Quarterly Environment Construction Monitoring Report

Q4 – October to December 2021

Pitt Street Integrated Station Development

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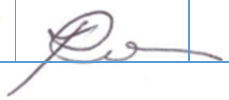
Signature					

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1. Introduction

1.1 Project Summary

The Sydney Metro City and Southwest is the second portion of the new standalone rail network known as the Sydney Metro, which is Australia's largest public transport infrastructure project and a priority rail project for the NSW Government. CPB Contractors (CPB) have been contracted by Transport for New South Wales to design and construct the Integrated Station Development (ISD) component of the future Pitt Street Station.

Pitt Street is situated within the Sydney CBD, largely surrounded by high-rise commercial and residential buildings. The Station is a binocular cavern station with north and southbound platform caverns running beneath Pitt and Castlereagh Streets respectively. The Station has two entrance shafts from the surface one at Pitt Street North and Pitt Street South connected to the platform caverns via adit tunnels.

Pitt Street North is located on Park Street between Pitt and Castlereagh Street, with the station entrance facing onto Park Street. The Over Station Development (OSD) surrounds the station entrance and access is provided on Pitt, Park and Castlereagh Streets. Pitt Street South is located on the corner of Pitt and Bathurst Street. It is configured in an 'L' shape which wraps around the Edinburgh Castle Hotel with the station entrance opening onto Bathurst Street. Access to the OSD is provided from Pitt Street.

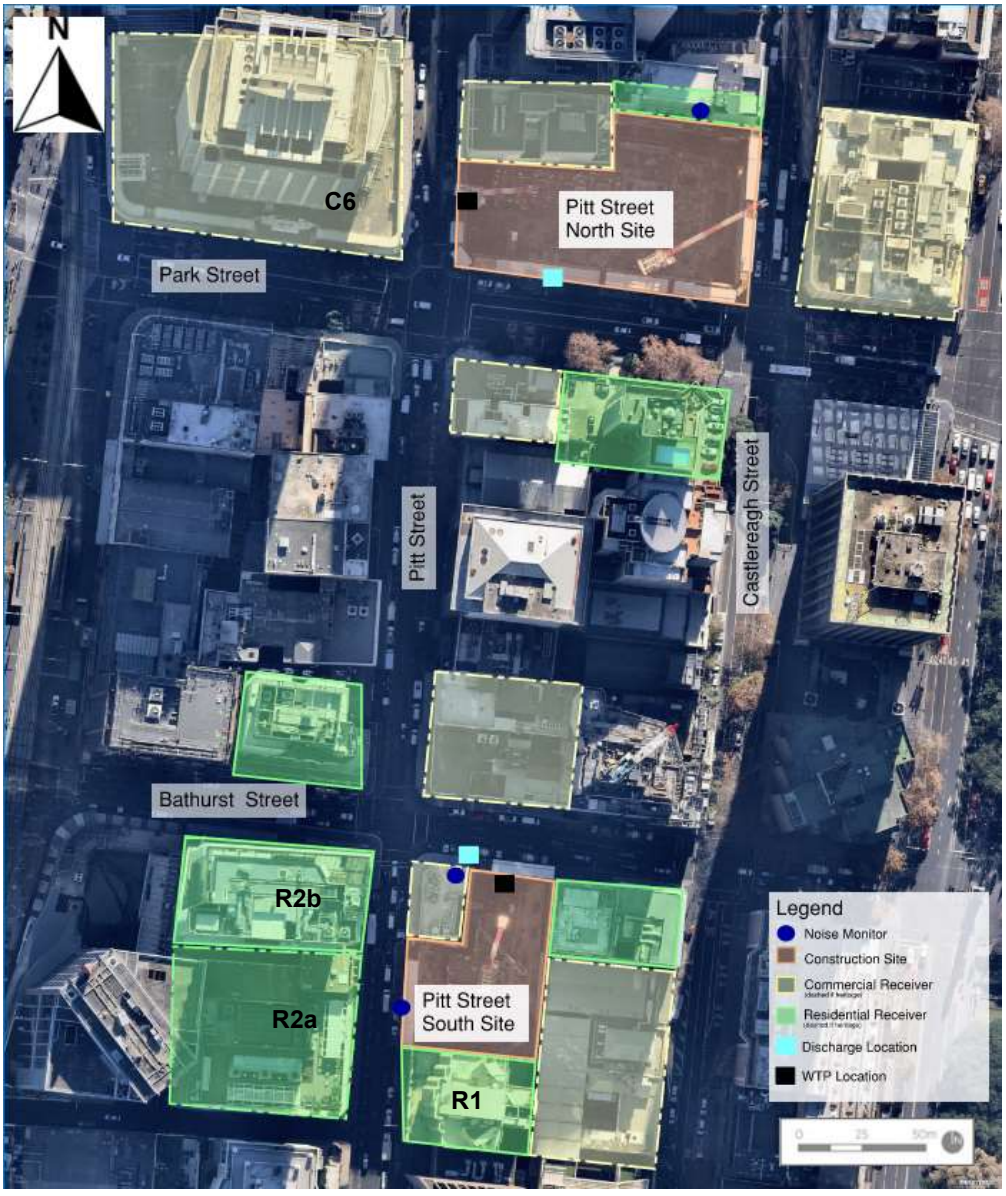

Figure 1-1 Pitt Street Station location and indicative monitoring layout

1.2 Site Activities

The Construction Environment Management Plan (CEMP) and associated sub-plans were approved by the Department of Planning, Industry and Environment (DPIE) on 24 December 2020 and construction works commenced on the project on 6 January 2021. This is the fourth quarterly report and reflects the monitoring that was conducted from October to December 2021. **Table 1-1** outlines the site activities that occurred during the reporting period.

Table 1-1 Site Activities

Month	Site Activities
October 2021	**Pitt Street North** - Ongoing formwork to B02 - Ongoing jump form pours - Ongoing site deliveries - Graphics installed - Ongoing column pours - Jump form modification and east core dismantle completed Ongoing Linewide concrete pours **Pitt Street South** - Ongoing site deliveries - Ongoing B01 slab pours - Ongoing perimeter wall pours and dismantling of wall climbing systems - Completed hoarding rectification - 50% of jump form scope is complete - Completed Eurotower variation works - Axis Plumbing water treatment system commissioned - Anchor destressing completed **Caverns** - Ongoing bracket and steel installation - Ongoing blockwork work - Ongoing adit formwork and pours
November 2021	**Pitt Street North** - Ongoing formwork to B01 on the western side - Ongoing jump form pours - Ongoing jump form modification and west core dismantling - Ongoing site deliveries - Capping beam removal commenced - Ongoing column pours - Ongoing Linewide concrete pours **Pitt Street South** - Ongoing site deliveries - B01 slab pour completed - B1 and B2 mezzanine commenced - Graphics installation completed - Perimeter wall pours completed - Ongoing jump form pours and dismantling of wall climbing systems **Caverns** - Ongoing bracket and steel installation - Trackway portion handed over to Linewide on 24/11/21 - Blockwork work completed Pours within adit formwork completed
December 2021	**Pitt Street North** - Dismantling of eastern and western jump form - Level 00 constructed and the western side poured - Ongoing site deliveries - Ongoing capping beam removal - Ongoing column pours - Ongoing Linewide concrete pours

Month	Site Activities
	- Formwork stripping commenced below B03 **Pitt Street South** - New hoist installed - Removal of capping beam commenced - Blockwork and fit-out commenced - B1 and B2 mezzanine slabs completed - Back propping removal from the soffit of B01 to B04 i completed **Caverns** - Topping slab of the east cavern and south front of house adit poured - Ongoing bracket and steel installation

2. Reporting Requirements

A Planning Approval has been obtained to construct Sydney Metro City and Southwest Chatswood to Sydenham, which was identified as Critical State-Significant Infrastructure (CSSI) SSI 15_7400.

Conditions C9 to C16 of the Planning Approval describes monitoring and reporting requirements for the ISD Works.

Monitoring and reporting requirements are detailed in the Construction Environmental Management Plan (approved by NSW DPIE on 24 Dec 2020), and the following associated sub-plans:

- Soil, Water and Groundwater Management Sub-Plan; and
- Noise and Vibration Management Sub-Plan

The following report details environmental monitoring that was undertaken during this reporting period conducted as per the Planning Approval, the approved CEMP and its associated sub-plans.

A copy of the Planning Approval can be found by following the link below to the NSW DPIE website.

https://www.planningportal.nsw.gov.au/major-projects/project/3601

The results of the Construction Monitoring Program are included in this Construction Monitoring Report and will be submitted to the Acoustic Advisor (AA), Sydney Metro and the Environmental Representative (ER) who will endorse the document prior to submission to DPIE and being made publicly available on the project website located at https://pittstreetsydneymetroisd.com.au. CPB will also issue the Construction Monitoring report to Council, NRAR and EPA.

2.1 Inspections

Periodic environmental inspections are undertaken by CPB to verify the adequacy of all environmental mitigation measures. In addition, inspections are conducted before and following significant rainfall events that are predicted to be over 10mm in 24 hours. Weather data for the period is included in **Appendix A**.

The Site Environmental Plans (SEPs) identify the environmental control measures on both PSISD sites. SEPs and environmental controls are monitored through these periodic environmental inspections and are updated as required to reflect the changing nature of the PSISD sites. All records of inspections are documented in the CPB Environmental Inspection Checklist. Pitt Street South and Pitt Street North are inspected independently, and the caverns/ adits are included in those inspections. Internal CPB inspections are conducted by the CPB Environmental and Project Team. ER inspections are attended by Sydney Metro, CPB, the DPIE endorsed Acoustic Advisor (AA) and the ER.

Five ER inspections and thirty internal inspections were completed during the reporting period. ER inspections occurred on a three weekly basis and internal inspections were conducted once per week.

2.2 Water Quality Monitoring

2.2.1 Background

Water quality parameters were determined from the Discharge Impact Assessment (supporting the Construction Environmental Management Plan Rev 0) which was updated in May 2021 to include the TSS/NTU correlation following ER review of the first Construction Monitoring Report (Q1 2021) and clarification of the Discharge Management Protocol.

Water quality parameters for the discharge criteria for the Project are presented in **Table 2-1**.

Table 2-1 Water Quality Discharge Criteria Parameters

Parameter	Unit	Discharge Criteria
pH	pH	6.5 – 8.5
Total Suspended Solids	mg/L	50mg/L (TSS:NTU correlation equivalent of 50NTU)
Oil and Grease	Visual	No visible surface sheen
Copper	mg/L	0.0013mg/L (50 percentile limit) 0.005mg/L (100 percentile limit)
Zinc	mg/L	0.015mg/L (50 percentile limit) 0.043mg/L (100 percentile limit)

CPB has a temporary stormwater connection for both the North site and South sites approved by the City of Sydney Council (CoSC) since 4 December 2020. During the reporting period the Trident 2 systems have been decommissioned and replaced with water treatment systems supporting the newly constructed stormwater pits for the permanent works. The new Pitt Street South system was commissioned on 11 October 2021 and a reuse system was established at Pitt Street North to recycle 100% water for site activities. The process for the water treatment is detailed in the Water Management Procedure in **Appendix E**. Both Trident systems were decommissioned from 12 October 2021 and removed from site.

Water discharged from the site is predominantly rainwater and construction (potable) water. Negligible groundwater is encountered which is evidenced by the frequency of discharge relating more to rainfall events than construction activities.

2.2.2 Water Quality Monitoring Methodology

Regular field tests are conducted by CPB Environmental Team using the calibrated water quality probe within the stormwater pit to confirm parameters are within the discharge criteria for pH, NTU and no visible oil and grease. If water requires treatment it is treated in the stormwater pit with the appropriate chemicals and retested again until compliant values are obtained. If the parameters are within the field criteria and monthly laboratory samples have been obtained, a permit to dewater will be issued. Additional field tests are undertaken by taking a sample of water from the sample valve located post-treatment to confirm the pH and NTU values and no visible oil and grease during discharge. This process is further detailed in the Water Management Procedure in **Appendix E**.

