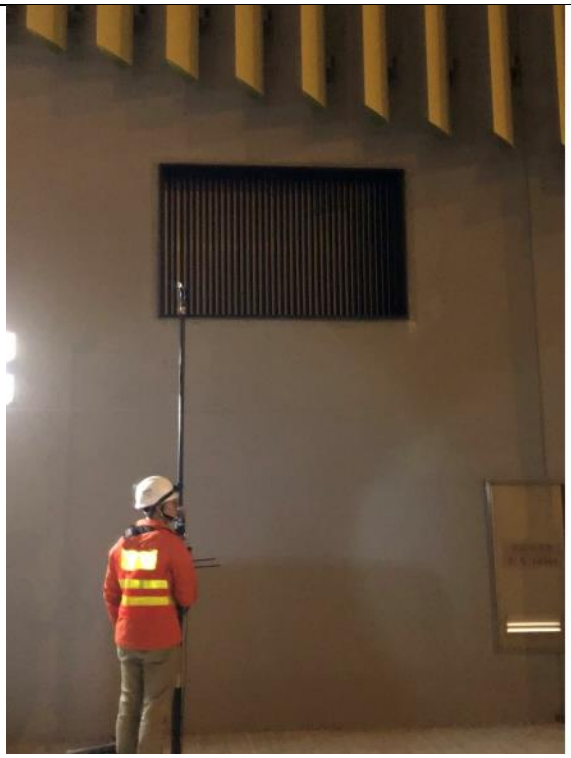
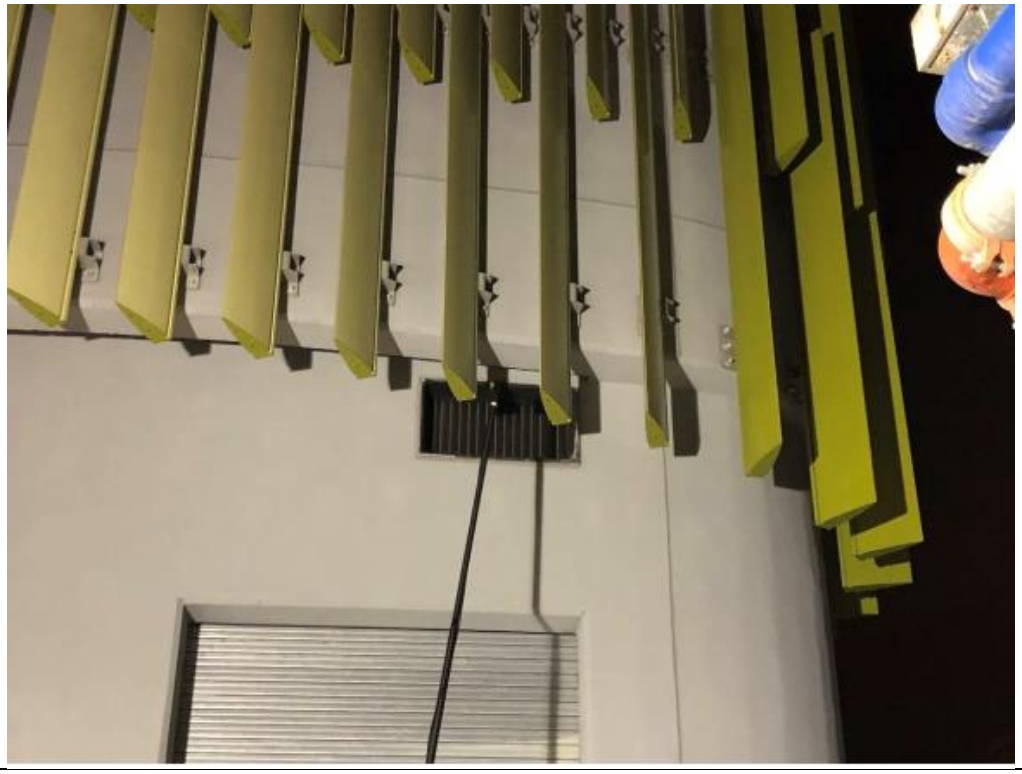
Appendix B3

Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

Appendix B3 Photographs showing the Examples of Noise Measurement for Fixed Plant Noise