Table 2-2 outlines the CPB water quality monitoring equipment used during the reporting period.

Table 2-2 Water Quality Monitoring Equipment Details

Monitoring Type	Equipment Details	Serial Number	Calibration Date
Water Quality Multi Parameter Meter	Yeo-Kal 611	426	15/07/2021

Laboratory testing is conducted monthly via grab samples to confirm the criteria in Table 2-1 in accordance with the Discharge Impact Assessment – Discharge Management Protocol.
Laboratory Testing of water quality is undertaken at Eurofins Sydney Laboratory in Lane Cove West, a NATA accredited laboratory. Laboratory results are provided in Appendix F.

2.2.3 Water Quality Monitoring Results

Detailed discharge monitoring results for this reporting period are presented in **Table 2-3.**

Commissioning samples were taken at Pitt Street South site to validate the discharge criteria as per the Discharge Management Protocol for the new water treatment system. One monthly sampling event on 22 November 2021 exceeded the Stage 2 protocol (exceedance of one parameter), the site supervisor was notified and no further discharge occurred until an investigation into the exceedance was undertaken. Subsequent samples were taken and compliant results were obtained. No monthly samples exceeded the Stage 3 protocol exceedance (2 consecutive exceedances of the same parameter) during the reporting period. All discharges have been compliant with the Discharge Management Protocol. Due to the Christmas shutdown no laboratory samples were taken on the due date of 22/12/2021 due to no further discharges within this reporting period.

No discharges occurred from Pitt Street North during the reporting period, water was reused on-site for construction activities and site amenities through the recycling system. This was set up at the beginning of November 2021.

Table 2-3 Discharge Water Monitoring Data

	Parameter, Criteria or Measured Value								
Identifier	**Dates Sampled**	**pH (6.5-8.5)**	**Turbidity (<50NTU)**	**Copper (0.005mg/L)**	**Zinc (0.043mg/L)**	**Oil & Grease (visible)**	**Testing Method**	**Status**	
PSS01	11/10/2021	7.7	<5	<0.001	<0.005	Nil	Laboratory	Compliant	PSS Commissioning samples
PSS01	11/10/2021	7.6	<5	<0.001	<0.005	Nil	Laboratory	Compliant	
PSS01	11/10/2021	7.5	<5	<0.001	<0.005	Nil	Laboratory	Compliant	
PSS01	11/10/2021	7.6	<5	<0.001	<0.005	Nil	Laboratory	Compliant	
PSS01	11/10/2021	7.5	<5	<0.001	<0.005	Nil	Laboratory	Compliant	
PSS01	27/10/2021	7.6	10.8	*	*	Nil	Field	Compliant	
PSS01	22/11/2021	7.9	8.3	0.003	0.047	Nil	Laboratory	Stage 2 exceedance	
PSS01	22/11/2021	*	*	*	0.036	*	Laboratory	Compliant	
PSS01	26/11/2021	8.3	10.2	*	*	Nil	Field	Compliant	
PSS01	2/12/2021	8.4	20.1	*	*	Nil	Field	Compliant	
PSS01	20/12/2021	8.2	35.5	*	*	Nil	Field	Compliant	

* No testing undertaken as it was not required.

2.2.4 Groundwater Monitoring Results

Water discharged from the site is predominantly rainwater collected and water used for dust suppression which is evident from the relation between rainfall events and the discharge dates. It is therefore determined that less than 7kL/day of groundwater seepage is being captured and discharged.

Monthly settlement monitoring of the buildings adjacent to the PSISD sites has been undertaken to monitor for any settlement due to groundwater seepage. Total Survey Solutions are engaged by CPB to monitor the movement of structures over the entire Pitt Street Metro Project. This includes monitoring of the external buildings adjacent to the North and South sites, walls of the North and South station boxes and through the caverns/ adits between them. The monitoring uses total station instruments to take direct measurements to reference targets on and inside adjacent buildings and walls to calculate any movement measured as an angle of tilt that is recorded live on Geomotion. The angles that trigger concern have been determined by Structural Engineers and alarms have been set to activate text messages if the triggers are reached. During the reporting period, there were no settlement monitoring triggers at Pitt Street North or South site.

2.3 Noise and Vibration Monitoring

2.3.1 Background

The Main Works Construction Noise and Vibration Impact Statement (CNVIS) is regularly reviewed to ensure it captures all works being undertaken prior to works commencing. **Table 2-4** outlines the CNVIS developed during the reporting period. The current CNVIS is provided on the project website at https://pittstreetsydneymetroisd.com.au.

Table 2-4 CNVIS' developed and approved during the reporting period.

CNVIS*	Details
CNVIS – Station Box Main Works	29/10/2021 – Revision 12 issued to Sydney Metro and was endorsed by AA on 01/11/2021

Out of Hours works (OOHW) were conducted during the reporting period in accordance with the Sydney Metro Out of Hours Protocol and subsequent approved Out of Hours Works Applications (OOHWA).

2.3.2 Noise and Vibration Criteria

Relevant criteria relating to noise and vibration are outlined in the PSISD Construction Noise and Vibration Management Sub Plan and respective CNVIS. These are outlined in **Table 2-5**.

Table 2-5 Construction noise management levels at receivers[1, 2]

Receiver type	Time of Day[2]	EIS Chapter 10 Requirements				CSSI Approval Requirements	
		ICNG*	Ground Borne Noise	Sleep Disturbance	Construction Traffic	Condition E37[3]	Condition E41[4]
Pitt Street South							
Residential	Day (Standard – 7am-6pm)	74dB(A)$L_{eq(15min)}$ 75dB(A)$L_{eq(15min)}$ – Highly Noise Affected Threshold	45dB(A)L_{eq}[1]$_{(5min)}$ (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A
	Day (OOH)	69dB(A)$L_{eq(15min)}$	45dB(A)L_{eq}[1]$_{(5min)}$ (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A
	Evening (OOH)	66dB(A)$L_{eq(15min)}$	40dB(A)L_{eq}[1]$_{(5min)}$ (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	N/A	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**
	Night (OOH)	63dB(A)$L_{eq(15min)}$	35dB(A)$L_{eq1(5min)}$ (internal noise level)	65dB(A)L_{max} (external noise level)	55dB(A)$L_{eq(9hr)}$	N/A	45dB(A)$L_{eq(15Min)}$ (internal noise level) 65dB(A)$L_{eq(15Min)}$ (external noise level)**
Commercial	When in use	70dB(A)$L_{eq(15min)}$	N/A	N/A	N/A	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A
Pitt Street North							

Residential	Day (Standard – 7am-6pm)	73dB(A)$L_{eq(15min)}$ (weekdays) 75dB(A) – Highly Noise Affected Threshold	45dB(A)L_{eq}^{1}(5min) (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A
	Day (OOH)***	68dB(A)$L_{eq15min)}$	45dB(A) L_{eq}^{1}(5min) (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A
	Evening	66dB(A)$L_{eq(15min)}$	40dB(A) L_{eq}^{1}(5min) (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	N/A	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**
	Night	64dB(A)$L_{eq(15min)}$	35dB(A) L_{eq}^{1}(5min) (internal noise level)	65dB(A)L_{max} (external noise level)	55dB(A)$L_{eq(9hr)}$	N/A	45dB(A)$L_{eq(15Min)}$ (internal noise level) 65dB(A)$L_{eq(15Min)}$ (external noise level)**
Commercial	When in use	70dB(A)$L_{eq(15min)}$	N/A	N/A	N/A	60dB(A)$L_{eq(15Min)}$ (internal noise level) 80dB(A)$L_{eq(15Min)}$ (external noise level)**	N/A

*ICNG noise management levels for residential receives are based on the background noise levels presented in Section 4 of the CNVIS.

** External noise target determined by assuming a 20dB (A) noise reduction between outside and inside (closed windows).

1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level unless stated otherwise.
2. Noise management levels apply when receiver areas are in use only.
3. Exceedance of this level triggers the need for consideration of respite periods as per Conditions of Approval E38.
4. Exceedances of this level trigger the need to consider additional mitigation methods as detailed in Sydney Metro City and South West Noise and Vibration Strategy.

As a conservative approach, and in accordance with *British Standard BS 7385-2*, the vibration screening criteria has been applied to buildings at Pitt Street:

- Screening criteria – 2.5 mm/s (Peak Particle Velocity (PPV)

2.3.3 Attended Monitoring Methodology

Attended noise monitoring was undertaken during this reporting period with details provided in Section 2.3.4. Attended monitoring is undertaken when two OOH scenarios occur simultaneously where predicted exceedances are expected to be >20dB above RBL, as well as in response to recommendations by the ER and AA, or if required on receival of a complaint.

All attended short-term noise monitoring was recorded over 15-minute sample intervals at the closest affected sensitive receiver. The recordings were taken from a height of 1.2 m from the ground, at least 1m from the walls or other major reflecting surfaces. The noise monitor was paused when there were high levels of traffic and pedestrian movement.

Table 2-6 CNVIS Requirements

Plan	Requirements
CNVIS r12 - Section 7.2	In the event that use of hydraulic hammers or vibratory rollers is required, vibration monitoring will be conducted at receivers R1 and R3 in addition to those detailed above. Given these buildings are not heritage buildings, this can potentially be done in the event of complaint by occupants or by attended vibration measurement.

CNVIS r12 – Appendix E	Long term vibration monitors will be installed at the heritage buildings sharing a common boundary with the site (Receivers C1, C2, C5 and R4). Monitoring to commence 2 days before the start of detailed excavation.

2.3.4 Attended Monitoring Results

Attended noise monitoring results during the reporting period are provided in Table 2-7 below and photos of monitoring can be seen in Appendix C. No attended vibration monitoring was required during the monitoring period.

Table 2-7 Attended Noise Monitoring Data

Monitoring Location	Date	Time	Nearest Receiver (ref Fig 1-1) /Type	Measured Value L_{eq} (15min)	Adjusted noise level at receiver (dBA)	Predicted Value from CNVIS r12 at Receiver (dBA)	Work Activity	Comments
Pitt Street South – on terrace behind R1, 10m from nearest window and 1m from noise	09/12/21	18:00	Residential Receiver R1	76.7	71	74	Covid shift	ISD compliant[1]
Pitt Street South – central to site and 1m from noise	09/12/21	14:05	Residential Receiver R1	83.6	60	80	Core drilling	ISD compliant[1]
Pitt Street South – central to site and 1m from noise	10/12/21	11:44	Residential Receiver R2b	81.8	62	80	Wire saw	ISD compliant[1]
Pitt Street South – on street outside R2a	15/12/21	9:47	Commercial Receiver R2a	76.6	77	90	Wall saw	ISD compliant

From measured noise values a predicted noise level at the receiver can be calculated and compared with the predicted maximum noise levels at Receivers as stated in the CNVIS. From the values provided in the table above all noise levels were compliant.

2.3.5 Real-Time Monitoring Methodology

Real-time noise monitors have been maintained and monitored by Acoustic Consultants Renzo Tonin since November 2020. The real-time links to the monitoring data have been submitted to Sydney Metro, DPIE and EPA and all records stored. Locations of these monitors are depicted in **Figure 2-1**.

It is noted that the noise monitoring locations are conservative and measure external noise levels and not internal noise levels. The noise and vibration consultant has provided advice to CPB that a 25 dB(A) (for the North) and 20dB(A) (for the South) noise reduction between the external noise level and the internal noise level has been determined following on-site outside/inside noise level measurements. This has been adopted by the project in assessing performance against the CoA E38 as approved in the CNVMP.

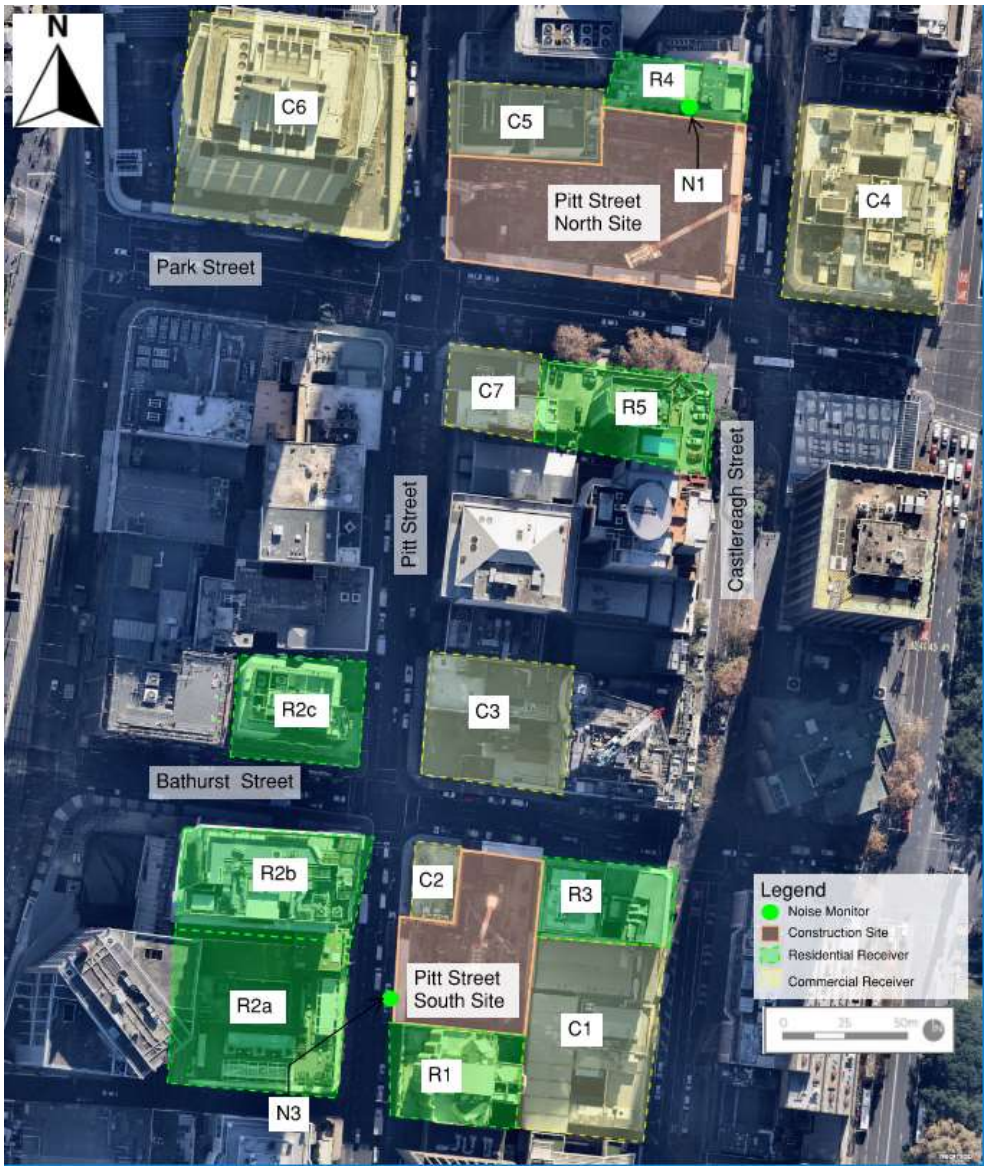

Figure 2-1 Pitt Street Station Real-Time Monitor Locations

Condition E28 of the CSSI 15_7400 requires that *vibration from construction activities does not exceed the vibration limits set out in the British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings: Guide to damage levels from groundborne vibration* which was interpreted in the CNVIS to set a limit of 2.5 mm/s peak component particle velocity as a conservative approach for the project. There are no construction activities during the reporting period identified in Table 1-1 that would be expected to generate vibration levels exceeding 2.5m/s. All demolition works for capping beam were completed using concrete saws.

Condition E38 of the CSSI 15_7400 requires that *internal noise levels be less than L_{eq}(15 minute) 60 dB(A) for at least 6.5 hours between 7am and 8pm (Upper Limit), of which at least 3.25 hours must be below L_{Aeq}(15 minute) 55 dB(A) (Lower Limit). Within these hours, works are 'permitted' to generate noise greater than 60dB(A) for up to 6.5 hours (the equivalent of 26x15 minute periods), and 'requires' 3.25 hours of noise generated to be less than 55dB(A) (the equivalent of 13x15 minute periods).* A SMS/Email alert system has been set up to notify the project team that CoA E38 limits are approaching. Following receipt of an SMS / Email, site activities are reviewed and works with high noise are ceased. Compliance during the reporting period with this condition are shown below in **Tables 2-10, 2-11 and 2-12.**

The equipment used for noise measurements was an NTi Audio Type XL2 precision sound level analyser which is a class 1 instrument having accuracy suitable for field and laboratory use. The instrument was calibrated prior and subsequent to measurements using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with IEC 61672

(parts 1-3) '*Electroacoustics - Sound Level Meters*' and IEC 60942 *'Electroacoustics - Sound calibrators'* and carries current NATA certification (or if less than 2 years old, manufacturers certification). **Table 2-8** outlines the noise monitoring equipment that has been used during the reporting period.

Photos of the real-time equipment are shown in **Appendix B** and calibration certificates for the equipment in **Table 2-8** can be seen in **Appendix D.**

Table 2-8 Monitoring Equipment Details

Monitoring Type / Location	Equipment Details	Serial Number	Last Calibration Date	Off Hire Date
Attended Noise	Rion NL-20	00143337	29/01/2021	N/A
Noise calibrator	Pulsar Model 106	93277	29/01/2021	N/A
Real-Time Noise – N1	NTi Audio Type XL2	RTA07-020	17/01/2020	14/12/2021
Real-Time Noise – N2	NTi Audio Type XL2	RTA07-022	20/12/2019	06/09/2021
Real-Time Noise – N3	NTi Audio Type XL2	RTA07-021	19/12/2019	14/12/2021
Real-Time Noise – N1	NTi Audio Type XL2	RTA07-ATP0	26/02/2021	On site
Real-Time Noise – N3	NTi Audio Type XL2	RTA07-004	18/01/2021	On site

2.3.6 Real-Time Monitoring Results

Real-time noise monitors were operating at Pitt Street North and Pitt Street South during the reporting period. Summarised real-time noise monitoring results outlining compliance with CoA E38 are presented for the North site in **Table 2-9** and for the South site in **Table 2-10**. Noise levels in this reporting period were generally compliant with the predicted noise levels set out in the CNVIS.

The noise monitor at Pitt Street South site was offline during the period 21/12/2021 to 05/01/2022. During this time no construction activities occurred as the site was shut for the Christmas break.

All real-time vibration monitors were removed in Q3 2021, the removal process occurred in consultation with the AA, ER and in accordance with the planning approval and CNVMP.

Table 2-9 Condition E38 Compliance North Site (Pitt Street)

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	6/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	7/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	8/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	9/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	10/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	11/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	12/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	13/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	14/10/2021	7am	8pm	13	12.25	Yes	Yes
Pitt Street (North)	15/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	16/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	17/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	18/10/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	19/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	20/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	21/10/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	22/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	23/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	24/10/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	25/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	26/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	27/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	28/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	29/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	30/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	31/10/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	1/11/2021	7am	8pm	13	12.5	Yes	Yes
Pitt Street (North)	2/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	3/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	4/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	5/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	6/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	7/11/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	8/11/2021	7am	8pm	13	12.5	Yes	Yes
Pitt Street (North)	9/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	10/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	11/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	12/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	13/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	14/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	15/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	16/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	17/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	18/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	19/11/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	20/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	21/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	22/11/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	23/11/2021	7am	8pm	12.5	10.75	Yes	Yes
Pitt Street (North)	24/11/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	25/11/2021	7am	8pm	13	12.5	Yes	Yes
Pitt Street (North)	26/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	27/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	28/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	29/11/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	30/11/2021	7am	8pm	12.75	11.25	Yes	Yes
Pitt Street (North)	1/12/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	2/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	3/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	4/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	5/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	6/12/2021	7am	8pm	13	12.75	Yes	Yes
Pitt Street (North)	7/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	8/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	9/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	10/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	11/12/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	12/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	13/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	14/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	15/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	16/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	17/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	18/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	19/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	20/12/2021	7am	8pm	12.75	11.25	Yes	Yes
Pitt Street (North)	21/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	22/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	23/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	24/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	25/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	26/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	27/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	28/12/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
Pitt Street (North)	29/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	30/12/2021	7am	8pm	13	13	Yes	Yes
Pitt Street (North)	31/12/2021	7am	8pm	13	13	Yes	Yes

Table 2-10 Condition E38 Compliance South Site (Pitt Street)

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	6/10/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	7/10/2021	7am	8pm	13	9.5	Yes	Yes
South Site (Pitt Street)	8/10/2021	7am	8pm	13	10.75	Yes	Yes
South Site (Pitt Street)	9/10/2021	7am	8pm	13	11.25	Yes	Yes
South Site (Pitt Street)	10/10/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	11/10/2021	7am	8pm	13	11	Yes	Yes
South Site (Pitt Street)	12/10/2021	7am	8pm	11.75	8.75	Yes	Yes
South Site (Pitt Street)	13/10/2021	7am	8pm	12.25	10.75	Yes	Yes
South Site (Pitt Street)	14/10/2021	7am	8pm	12.75	9.25	Yes	Yes
South Site (Pitt Street)	15/10/2021	7am	8pm	12.25	8.75	Yes	Yes
South Site (Pitt Street)	16/10/2021	7am	8pm	13	11.75	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	17/10/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	18/10/2021	7am	8pm	11.75	6.75	Yes	Yes
South Site (Pitt Street)	19/10/2021	7am	8pm	12.75	10	Yes	Yes
South Site (Pitt Street)	20/10/2021	7am	8pm	13	10.25	Yes	Yes
South Site (Pitt Street)	21/10/2021	7am	8pm	12.75	7	Yes	Yes
South Site (Pitt Street)	22/10/2021	7am	8pm	12.25	7.5	Yes	Yes
South Site (Pitt Street)	23/10/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	24/10/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	25/10/2021	7am	8pm	13	11.25	Yes	Yes
South Site (Pitt Street)	26/10/2021	7am	8pm	13	10.5	Yes	Yes
South Site (Pitt Street)	27/10/2021	7am	8pm	13	8.75	Yes	Yes
South Site (Pitt Street)	28/10/2021	7am	8pm	12.25	10.5	Yes	Yes
South Site (Pitt Street)	29/10/2021	7am	8pm	12	6.75	Yes	Yes
South Site (Pitt Street)	30/10/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	31/10/2021	7am	8pm	12.75	12.75	Yes	Yes
South Site (Pitt Street)	28/10/2021	7am	8pm	12.25	10.5	Yes	Yes
South Site (Pitt Street)	29/10/2021	7am	8pm	12	6.75	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	30/10/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	31/10/2021	7am	8pm	12.75	12.75	Yes	Yes
South Site (Pitt Street)	28/10/2021	7am	8pm	12.25	10.5	Yes	Yes
South Site (Pitt Street)	29/10/2021	7am	8pm	12	6.75	Yes	Yes
South Site (Pitt Street)	30/10/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	31/10/2021	7am	8pm	12.75	12.75	Yes	Yes
South Site (Pitt Street)	1/11/2021	7am	8pm	12.25	9	Yes	Yes
South Site (Pitt Street)	2/11/2021	7am	8pm	11.5	10	Yes	Yes
South Site (Pitt Street)	3/11/2021	7am	8pm	12.5	4.75	Yes	Yes
South Site (Pitt Street)	4/11/2021	7am	8pm	12.5	9.25	Yes	Yes
South Site (Pitt Street)	5/11/2021	7am	8pm	13	10.75	Yes	Yes
South Site (Pitt Street)	6/11/2021	7am	8pm	13	9.5	Yes	Yes
South Site (Pitt Street)	7/11/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	8/11/2021	7am	8pm	12	9.5	Yes	Yes
South Site (Pitt Street)	9/11/2021	7am	8pm	13	6.25	Yes	Yes
South Site (Pitt Street)	10/11/2021	7am	8pm	13	11	Yes	Yes
South Site (Pitt Street)	11/11/2021	7am	8pm	13	10.25	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	12/11/2021	7am	8pm	13	11.25	Yes	Yes
South Site (Pitt Street)	13/11/2021	7am	8pm	13	10.75	Yes	Yes
South Site (Pitt Street)	14/11/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	15/11/2021	7am	8pm	12.5	5.25	Yes	Yes
South Site (Pitt Street)	16/11/2021	7am	8pm	13	9.25	Yes	Yes
South Site (Pitt Street)	17/11/2021	7am	8pm	13	11	Yes	Yes
South Site (Pitt Street)	18/11/2021	7am	8pm	13	7.25	Yes	Yes
South Site (Pitt Street)	19/11/2021	7am	8pm	12.5	5.5	Yes	Yes
South Site (Pitt Street)	20/11/2021	7am	8pm	11.5	7.75	Yes	Yes
South Site (Pitt Street)	21/11/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	22/11/2021	7am	8pm	12	3.25	Yes	Yes
South Site (Pitt Street)	23/11/2021	7am	8pm	13	9	Yes	Yes
South Site (Pitt Street)	24/11/2021	7am	8pm	12.75	11.5	Yes	Yes
South Site (Pitt Street)	25/11/2021	7am	8pm	13	9.75	Yes	Yes
South Site (Pitt Street)	26/11/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	27/11/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	28/11/2021	7am	8pm	13	13	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	29/11/2021	7am	8pm	12.75	10	Yes	Yes
South Site (Pitt Street)	30/11/2021	7am	8pm	12.75	10.5	Yes	Yes
South Site (Pitt Street)	1/12/2021	7am	8pm	11	7.5	Yes	Yes
South Site (Pitt Street)	2/12/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	3/12/2021	7am	8pm	13	10.75	Yes	Yes
South Site (Pitt Street)	4/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	5/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	6/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	7/12/2021	7am	8pm	13	12.75	Yes	Yes
South Site (Pitt Street)	8/12/2021	7am	8pm	13	9.5	Yes	Yes
South Site (Pitt Street)	9/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	10/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	11/12/2021	7am	8pm	13	12.5	Yes	Yes
South Site (Pitt Street)	12/12/2021	7am	8pm	13	13	Yes	Yes
South Site (Pitt Street)	13/12/2021	7am	8pm	12.75	11.5	Yes	Yes
South Site (Pitt Street)	14/12/2021	7am	8pm	9.75	7.75	Yes	Yes
South Site (Pitt Street)	15/12/2021	7am	8pm	7.5	7	Yes	Yes