Appendix B4

Noise Measurement Results

Appendix B4 Noise Measurement Results

Location	Fixed Plant Source ID	Plant Type	Method	Size of Louvre/PCU (mm)			Averaged Measured L_{Aeq} ,dB(A) [a]	Background L_{Aeq} ,dB(A)	Difference L_{Aeq} ,dB(A)	Background Corrected L_{Aeq} ,dB(A)[b]	Calculated SWL, dB(A)
				Height	Width	Length					
NOV	NOV-VS1 [c]	Ventilation Louver	2	N/A	10230	5780	72.1	51.3	20.8	72.1	93
				N/A	10230	5780	58.7	52.3	6.4	57.6	79
	NOV-VS2 [c]	Ventilation Louver	2	N/A	7000	7000	77.5	50.9	26.6	77.5	98
				N/A	7000	7000	64.0	52.3	11.7	64.0	85
	NOV-LV-03	Ventilation Louver	2	1250	2400	N/A	56.3	53.2	3.1	53.4	68
	NOV-LV-04	Ventilation Louver	2	1250	2600	N/A	55.8	54.0	1.8	52.8	68
	NOV-LV-05	Ventilation Louver	2	1250	2250	N/A	54.2	53.2	1.0	51.2	66
	NOV-LV-06	Ventilation Louver	2	1250	2500	N/A	59.6	55.4	4.2	57.5	72
	NOV-LV-07	Ventilation Louver	2	1800	3900	N/A	57.7	54.9	2.8	54.7	71
	NOV-LV-09	Ventilation Louver	2	3063	1628	N/A	65.5	63.3	2.2	62.5	78
	NOV-LV-10	Ventilation Louver	2	2950	1350	N/A	65.3	45.9	19.4	65.3	79
	NOV-LV-12	Ventilation Louver	2	1000	2950	N/A	59.0	56.3	2.7	56.0	71
	NOV-LV-13	Ventilation Louver	2	500	4950	N/A	54.5	52.9	1.6	51.5	67
	NOV-LV-19	Ventilation Louver	2	500	900	N/A	60.1	57.1	3.0	57.1	67
	NOV-LV-22	Ventilation Louver	2	1478	6850	N/A	62.9	59.3	3.6	60.4	78
	NOV-LV-24	Ventilation Louver	2	650	700	N/A	55.2	53.8	1.4	52.2	65
	NOV-LV-26	Ventilation Louver	2	700	650	N/A	58.4	53.8	4.6	56.6	69
	NOV-VCU-001	Packaged Condenser Unit	4	1675	1080	480	54.7	47.0	7.7	53.9	67
	NOV-VCU-002	Packaged Condenser Unit	4	1675	1080	480	57.2	45.4	11.8	57.2	70
	NOV-VCU-003	Packaged Condenser Unit	4	1675	1080	480	56.6	44.5	12.1	56.6	69
	NOV-VCU-004	Packaged Condenser Unit	4	845	970	370	52.5	45.5	7.0	51.5	62
HUH	HUH-7a	Ventilation Louver	2	6520	2850	N/A	58.7	47.8	10.9	58.7	77
	HUH-7b	Ventilation Louver	2	N/A	2850	2090	62.2	47.8	14.4	62.2	78
	HUH-8a	Ventilation Louver	2	6520	2850	N/A	53.4	47.8	5.6	52.0	70
	HUH-8b	Ventilation Louver	2	N/A	2850	2090	54.1	47.8	6.3	52.9	69
	HUH-17	Ventilation Louver	2	3550	9900	N/A	73.3	55.0	18.3	73.3	93
	HUH-18	Ventilation Louver	2	N/A	8540	6020	66.8	54.2	12.6	66.8	88
	HUH-19a	Ventilation Louver	2	N/A	6500	7500	63.0	54.8	8.2	62.3	83
	HUH-19b	Ventilation Louver	2	4100	5310	N/A	61.6	54.8	6.8	60.6	79
	HUH-21a	Ventilation Louver	2	N/A	6000	1350	57.7	52.0	5.7	56.3	73
	HUH-21b	Ventilation Louver	2	5100	6000	N/A	66.5	52.0	14.5	66.5	85

Remarks:

a) Results are averaged from number of points in accordance with ISO3746.

b) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0dB

c) There will be two operation modes, namely daytime/evening and night-time modes.