Monitoring Location (Address)	Monitoring Date	Start Time	End Time	Period below 60 $L_{eq(15minute)}$ dB(A) - (Hours)	Period below 55 $L_{eq(15minute)}$ dB(A) - (Hours)	Min 6.5 hrs below 60dB(A)$L_{eq(15min)}$	Min 3.25 hrs below 55dB(A)$L_{eq(15min}$
South Site (Pitt Street)	16/12/2021	7am	8pm	12.25	7.25	Yes	Yes
South Site (Pitt Street)	17/12/2021	7am	8pm	12.75	9.5	Yes	Yes
South Site (Pitt Street)	18/12/2021	7am	8pm	10.25	9.75	Yes	Yes
South Site (Pitt Street)	19/12/2021	7am	8pm	12.75	10.25	Yes	Yes
South Site (Pitt Street)	20/12/2021	7am	8pm	10.75	8	Yes	Yes

Conclusion

Based on the monitoring results presented in this report, compliance with the monitoring programs and criteria for Water Quality and Groundwater has been verified.

Observed noise levels do not exceed the forecasted levels presented in the project CNVIS Rev 12. Based on the monitoring results and site investigations, CPB considers that the noise associated with the stated construction works was compliant with the project approvals and requirements during the monitoring period.

3. Appendices

A - Weather Data

Sydney, New South Wales
October 2021 Daily Weather Observations

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	14.8	24.7	0	5.2	4.6	W	80	17:11	17.1	81	8	W	9	1007.8	21.8	66	5	E	24	1002.3
2	Sa	11.9	24.9	3.2	7.0	7.8	SW	37	20:17	18.9	67	1	W	7	1004.6	19.4	70	7	E	17	1001.9
3	Su	12.9	26.0	7.0	4.6	9.1	W	41	12:52	15.0	100	1	WNW	11	1004.7	24.1	41	5	W	17	1001.2
4	Mo	15.0	28.3	0	4.4	10.9	WNW	54	19:10	19.0	73	1	SSE	4	999.6	26.5	36	2	WSW	20	998.2
5	Tu	12.8	22.6	0	9.8	11.0	WNW	59	12:10	16.0	49	2		Calm	1008.1	21.8	24	1	WSW	31	1007.5
6	We	11.5	24.9	0	5.0	11.4	W	43	08:17	14.7	54	0	W	28	1016.1	22.3	43	0	ENE	20	1012.0
7	Th	12.7	31.0	0	7.6	7.3	SSW	83	16:25	17.6	39	6	NNW	9	1009.4	30.5	21	3	W	22	1005.7
8	Fr	15.8	22.8	0	9.4	8.8	ENE	43	17:04	16.4	69	3	WNW	6	1019.0	21.4	54	1	NE	26	1017.0
9	Sa	13.4	25.6	0	7.8	10.3	NNE	31	18:22	16.2	84	7	WNW	9	1017.3	24.6	55	1	ESE	11	1012.5
10	Su	16.2	25.5	0	7.6	4.6	S	65	14:08	20.9	66	7		Calm	1009.1	18.2	86	7	SSW	35	1007.1
11	Mo	10.3	15.5	14.4	4.6	0.0	S	54	00:59	11.0	94	8	SW	13	1016.0	13.2	89	8	S	17	1016.3
12	Tu	10.9	17.3	2.0	2.2	0.1	ESE	43	07:41	15.0	66	7	E	24	1018.9	16.7	57	7	ESE	22	1016.9
13	We	13.7	18.4	3.2	3.2	0.0	E	52	11:01	14.5	98	8	E	24	1017.0	17.3	92	8	ENE	31	1013.1
14	Th	14.4	24.1	8.2	3.8	5.4	NNE	59	15:44	17.9	82	7	N	13	1009.6	22.0	77	7	NE	24	1004.1
15	Fr	13.1	22.1	10.0	7.2	8.3	WNW	74	12:17	16.3	67	5	WSW	24	1003.4	16.4	59	5	WNW	28	999.6
16	Sa	12.6	23.3	0.8	8.0	8.1	W	74	15:02	17.0	51	3	W	26	1002.9	22.2	36	2	WSW	28	1003.0
17	Su	12.5	23.1	0	6.0	12.1	W	44	08:26	16.0	52	1	W	20	1014.6	21.9	51	1	E	19	1013.1
18	Mo	12.3	25.1	0	8.0	11.9	ENE	30	14:05	16.5	85	1	W	19	1016.8	23.8	42	1	ENE	22	1012.7
19	Tu	14.3	24.2	0	7.8	8.6	SSW	65	14:42	19.0	65	3	NNE	6	1015.6	19.7	68	7	S	30	1014.7
20	We	11.9	23.5	0	4.2	10.4	ESE	31	10:40	15.1	75	5	W	15	1017.8	23.0	49	2	SE	15	1016.7
21	Th	13.4	24.8	0	5.6	11.8	E	28	16:36	17.3	89	2	WNW	11	1017.8	24.7	56	2	E	17	1015.7
22	Fr	15.3	25.1	0	6.4	10.5	E	26	15:31	18.2	87	3	NW	4	1018.0	24.2	63	2	E	17	1015.4
23	Sa	16.1	25.2	0	6.8	11.3	NE	35	17:09	20.0	90	1	NE	15	1013.7	24.5	72	4	E	22	1010.0
24	Su	16.5	22.8	3.6	6.2	11.3	SSW	52	04:15	18.7	76	6	S	19	1015.5	21.8	54	1	ESE	26	1014.2
25	Mo	13.3	23.2	2.2	6.4	11.8	ESE	41	14:55	16.7	78	3	W	17	1016.5	20.9	52	1	SE	22	1014.7
26	Tu	12.7	23.4	0	10.0	12.0	ESE	31	13:57	17.2	65	2	WNW	9	1020.5	21.5	51	3	ESE	22	1017.8
27	We	16.0	25.4	0	5.8	11.1	ENE	28	13:46	19.1	76	6	E	4	1019.2	24.7	63	1	ENE	22	1014.6
28	Th	16.3	30.4	0	5.6	9.4	E	28	12:19	20.1	79	6	W	15	1012.4	26.8	56	7	E	17	1008.5
29	Fr	20.1	33.0	0	7.2	8.0	W	81	15:26	24.3	42	7	NNW	9	1002.8	31.6	31	2	W	50	1001.5
30	Sa	16.0	20.9	0	11.4	5.5	SSE	41	14:04	17.2	57	7	SSE	17	1017.9	19.1	50	7	SE	24	1017.9
31	Su	11.8	23.0	0	8.6	7.9	ENE	31	17:48	16.3	63	3	WNW	13	1025.9	21.6	47	1	E	20	1024.3
Statistics for October 2021																					
Mean		13.9	24.2		6.6	8.4				17.3	71	4		12	1013.2	22.2	55	3		23	1010.7
Lowest		10.3	15.5		2.2	0.0				11.0	39	0		Calm	999.6	13.2	21	0	ESE	11	998.2
Highest		20.1	33.0	14.4	11.4	12.1	SSW	83		24.3	100	8	W	28	1025.9	31.6	92	8	W	50	1024.3
Total				54.6	203.4	261.3															

Temperature, humidity and rainfall observations are from Sydney (Observatory Hill) {station 066214}. Pressure, cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}. Wind observations are from Fort Denison {station 066022}

Sydney Airport is about 10 km to the south of Observatory Hill.

IDCJDW2124.202110 Prepared at 16:00 UTC on 2 Dec 2021
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Sydney, New South Wales
November 2021 Daily Weather Observations

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	12.9	24.6	0	5.2	4.3	ENE	33	12:00	17.8	70	7	W	4	1026.5	21.6	57	7	NE	17	1024.0
2	Tu	16.4	25.9	0	6.6	11.1	ENE	43	16:58	21.0	72	3	E	11	1027.7	25.0	56	5	ENE	30	1026.4
3	We	17.3	25.1	0	7.4	10.9	NE	46	13:40	21.3	60	3	NNE	20	1026.9	24.8	51	7	NE	26	1022.9
4	Th	18.2	20.7	0	10.0	0.0	ENE	22	08:03	20.4	73	8	E	13	1021.5	20.1	86	8	NE	11	1020.6
5	Fr	16.7	25.0	7.6	1.4	1.6	ENE	41	14:21	19.4	90	8	ENE	9	1021.5	23.1	69	7	ENE	24	1018.9
6	Sa	16.2	26.0	0	4.6	11.6	NNE	48	17:52	20.0	78	2	E	13	1015.9	25.2	57	1	NE	22	1010.7
7	Su	17.9	26.1	0.4	7.6	0.5	W	30	07:15	19.6	89	8	W	13	1009.8	19.8	84	8	NNW	7	1006.8
8	Mo	17.8	24.8	9.6	1.0	7.2	ESE	30	12:41	19.6	92	7	E	6	1008.2	23.2	67	6	ESE	19	1007.7
9	Tu	17.1	24.8	1.4	6.8	8.2	ENE	28	17:34	18.9	83	7	SSW	15	1013.0	23.7	68	6	ENE	15	1010.7
10	We	18.8	21.1	0	4.4	0.4				20.9	85	7	NW	9	1009.1	19.5	98	8	ESE	4	1006.9
11	Th	17.5	19.4	17.6	1.2	0.0	SSE	44	22:06	18.4	86	8	SSE	26	1006.5	17.6	83	8	SSE	19	1005.9
12	Fr	13.0	22.4	16.8	5.2	4.0	NW	39	22:35	14.6	99	8	W	20	998.1	20.4	73	6	SSE	17	994.5
13	Sa	14.6	21.4	0.2	4.4	7.5	WNW	69	14:30	17.6	50	3	WNW	33	998.2	20.6	42	7	WNW	37	997.4
14	Su	13.3	23.2	0.4	10.2	10.7	NW	67	16:49	17.4	47	7	WNW	28	1007.7	23.1	32	5	W	35	1003.9
15	Mo	13.0	24.1	0.8	6.4	11.8	WSW	54	17:32	16.8	41	1	W	30	1007.5	21.3	31	3	WNW	31	1007.0
16	Tu	13.7	21.6	0	8.8	13.0	ESE	41	14:16	17.0	41	1	WSW	20	1015.9	20.1	44	1	ESE	26	1017.1
17	We	13.5	22.5	0	8.0	10.1	E	31	15:05	17.2	63	5	SSE	11	1024.6	22.0	55	2	E	19	1022.6
18	Th	14.9	25.3	0	8.0	11.3	NE	44	16:36	19.9	71	3	NNE	19	1021.2	24.5	62	1	NE	26	1015.5
19	Fr	19.0	30.5	1.0	7.6	3.4	SSW	59	17:01	19.1	89	8	ESE	6	1013.4	29.4	45	8	ENE	24	1010.0
20	Sa	17.3	21.0	0.2	4.2	0.2	SSE	37	17:51	19.2	84	8	E	4	1010.7	18.6	81	8	SSE	19	1010.8
21	Su	15.3	19.2	13.0	3.6	0.0	ESE	52	20:27	16.0	97	8	S	17	1016.3	16.0	98	8	SSE	28	1015.8
22	Mo	15.4	22.3	18.4	2.0	4.0	SSE	44	10:37	18.8	74	7	SSE	28	1022.4	21.8	64	5	SSE	24	1021.1
23	Tu	16.3	22.7	2.8	4.8	2.6	ESE	30	12:00	18.8	88	7	ESE	20	1021.2	21.9	78	7	ESE	13	1019.1
24	We	17.8	27.6	0.4	2.2	3.8	NE	48	15:58	21.0	90	8	ESE	7	1017.3	26.3	71	7	ENE	26	1014.0
25	Th	19.8	24.5	6.0	5.0	0.2	NE	31	16:45	21.1	98	8	E	6	1011.7	23.5	90	7	NE	11	1007.2
26	Fr	16.5	18.7	21.4	8.8	0.0	S	63	13:45	17.1	98	8	SSW	26	1009.0	18.3	86	8	S	33	1009.9
27	Sa	15.2	18.7	17.0	2.6	0.7	SSE	59	12:23	15.2	95	8	S	22	1018.1	18.3	68	7	S	33	1018.7
28	Su	15.1	21.2	2.0	4.6	4.1	SSE	46	07:49	17.5	75	5	SSE	28	1022.4	19.7	56	7	S	26	1021.1
29	Mo	14.0	23.3	0	4.0	3.2	ESE	28	11:31	18.6	67	7	S	11	1021.1	20.5	60	6	E	13	1018.5
30	Tu	18.1	23.3	0	5.8	0.0	NE	26	20:17	20.3	80	8	E	6	1018.7	21.8	86	8	ESE	11	1016.5
Statistics for November 2021																					
Mean		16.1	23.2		5.4	4.9				18.7	77	6		16	1015.4	21.7	66	6		21	1013.4
Lowest		12.9	18.7		1.0	0.0				14.6	41	1	#	4	998.1	16.0	31	1	ESE	4	994.5
Highest		19.8	30.5	21.4	10.2	13.0	WNW	69		21.3	99	8	WNW	33	1027.7	29.4	98	8	WNW	37	1026.4
Total				137.0	162.4	146.4															

Temperature, humidity and rainfall observations are from Sydney (Observatory Hill) {station 066214}. Pressure, cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}. Wind observations are from Fort Denison {station 066022}

Sydney Airport is about 10 km to the south of Observatory Hill.

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Sydney, New South Wales
December 2021 Daily Weather Observations

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	We	19.3	26.8	1.0	2.0	6.9	E	33	11:49	22.8	80	7	NE	11	1016.3	26.2	61	5	ENE	20	1014.6
2	Th	18.3	27.4	0	6.4	10.9	ENE	37	16:18	22.8	79	3	ESE	6	1017.2	27.1	63	1	E	26	1015.2
3	Fr	18.5	27.3	0.4	8.8	8.0	S	57	12:43	23.3	75	0	E	11	1014.2	22.9	73	8	SSE	31	1015.3
4	Sa	17.9	23.1	0.2	5.6	0.2	SSE	54	14:37	19.5	86	8	S	19	1013.8	22.1	61	7	SSE	31	1013.5
5	Su	16.8	19.7	0.4	8.0	0.0	S	43	01:06	17.3	86	8	SSW	6	1021.7	18.7	62	8	ESE	24	1022.2
6	Mo	16.7	23.3	1.0	5.0	0.0	E	31	01:58	19.7	65	8	E	13	1020.4	20.9	60	8	NE	17	1017.6
7	Tu	17.5	26.9	0	3.0	6.6	NNE	43	15:33	21.4	72	7	W	7	1012.7	26.2	68	3	ENE	20	1008.9
8	We	17.5	20.1	15.4	5.4	0.0	S	56	01:59	17.9	89	8	SSW	22	1014.5	18.7	84	8	S	17	1013.0
9	Th	16.2	24.7	14.2	1.8	8.0	W	39	01:13	19.8	87	6	SSE	13	1010.7	23.6	74	5	SE	20	1007.6
10	Fr	13.9	22.7	18.4	6.4	4.7	WNW	56	10:50	18.2	63	1	WNW	19	1005.7	15.6	94	8	W	24	1006.4
11	Sa	14.1	22.6	10.0	5.2	8.0	S	59	14:08	17.0	68	7	SSW	20	1014.9	21.6	55	3	S	39	1014.8
12	Su	15.1	23.6	0.4	7.4	10.5	SSE	44	12:18	18.4	71	6	SSW	20	1018.5	22.0	58	2	S	28	1016.6
13	Mo	16.2	24.8	0	7.8	11.6	ESE	33	12:06	20.6	57	3	SSW	11	1016.5	23.7	56	1	ESE	19	1014.0
14	Tu	14.9	25.8	0	8.0	11.6	ESE	26	13:04	20.4	72	7	WNW	7	1015.0	25.3	59	7	E	20	1014.6
15	We	16.3	28.0	0	5.0	12.1	SSW	57	19:12	21.4	76	0	WSW	6	1013.7	27.0	51	1	ENE	20	1008.8
16	Th	20.0	25.7	6.2	11.6	6.3	SSE	41	14:14	21.8	82	7	S	17	1013.1	22.7	73	7	SE	20	1013.6
17	Fr	18.4	26.4	0	6.2	6.3	ENE	41	17:39	21.4	79	7	S	4	1018.4	26.0	60	3	E	24	1015.3
18	Sa	19.0	30.9	0	5.2	10.8	SSW	59	22:31	23.9	77	7	E	11	1013.9	29.5	63	5	NE	13	1009.5
19	Su	21.4	34.6	3.4	11.4	4.4	WSW	78	14:24	26.9	69	7	NNE	13	1009.3	33.1	36	7	W	31	1006.0
20	Mo	20.4	29.1	0.2	8.0	10.4	ENE	31	15:39	24.4	76	7	SSE	11	1014.1	28.1	70	1	E	20	1011.2
21	Tu	21.2	31.5	0	7.2	13.4	ESE	28	12:57	26.1	62	1	S	9	1012.5	30.3	42	1	SE	13	1009.9
22	We	21.3	28.5	0	12.2	2.5	S	33	23:41	22.8	78	8	SSW	11	1012.6	28.1	62	7	SE	20	1010.9
23	Th	21.0	27.0	18.0	6.2	1.3	ENE	35	14:45	22.5	95	8	NNE	4	1012.5	26.9	84	7	ENE	20	1010.8
24	Fr	19.8	28.1	10.6	1.6	9.8	SSW	37	02:34	21.6	82	4	S	22	1015.3	27.7	67	1	ESE	17	1013.2
25	Sa	20.7	29.4	0	5.0	10.6	ENE	44	14:53	24.4	80	3	E	6	1014.9	28.9	67	1	NE	28	1012.0
26	Su	20.4	27.3	0	12.8	4.0	SSW	56	16:58	24.8	78	7	SSE	19	1015.0	24.4	75	7	S	20	1013.1
27	Mo	18.4	22.8	5.0	6.4	1.6	S	59	11:37	19.7	79	7	SSW	26	1017.8	21.5	67	7	S	30	1017.3
28	Tu	16.1	22.5	18.0	6.4	3.5	SSE	46	23:22	17.7	83	7	WSW	13	1020.0	20.8	65	7	ENE	17	1019.2
29	We	14.9	23.8	5.4	5.4	7.8	SSW	28	13:15	17.3	89	6	W	19	1019.3	19.6	88	7	N	7	1017.4
30	Th	15.7	27.2	4.6	5.0	12.9	NE	41	16:47	20.7	75	1	WNW	13	1017.7	26.6	59	1	E	24	1015.9
31	Fr	17.6	28.1	0	11.2	12.6	ENE	46	14:54	22.4	73	1	NNE	17	1016.4	27.4	61	1	NE	22	1013.9
Statistics for December 2021																					
Mean		17.9	26.1		6.7	7.0				21.3	76	5		13	1015.1	24.6	65	4		22	1013.3
Lowest		13.9	19.7		1.6	0.0				17.0	57	0	#	4	1005.7	15.6	36	1	N	7	1006.0
Highest		21.4	34.6	18.4	12.8	13.4	WSW	78		26.9	95	8	SSW	26	1021.7	33.1	94	8	S	39	1022.2
Total				132.8	207.6	217.3															

Temperature, humidity and rainfall observations are from Sydney (Observatory Hill) {station 066214}. Pressure, cloud, evaporation and sunshine observations are from Sydney Airport AMO {station 066037}. Wind observations are from Fort Denison {station 066022}

Sydney Airport is about 10 km to the south of Observatory Hill.