Appendix C

Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Appendix C1

Calibration Certificates –
Noise Measurement at Representative NSRs

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA1019 03-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Class 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4950	ZC0032
Serial/Equipment No.:	3001291	3005374	23853
Adaptors used:	-	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Oct-2021

Date of test: 21-Oct-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2022	CIGISMEC
Signal generator	DS 360	61227	31-Dec-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 22-Oct-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA1019 03-01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 21-Oct-2021

Checked by: Chan Yuk Yiu **Date:** 22-Oct-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0319 01-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2681366	2665582	17190
Adaptors used:	-	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Mar-2021

Date of test: 23-Mar-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2021	CIGISMEC
Signal generator	DS 360	33873	19-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 24-Mar-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0319 01-01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 23-Mar-2021

Checked by: Chan Yuk Yiu **Date:** 24-Mar-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA0401 02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	3006428
Adaptors used:	-

Item submitted by

Curstomer:	AECOM
Address of Customer:	-
Request No.:	-
Date of receipt:	01-Apr-2021

Date of test: 05-Apr-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	11-May-2021	SCL
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI
Signal generator	DS 360	33873	19-May-2021	CEPREI
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI
Universal counter	53132A	MY40003662	18-May-2021	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 07-Apr-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA0401 02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.23	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.016 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 999.95 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.3 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 05-Apr-2021

Checked by: Chan Yuk Yiu **Date:** 07-Apr-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 21CA1019 03-02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Rion Co., Ltd.
Type/Model No.:	NC-74
Serial/Equipment No.:	34246490 / N.004.10
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Oct-2021

Date of test: 21-Oct-2021

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	04-May-2022	SCL
Preamplifier	B&K 2673	2239857	31-May-2022	CEPREI
Measuring amplifier	B&K 2610	2346941	01-Jun-2022	CEPREI
Signal generator	DS 360	33873	27-May-2022	CEPREI
Digital multi-meter	34401A	US36087050	27-May-2022	CEPREI
Audio analyzer	8903B	GB41300350	28-May-2022	CEPREI
Universal counter	53132A	MY40003662	02-Jun-2022	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 22-Oct-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 21CA1019 03-02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.00	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.012 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 1002.1**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 1.7 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 21-Oct-2021

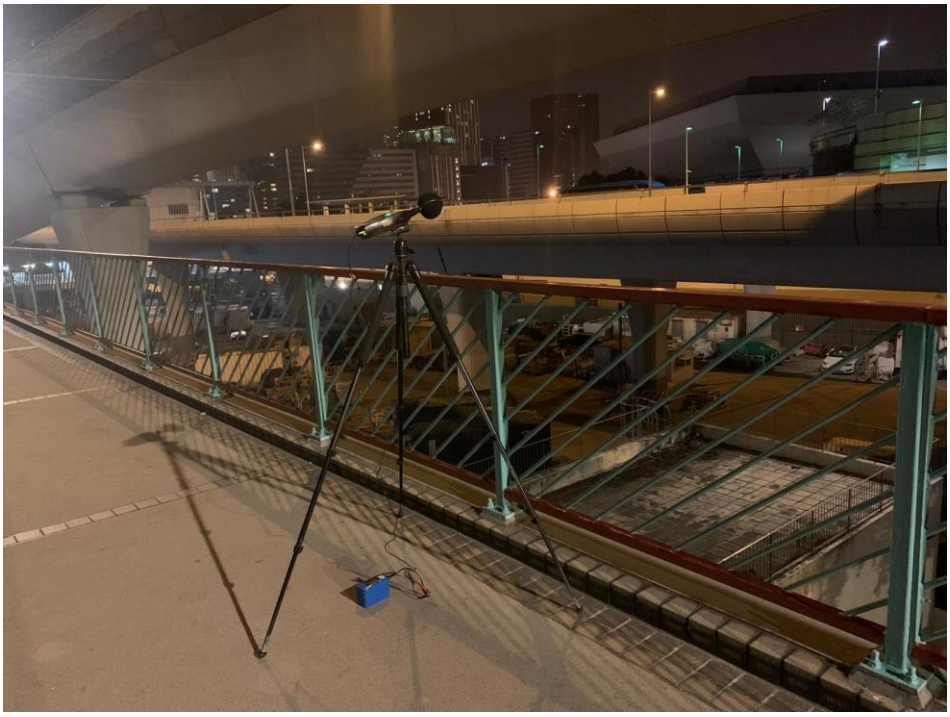
Checked by: Chan Yuk Yiu **Date:** 22-Oct-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