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B – Photos of Real-Time Equipment

Figure B-1 N1 Pitt Street North

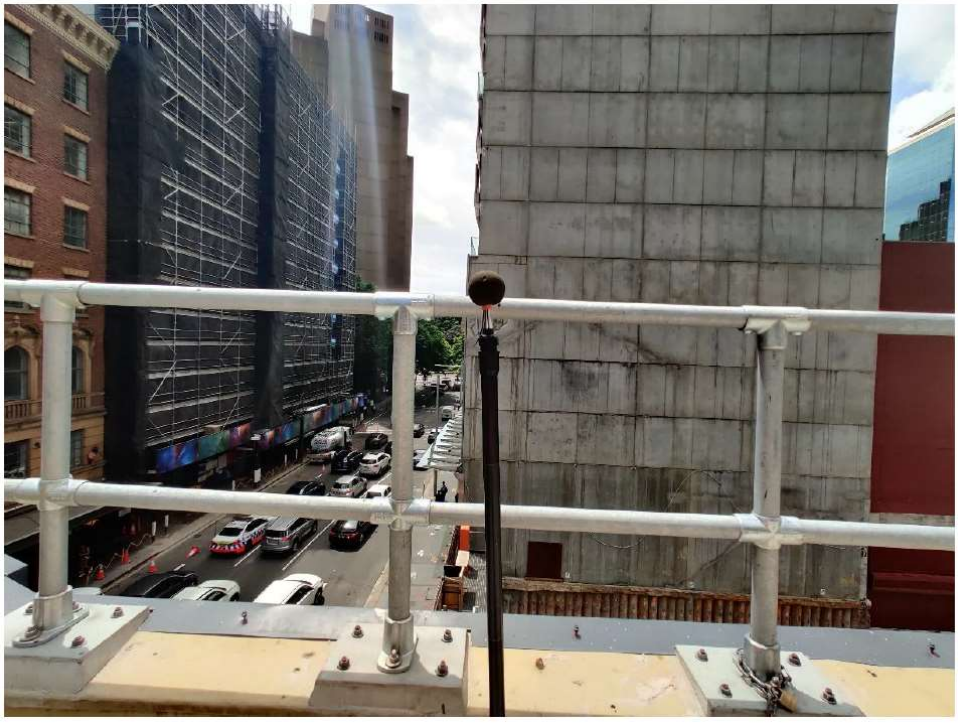

Figure B-2 N2 Pitt Street South (facing Pitt Bathurst)

Figure B-3 N3 Pitt Street South (facing Pitt Street)

C – Attended Monitoring Photos

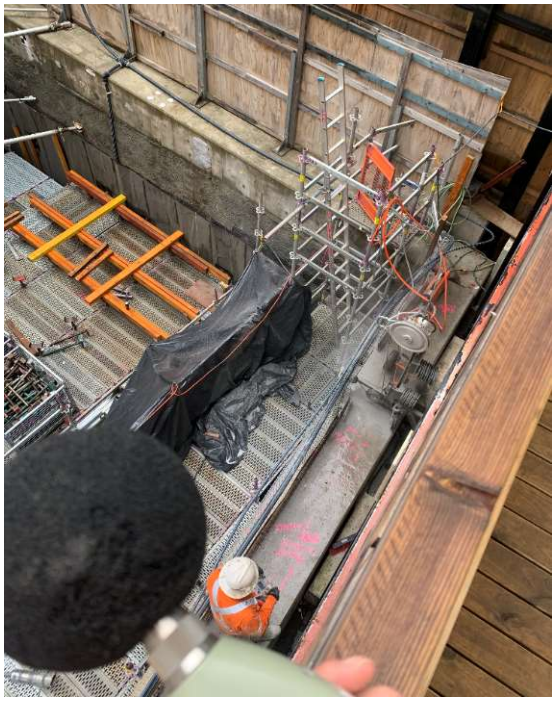

Figure C-1 R5 Attended Monitoring 05/11/2021

Figure C-2 R5 Attended Monitoring 10/11/2021

D – Calibration Certificates

NATacoustic
Acoustic Calibration & Testing Laboratory
Level 1, 418A Elizabeth Street., Surry Hills NSW 2010 AUSTRALIA
Ph: (02) 8218 0570 email: service@natacoustic.com.au website: www.natacoustic.com.au
A division of Renzo Tonin & Associates (NSW) Pty Ltd ABN 29 117 462 861

Certificate of Calibration
Sound Level Meter

Calibration Date	17/01/2020	**Job No**	RB762	**Operator**	JA
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

Test Item

Instrument Make	NTI	**Model**	XL2	**Serial No**	#A2A-13500-E0 #RTA07-020
Microphone Make	NTI	**Model**	MC230	**Serial No**	#9533
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#6540
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

SLM Type	1
Filters Class	1

Environmental Conditions	**Measured**	
	Start	**End**
Air Temp. (°C)	23.2	23.5
Rel. Humidity (%)	58.9	57.4
Air Pressure (kPa)	100.6	99.9

Applicable Standards:
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Function Generator Model 33220A SN MY43004013
Agilent Digital Multimeter Model 34401A SN MY41004386

Traceability:
Accredited for compliance with ISO/IEC 17025 - Calibration.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. This document shall not be reproduced, except in full.

Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification. See "Sound Level Meter Verification - Summary of Tests" page for an itemised list of results for each test.

Uncertainty:
The uncertainty is stated at a confidence level of 95% using a k factor of 2.

Calibration Statement:
The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 and IEC 61260-1:2014 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 and IEC 61260-1:2014 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016 cover only a limited subset of the specifications in IEC 61672-1:2013 and IEC 61260-1:2014.

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Authorized Signatory:

Print Name: Renzo Tonin Date: 22 January 2020

Template Document Name: RQT-05 (rev 65) SLM ISO Verification

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	17/01/2020	**Job No**	RB762	**Operator**	JA
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Instrument Make	NTI	**Model**	XL2	**Serial No**	#A2A-13500-E0 #RTA07-020
Microphone Make	NTI	**Model**	MC230	**Serial No**	#9533
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#6540
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

Freq Weightings	**FLAT**	No	**A**	Yes	**C**	Yes	**Z**	Yes
Time Weightings	**Fast**	Yes	**Slow**	Yes	**Impulse**	Yes		

SLM Type	1
Filter Class	1

Instruction Manual is Available	Yes

2. Preliminary Inspection and Power Supply

Logger Inspected	Yes
Calibration Equipment Okay	Yes
Power Supply Ok (Start)	Yes
Power Supply Ok (End)	Yes

3. Environmental Conditions

Environmental Conditions	**Measured Start**	**Measured End**
Air Temp. (°C)	23.2	23.5
Rel. Humidity (%)	58.9	57.4
Air Pressure (kPa)	100.6	99.9
Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	113.9	0.11
		Indicated Level After Adjustment (dB)	114.0	0.11
		Stability During Continuous Operation (dB)	Yes	N/A
5(a). Self-Generated Noise, Microphone Installed		**A**	16.7	0.09
5(b). Self-Generated Noise, Electrical		**A**	8.8	0.09
		C	12.0	0.09
		Z	18.2	0.09
6. Acoustical Signal Test		**125 Hz**	Yes	0.42
		1 kHz	Yes	0.42
		8 kHz	Yes	0.60
7. Electrical Frequency Weighting		**A**	Yes	0.09
		C	Yes	0.09
		Z	Yes	0.09
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.09
		Z	Yes	0.09
		FLAT	N/A	0.09
	8(b). Time Weighting	**Slow**	Yes	0.09
		Leq	Yes	0.09
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.13
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.13
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.13
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.13
11. Toneburst Response		**Fast**	Yes	0.13
		Slow	Yes	0.13
		SEL/Leq	Yes	0.13
12. Peak C sound level		**8 kHz**	Yes	0.09
		500 Hz	Yes	0.09
13. Overload indication		**Conforming**	Yes	0.09
		Latches	N/A	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.09
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.09
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.13
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.13
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.13
18(b). Octrave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.13
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.13
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.13
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.13
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.13
20(a). Octave Band Filter Lower Limit (Reference Range)		**Conforming**	Yes	0.09
20(b). Octave Band Filter Lower Limit (Lowest Range)		**Conforming**	Yes	0.09
21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)		**Conforming**	Yes	0.09
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.09
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.09
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.09

22. Third Octave Band Filter Relative Attenuation at Midband Frequency	**Conforming**	Yes	0.09
23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.13
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.13
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.13
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.13
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.13
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.13
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.13
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.13
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.13
26(a). Octave Band Filter Lower Limit (Reference Range)	**Conforming**	Yes	0.09
26(b). Octave Band Filter Lower Limit (Lowest Range)	**Conforming**	Yes	0.09
SLM Overall Conforming		**Yes**	

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
This document shall not be reproduced, except in full.
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016.

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Template Document Name: RQT-05 (rev 65) SLM ISO Verification

NATacoustic
Acoustic Calibration & Testing Laboratory
Level 1, 418A Elizabeth Street., Surry Hills NSW 2010 AUSTRALIA
Ph: (02) 8218 0570 email: service@natacoustic.com.au website: www.natacoustic.com.au
A division of Renzo Tonin & Associates (NSW) Pty Ltd ABN 29 117 462 861

Certificate of Calibration
Sound Level Meter

Calibration Date	19/12/2019	**Job No**	RB759	**Operator**	JA
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

Test Item

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-13529-E0 #RTA07-021
Microphone Make	NTI	**Model**	MC230A	**Serial No**	#A1498
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#7064
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

SLM Type	1
Filters Class	1

Environmental Conditions	**Measured**	
	Start	**End**
Air Temp. (°C)	23.7	25.1
Rel. Humidity (%)	57.4	55.1
Air Pressure (kPa)	101.0	101.3

Applicable Standards:
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Function Generator Model 33220A SN MY43004013
Agilent Digital Multimeter Model 34401A SN MY41004386

Traceability:
Accredited for compliance with ISO/IEC 17025 - Calibration.
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Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification. See "Sound Level Meter Verification - Summary of Tests" page for an itemised list of results for each test.

Uncertainty:
The uncertainty is stated at a confidence level of 95% using a k factor of 2.

Calibration Statement:
The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2017 and IEC 61260-2:2017, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 and IEC 61260-1:2014, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013 and IEC 61260-1:2014.

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Authorized Signatory:

Print Name: Renzo Tonin Date: 20 December 2019

Template Document Name: RQT-05 (rev 65) SLM ISO Verification

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	19/12/2019	**Job No**	RB759	**Operator**	JA
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-13529-E0 #RTA07-021
Microphone Make	NTI	**Model**	MC230A	**Serial No**	#A1498
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#7064
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

Freq Weightings	**FLAT**	No	**A**	Yes	**C**	Yes	**Z**	Yes
Time Weightings	**Fast**	Yes	**Slow**	Yes	**Impulse**	Yes		

SLM Type	1
Filter Class	1

Instruction Manual is Available	Yes

2. Preliminary Inspection and Power Supply

Logger Inspected	Yes
Calibration Equipment Okay	Yes
Power Supply Ok (Start)	Yes
Power Supply Ok (End)	Yes

3. Environmental Conditions

	Measured	
Environmental Conditions	**Start**	**End**
Air Temp. (°C)	23.7	25.1
Rel. Humidity (%)	57.4	55.1
Air Pressure (kPa)	101.0	101.3
Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	114.2	0.11
		Indicated Level After Adjustment (dB)	114.0	0.11
		Stability During Continuous Operation (dB)	Yes	N/A
5(a). Self-Generated Noise, Microphone Installed		**A**	16.6	0.09
5(b). Self-Generated Noise, Electrical		**A**	9.6	0.09
		C	12.7	0.09
		Z	18.8	0.09
6. Acoustical Signal Test		**125 Hz**	Yes	0.42
		1 kHz	Yes	0.42
		8 kHz	Yes	0.60
7. Electrical Frequency Weighting		**A**	Yes	0.09
		C	Yes	0.09
		Z	Yes	0.09
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.09
		Z	Yes	0.09
		FLAT	N/A	0.09
	8(b). Time Weighting	**Slow**	Yes	0.09
		Leq	Yes	0.09
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.13
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.13
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.13
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.13
11. Toneburst Response		**Fast**	Yes	0.13
		Slow	Yes	0.13
		SEL/Leq	Yes	0.13
12. Peak C sound level		**8 kHz**	Yes	0.09
		500 Hz	Yes	0.09
13. Overload indication		**Conforming**	Yes	0.09
		Latches	N/A	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.09
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.09
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.13
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.13
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.13
18(b). Octrave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.13
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.13
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.13
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.13
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.13
20(a). Octave Band Filter Lower Limit (Reference Range)		**Conforming**	Yes	0.09
20(b). Octave Band Filter Lower Limit (Lowest Range)		**Conforming**	Yes	0.09
21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)		**Conforming**	Yes	0.09
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.09
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.09
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.09

22. Third Octave Band Filter Relative Attenuation at Midband Frequency	**Conforming**	Yes	0.09
23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.13
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.13
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.13
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.13
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.13
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.13
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.13
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.13
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.13
26(a). Octave Band Filter Lower Limit (Reference Range)	**Conforming**	Yes	0.09
26(b). Octave Band Filter Lower Limit (Lowest Range)	**Conforming**	Yes	0.09
SLM Overall Conforming		**Yes**	

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Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016.

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Template Document Name: RQT-05 (rev 65) SLM ISO Verification

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A division of Renzo Tonin & Associates (NSW) Pty Ltd ABN 29 117 462 861

Certificate of Calibration
Sound Level Meter

Calibration Date	20/12/2019	**Job No**	RB759	**Operator**	AM
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

Test Item

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-13528-E0 #RTA07-022
Microphone Make	NTI	**Model**	MC230A	**Serial No**	#A14673
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#7164
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

SLM Type	1
Filters Class	1

Environmental Conditions	**Measured**	
	Start	**End**
Air Temp. (°C)	25.1	25.4
Rel. Humidity (%)	55.7	55.1
Air Pressure (kPa)	101.4	101.5

Applicable Standards:
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Function Generator Model 33220A SN MY43004013
Agilent Digital Multimeter Model 34401A SN MY41004386

Traceability:
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Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification. See "Sound Level Meter Verification - Summary of Tests" page for an itemised list of results for each test.

Uncertainty:
The uncertainty is stated at a confidence level of 95% using a k factor of 2.

Calibration Statement:
The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2017 and IEC 61260-2:2017, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 and IEC 61260-1:2014, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013 and IEC 61260-1:2014.

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Authorized Signatory:

Print Name: Renzo Tonin Date: 20 December 2019

Template Document Name: RQT-05 (rev 65) SLM ISO Verification

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	20/12/2019	**Job No**	RB759	**Operator**	AM
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-13528-E0 #RTA07-022
Microphone Make	NTI	**Model**	MC230A	**Serial No**	#A14673
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#7164
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.2

Freq Weightings	**FLAT**	No	**A**	Yes	**C**	Yes	**Z**	Yes
Time Weightings	**Fast**	Yes	**Slow**	Yes	**Impulse**	Yes		

SLM Type	1
Filter Class	1

Instruction Manual is Available	Yes

2. Preliminary Inspection and Power Supply

Logger Inspected	Yes
Calibration Equipment Okay	Yes
Power Supply Ok (Start)	Yes
Power Supply Ok (End)	Yes

3. Environmental Conditions

Environmental Conditions	**Measured Start**	**Measured End**
Air Temp. (°C)	25.1	25.4
Rel. Humidity (%)	55.7	55.1
Air Pressure (kPa)	101.4	101.5
Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	114.2	0.11
		Indicated Level After Adjustment (dB)	114.0	0.11
		Stability During Continuous Operation (dB)	Yes	N/A
5(a). Self-Generated Noise, Microphone Installed		**A**	16.5	0.09
5(b). Self-Generated Noise, Electrical		**A**	9.1	0.09
		C	12.4	0.09
		Z	18.6	0.09
6. Acoustical Signal Test		**125 Hz**	Yes	0.42
		1 kHz	Yes	0.42
		8 kHz	Yes	0.60
7. Electrical Frequency Weighting		**A**	Yes	0.09
		C	Yes	0.09
		Z	Yes	0.09
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.09
		Z	Yes	0.09
		FLAT	N/A	0.09
	8(b). Time Weighting	**Slow**	Yes	0.09
		Leq	Yes	0.09
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.13
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.13
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.13
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.13
11. Toneburst Response		**Fast**	Yes	0.13
		Slow	Yes	0.13
		SEL/Leq	Yes	0.13
12. Peak C sound level		**8 kHz**	Yes	0.09
		500 Hz	Yes	0.09
13. Overload indication		**Conforming**	Yes	0.09
		Latches	N/A	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.09
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.09
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.13
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.13
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.13
18(b). Octrave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.13
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.13
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.13
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.13
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.13
20(a). Octave Band Filter Lower Limit (Reference Range)		**Conforming**	Yes	0.09
20(b). Octave Band Filter Lower Limit (Lowest Range)		**Conforming**	Yes	0.09
21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)		**Conforming**	Yes	0.09
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.09
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.09
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.09

22. Third Octave Band Filter Relative Attenuation at Midband Frequency	**Conforming**	Yes	0.09
23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.13
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.13
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.13
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.13
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.13
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.13
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.13
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.13
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.13
26(a). Octave Band Filter Lower Limit (Reference Range)	**Conforming**	Yes	0.09
26(b). Octave Band Filter Lower Limit (Lowest Range)	**Conforming**	Yes	0.09
SLM Overall Conforming		**Yes**	

Accredited for compliance with ISO/IEC 17025 - Calibration.
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Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016.

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Template Document Name: RQT-05 (rev 65) SLM ISO Verification

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Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C21038

Client Details	CPB Contractors Level 4, 201 Elizabeth Street Sydney NSW 2000
Equipment Tested/ Model Number :	Rion NL-20
Instrument Serial Number :	00143337
Microphone Serial Number :	94478
Pre-amplifier Serial Number :	10094

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	23°C	**Ambient Temperature :**	22.6°C
Relative Humidity :	52.5%	**Relative Humidity :**	50.2%
Barometric Pressure :	100.78kPa	**Barometric Pressure :**	100.77kPa

Calibration Technician :	Jeff Yu	**Secondary Check:**	Max Moore
Calibration Date :	29 Jan 2021	**Report Issue Date :**	29 Jan 2021

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*N/A*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.12dB*	*Temperature*	*±0.2°C*
1kHz	*±0.11dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.13dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Calibrator

IEC 60942-2017

Calibration Certificate

Calibration Number C21042

Client Details CPB Contractors
Level 4, 201 Elizabeth Street
Sydney NSW 2000

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 93277

Atmospheric Conditions
Ambient Temperature : 22.9°C
Relative Humidity : 50.7%
Barometric Pressure : 100.74kPa

Calibration Technician : Jeff Yu
Secondary Check: Max Moore
Calibration Date : 29 Jan 2021
Report Issue Date : 29 Jan 2021

Approved Signatory : Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.01	1000.30

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

* The tests <1000 kHz are not covered by Acoustic Research Labs Pty Ltd NATA accreditation.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Yeo-Kal Electronics Pty Ltd 18/26 Wattle Road, Brookvale NSW Australia
Telephone +61 2 9939 2616 Fax +61 2 9905 1100

CERTIFICATE OF CALIBRATION

Model: 611

Make: Yeo-Kal Electronics Pty Ltd.

Serial Number 426
Date/s of Calibration 15/07/21

Standards:

Temperature: Mercury in glass thermometer. Certified thermometer R246

Salinity: 35.00ppt seawater standardised with a model 610MK1V Salinometer against IAPSO Standard Seawater P101 K15= 1.00002 (Chlorinity 19.377). The conversion between conductivity and salinity is performed using the Practical Salinity Scale. UNESCO Technical Papers in marine Science 1983.

Conductivity: 1413us/cm. The conversion of low conductivity raw data to conductivity referenced to 25Deg C is performed using constants derived from the HANDBOOK OF CHEMISTRY AND PHYSICS 1963, Chemical Rubber Publishing Company, Page 2691, Conductivity of Standard Solutions using KCL, 0.001M Solution.

Dissolved Oxygen: 100% saturated distilled water. The YK611 measures dissolved oxygen as % saturation and then it automatically converts the reading to milligrams per litre. This conversion is calculated from the dissolved oxygen solubility tables found in International Oceanographic Tables vol.2. National Institute of Oceanography 1972. Zero oxygen achieved by purging probe with nitrogen/ or zero dummy plug.

Turbidity: Formazin 200ntu prepared as per Standard Methods. 0ntu prepared using distilled water.

pH: 4 and 10 buffers prepared as per Standard Methods. Ref: Durst, R.A. 1975 Standard Reference Materials: Standardization of pH Measurements NBS Spec Publ.260-53, National Bur. Standards, Washington D.C.

ORP: Buffers 7 and 10 with quinhydrone prepared as per standard methods and American Society for Testing and Materials. The redox potential conforms to International Standard IEC 746-5 "Expressions of Performance of Electrochemical Analyzers, Part 5: Oxidation-Reduction potential". In accordance with this standard, the Redox potential is referred to the standard ("normal") hydrogen electrode (NHE) and is expressed in mV.

Depth: Calibrated using a Druck DPI 610 pressure calibrator / 2.0 meter water column.

Model 611- Serial 426

At the time of calibration the sensors were calibrated to the following accuracy.

Temperature: $^{+}/_{-}$ 0.05 ^{o} C

Salinity: +/-0.1ppt

Conductivity: +/- 5us/cm

pH: +/- 0.03

ORP: +/- 3mv

Dissolved Oxygen: Normally ($^{+}/_{-}$ 0.5%).

Turbidity: +/- 0.3ntu for range of 0-200ntu.

Yeo-Kal Reference: RFS 2714

Calibrated by: G. Yeomans

SERIAL NUMBER: 426

CAL DATE/TIME	SENSOR	OFFSET	SLOPE
15/07/21 08:25	TEMPERATURE	2412.842	115.513
15/07/21 09:05	SAL/COND MSCM	1.000	20665.807
15/07/21 09:00	COND USCM	9.651	4.826
15/07/21 09:22	DISSOLVED OXYGEN	-18.000	2.922
15/07/21 09:14	PH	3998.747	-581.728
15/07/21 09:18	ORP	515.000	2.881
15/07/21 09:25	TURBIDITY	-280.000	3.440

NATacoustic
Acoustic Calibration & Testing Laboratory
Level 1, 418A Elizabeth Street., Surry Hills NSW 2010 AUSTRALIA
Ph: (02) 8218 0570 email: service@natacoustic.com.au website: www.natacoustic.com.au
A division of Renzo Tonin & Associates (NSW) Pty Ltd ABN 29 117 462 861

Certificate of Calibration
Sound Level Meter

Calibration Date	18/01/2021	**Job No**	RB844	**Operator**	AM
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

Test Item

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-08038-E0 #RTA07-004
Microphone Make	NTI	**Model**	MC230	**Serial No**	#8045
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#3336
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.20

SLM Type	1
Filters Class	1

Environmental Conditions	**Measured**	
	Start	**End**
Air Temp. (°C)	23.5	23.5
Rel. Humidity (%)	56.2	54.9
Air Pressure (kPa)	100.4	101.3

Applicable Standards:
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Function Generator Model 33220A SN MY43004013
Agilent Digital Multimeter Model 34401A SN MY41004386

Traceability:
The results of the tests and measurements included in this document are traceable via the test methods described under each test, and by the use of the above equipment, which has been calibrated by NATA accredited calibration facilities.
This document shall not be reproduced, except in full.

Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification.
See "Sound Level Meter Verification - Summary of Tests" page for an itemised list of results for each test.

Uncertainty:
The uncertainty is stated at a confidence level of 95% using a k factor of 2.

Calibration Statement:
The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 and IEC 61260-1:2014 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 and IEC 61260-1:2014 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016 cover only a limited subset of the specifications in IEC 61672-1:2013 and IEC 61260-1:2014.