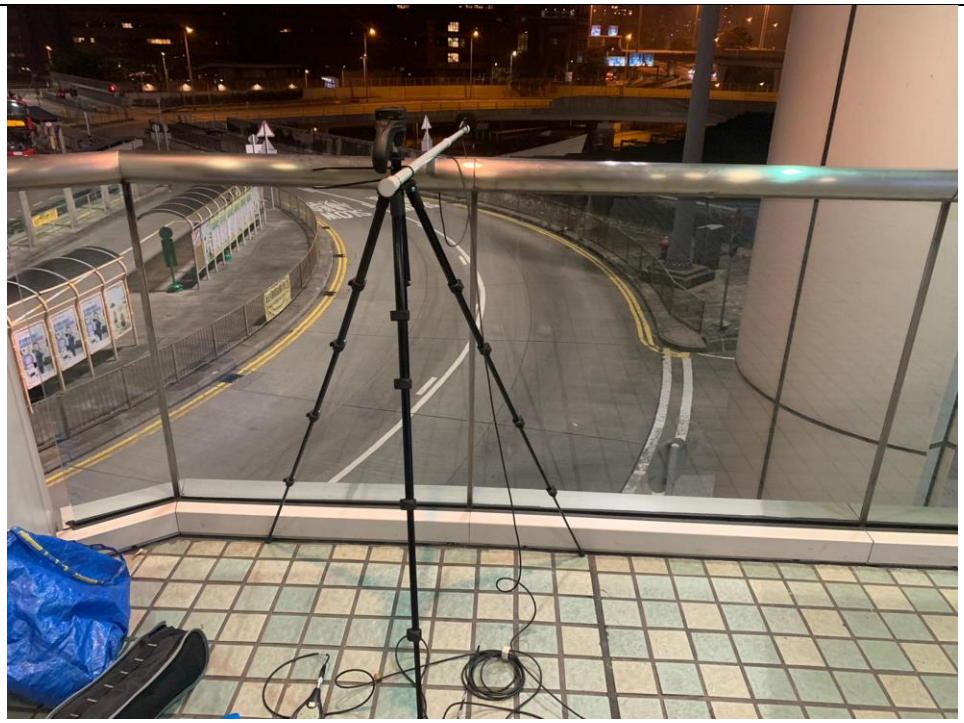
Appendix C2

Photographs – Noise Measurement at Representative NSRs

Appendix C2 Photographs – Noise Measurement at Representative NSRs



NSR Measurement Location at FN1



NSR Measurement Location at FN2

Appendix C3

Measurement Results at Representative NSRs

Appendix C3 Noise Measurement Results at Measurement Locations

Measurement Location ID	Measurement Date	Operation Scenario [(1)(2)]	Fixed Plant Noise		Background Noise		Difference between Measured Noise Level and Background Level, dB(A)
			Measurement Time	Measured Noise Level, $L_{Aeq\ 30mins}$, dB(A)	Measurement Time	Background Noise Level, $L_{Aeq\ 5mins}$, dB(A)	
FN1	3/2/2022	Daytime and Evening	03:05:00 - 03:35:00	62.8	03:55:00 - 04:00:00	62.6	0.2
		Night-time	01:59:00 - 02:29:00	63.1	01:23:00 - 01:28:00	63.6	-0.5
FN2	3/3/2022	Daytime and Evening	03:05:00 - 03:35:00	57.9	03:55:00 - 04:00:00	56.9	1.0
		Night-time	01:59:00 - 02:29:00	58.8	01:23:00 - 01:28:00	58.2	0.6

Note:

(1) Day: 0700 to 1900 hours; Evening: 1900 to 2300 hours; Night: 2300 to 0700 hours.

(2) Fixed plant noise operation during daytime/evening and night-time periods have been included according to corresponding fixed plant noise measurement.