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Accredited for compliance with ISO/IEC 17025 - Calibration

Authorized Signatory:

Print Name: Ariel Michael Date: 19/01/2021

Template Document Name: RQT-05 (rev 72) SLM ISO Verification

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	18/01/2021	**Job No**	RB844	**Operator**	AM
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-08038-E0 #RTA07-004
Microphone Make	NTI	**Model**	MC230	**Serial No**	#8045
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#3336
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.20

Freq Weightings	**FLAT**	No	**A**	Yes	**C**	Yes	**Z**	Yes
Time Weightings	**Fast**	Yes	**Slow**	Yes	**Impulse**	Yes		

SLM Type	1
Filter Class	1

Instruction Manual is Available	Yes

2. Preliminary Inspection and Power Supply	**Logger Inspected**	Yes
	Calibration Equipment Okay	Yes
	Power Supply Ok (Start)	Yes
	Power Supply Ok (End)	Yes

		Measured	
3. Environmental Conditions	**Environmental Conditions**	**Start**	**End**
	Air Temp. (°C)	23.5	23.5
	Rel. Humidity (%)	56.2	54.9
	Air Pressure (kPa)	100.4	101.3
	Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	114.1	0.11
		Indicated Level After Adjustment (dB)	114.0	0.11
		Stability During Continuous Operation (dB)	Yes	N/A
5(a). Self-Generated Noise, Microphone Installed		**A**	17.0	0.09
5(b). Self-Generated Noise, Electrical		**A**	10.7	0.09
		C	14.5	0.09
		Z	20.2	0.09
6. Acoustical Signal Test		**125 Hz**	Yes	0.42
		1 kHz	Yes	0.42
		8 kHz	Yes	0.60
7. Electrical Frequency Weighting		**A**	Yes	0.09
		C	Yes	0.09
		Z	Yes	0.09
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.09
		Z	Yes	0.09
		FLAT	N/A	0.09
	8(b). Time Weighting	**Slow**	Yes	0.09
		Leq	Yes	0.09
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.13
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.13
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.13
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.13
11. Toneburst Response		**Fast**	Yes	0.13
		Slow	Yes	0.13
		SEL/Leq	Yes	0.13
12. Peak C sound level		**8 kHz**	Yes	0.09
		500 Hz	Yes	0.09
13. Overload indication		**Conforming**	Yes	0.09
		Latches	N/A	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.09
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.09
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.13
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.13
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.13
18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.13
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.13
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.13
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.13
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.13
20(a). Octave Band Filter Lower Limit (Reference Range)		**Conforming**	Yes	0.09
20(b). Octave Band Filter Lower Limit (Lowest Range)		**Conforming**	Yes	0.09
21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)		**Conforming**	Yes	0.09
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.09
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.09
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.09
22. Third Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.13
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.13
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.13
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.13
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.13
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.13
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.13
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.13
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.13
26(a). Octave Band Filter Lower Limit (Reference Range)	**Conforming**	Yes	0.09
26(b). Octave Band Filter Lower Limit (Lowest Range)	**Conforming**	Yes	0.09
SLM Overall Conforming		**Yes**	

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
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Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016.

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Template Document Name: RQT-05 (rev 72) SLM ISO Verification

1(a). Instrument Information

Calibration Date	18/01/2021	Job No	RB844	Operator	AM

Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010

1. Instrument Information

Instrument Make	NTI	Model	XL2-TA	Serial	#A2A-08038-E0 #RTA07-004		
Microphone Make	NTI	Model	MC230	Serial	#8045	pF	15
Preampifier Make	NTI	Model	MA220	Serial	#3336		
Ext'n Cable Make	NTI	Model		Serial			
Accessories	Nil			Firmware	4.20		

Freq Weightings	A	Yes
	C	Yes
	Z	Yes
	FLAT	No

Time Weightings	Fast	Yes
	Slow	Yes
	Impulse	Yes

Functions	Leq	Yes
	SEL	Yes
	Peak	Yes

Instrument Ranges	Range Name	Indicator Range		Primary Range	
		Low dB	High dB	Low dB	High dB
1	HIGH	40	140	60	134
2	MID	20	120	40	120
3	LOW	0	100	20	100
4					
5					
6					
7					
8					
9					
10					
Check List	OK				

Reference Range	MID
Ref. SPL @ 1kHz	114

Linearity Limits on Ref range	Low dB	High dB
1kHz Leq (A weighting)	40.0	120.0
4kHz Leq	40.0	120.0
8kHz Leq	40.0	120.0

Highest Range for 10(b),12,13	MID

SLM Class	1
Filter Class	1
Filter Base	2

Colour Legend	
Enter Value	110
Operator Action	110
Difference	1.0
Error/Outside Tolerance	2.0
Tolerance	+/-1
Select Toggle	Val
Informative	110
Conforming	Yes

Instruction Manual Title (Clause 3.1&3.2, IEC 61672-3:2013)	NTI XL2 Operating Manual
Version	2.5
Publication Date	2/11/2012
Source of Document (& Date of Download if Applicable)	N/A

Conforming	Yes

Pattern Evaluation Test Report (Clause 3.5, IEC 61672-3:2013)	
Reference Number or Page Number	
Publication Date	
Source of Document (& Date of Download if Applicable)	

Conforming	No

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1(b). Acoustic Corrections

	Absolute Corrections and Uncertainties									
Freq	Mic FF to Pressure		Case		Windscreen		Other *		Total	
(Hz)	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB
31.5	0.00								0.00	0.41
63	0.00								0.00	0.41
125	0.00								0.00	0.41
250	0.00								0.00	0.41
500	0.00								0.00	0.41
1k	0.00								0.00	0.41
2k	0.30								0.30	0.41
4k	0.70								0.70	0.41
8k	2.60								2.60	0.58
12.5k	6.00								6.00	0.64
16k	7.30								7.30	0.64

Source of Mic FF to Pressure Correction	Nti Microphone Technical Specification
Source of Case Correction	Not Available
Source of Windscreen Correction	Not Available
***Description of Other Correction**	N/A

Descriptions of Tests

1(b). Acoustical signal tests of a frequency weighting (IEC 61672-3)
(Clause 12.2)
Correction data shall account for:
- the equivalent free-field or random-incidence frequency response of the sound level meter if the source of sound or simulated sound is the pressure field in a multi-frequency sound calibrator, in a comparison coupler, or from an electrostatic actuator; and,
- if applicable, the average influence on the frequency response of a typical microphone of a windscreen and any accessories that are part of the configuration of the sound level meter for normal use.

(Clause 12.3)
Correction data shall be obtained from tables in the Instruction Manual for the sound level meter.
(Clause 12.4)
If the necessary correction data are not available from the Instruction Manual, data from the manufacturer of the microphone, multi-frequency sound calibrator, comparison coupler, or electrostatic actuator may then be used. This data shall be publicly available
(Clause 12.5)
The source for the free-field or random-incidence correction data shall be stated in the documentation for the results of the periodic tests. The source for the associated uncertainties of measurement shall be the same as the source for the corresponding correction data. If the uncertainties of the corresponding free-field correction data are not available, the applicable maximum-permitted uncertainties given in IEC 62585 shall be used in the calculation of the laboratory's total uncertainty budget.

NOTE: Where the uncertainties due to the "Mic FF to Pressure", "Case" or "Windscreen" are omitted in the table above, the following statement applies:

No information on the uncertainty of measurement, required by IEC 61672-3:2013, for the correction data given in the Instruction Manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was provided in the Instruction Manual or made available by the manufacturer or supplier of the sound level meter. The uncertainty of measurement of the correction data was therefore assumed to be the maximum-permitted uncertainty given in IEC 62585 for the corresponding free-field correction data and for a coverage probability of 95 %.

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1(c). Electrical Corrections

	Absolute Corrections and Uncertainties									
Freq	Mic 0 deg FF Resp		Case		Windscreen		Other *		Total	
(Hz)	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB
31.5			0.00		0.00		0.00		0.00	0.41
63			0.00		0.00		0.00		0.00	0.41
125			0.00		0.00		0.00		0.00	0.41
250			0.00		0.00		0.00		0.00	0.41
500			0.00		0.00		0.00		0.00	0.41
1k			0.00		0.00		0.00		0.00	0.41
2k			0.00		0.00		0.00		0.00	0.41
4k			0.00		0.00		0.00		0.00	0.41
8k			0.00		0.00		0.00		0.00	0.58
12.5k			0.00		0.00		0.00		0.00	0.64
16k			0.00		0.00		0.00		0.00	0.64

Source of Mic 0 deg Free-field Response	Not Available
Source of Case Correction	Not Available
Source of Windscreen Correction	Not Available
*Description of Other Correction	N/A

Descriptions of Tests

1(c). Acoustical signal tests of a frequency weighting (IEC 61672-3)
(Clause 13.6)
For each frequency weighting and at each test frequency, corrections shall be applied to the relative frequency weightings determined in 13.5 to account for:
– the deviation of the free-field or random-incidence frequency response of the microphone in the reference direction from a uniform frequency response;
– the average effects of reflections from the case of the sound level meter and of diffraction of sound around the microphone and preamplifier; and,
– if applicable, the average influence on the frequency response of a typical microphone of a windscreen and any accessories that are part of the configuration of the sound level meter for normal use.
(Clause 13.7)
Corrections for the effects of reflections and diffraction and for the influence of the windscreen and windscreen accessories on the free-field or random-incidence frequency response shall be the same as used for the frequency-weighting tests with acoustical signals.

NOTE: Where the uncertainties due to the "Mic FF to Pressure", "Case" or "Windscreen" are omitted in the table above, the following statement applies:

No information on the uncertainty of measurement, required by IEC 61672-3:2013, for the correction data given in the Instruction Manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was provided in the Instruction Manual or made available by the manufacturer or supplier of the sound level meter. The uncertainty of measurement of the correction data was therefore assumed to be the maximum-permitted uncertainty given in IEC 62585 for the corresponding free-field correction data and for a coverage probability of 95 %.

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2. Preliminary,3.Environmental Conditions & 4. Calibration

2. Preliminary Inspection and Power Supply

Instrument Inspected	Yes
Laboratory Calibration Equipment Ok	Yes
Power Supply Ok (Start)	Yes
Power Supply Ok (End)	Yes

3. Environmental Conditions

Environmental Conditions	Measured		Devn from Mid Limits		Uncert.	Expanded Deviation			Complies	Limits	
	Start	End	Start	End		Start	End	Tolerance		Min	Max
Air Temp. (°C)	23.5	23.5	0.5	0.5	0.5	1.00	1.00	3	Yes	20	26
Rel. Humidity (%)	56.2	54.9	8.7	7.4	4.8	13.50	12.20	22.5	Yes	25	70
Air Pressure (kPa)	100.4	101.3	7.8	8.8	0.63	8.48	9.45	12.5	Yes	80	105

Conforming	Yes

4(a). Initial Calibration

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Microphone / Windshield Correction	OFF
Polarization Voltage (V)	0
Microphone Sensitivity (mV/Pa)	43.6

B&K 4226 Calibrator Settings	
"Sound Field"	Pressure
"Microphone"	N/A
Calibration Level (Lin)	114
Calibration Frequency (Hz)	1000

Calibration	
Indicated Level before adjust. (dB)	114.1
Adjustment required	Yes
Indicated level after adjust. (dB)	114

4(b). Final Calibration

Level at conclusion of testing (dB)	114.0
Difference	0.0
Tolerance	± 0.1

Conforming	Yes

Uncertainty (+/-) dB	0.11

Descriptions of Tests

2. Preliminary Inspection and Power Supply (IEC 61672-3 Clause 5 "Preliminary Inspection" & Clause 6 "Power Supply")
Prior to any measurements, the sound level meter and all accessories shall be visually inspected, paying particular attention to damage to, or accumulation of foreign material on, the protection grid or diaphragm of the microphone. All relevant controls shall be operated to
ensure that they are in working order. If the controls, display, and other essential elements are not in proper working order, no periodic tests shall be performed.

For all tests, the sound level meter shall be powered from its preferred supply or a suitable alternative. Before and after conducting the set of tests with acoustical signals and before and after conducting the set of tests with electrical signals, the power supply for the sound level meter shall be checked by the method stated in the Instruction Manual to ensure that it is within the specified operating limits. If the voltage or the equivalent indication of the status of the power supply is not within the operating limits and the reason cannot be attributed to partially discharged batteries or an incorrect selection of the voltage of the public power supply, then no periodic tests shall be performed as a malfunction is indicated.

3. Environmental conditions (IEC 61672-3 Clause 7 "Environmental Conditions")
Periodic tests shall be performed within the following ranges of environmental conditions: 80 kPa to 105 kPa for static air pressure, 20 °C to 26 °C for air temperature and 25 % to 70 % for relative humidity. These conditions are recorded at the start and end of the testing.

4a. Calibration (IEC 61672-3 Clause 10 "Indication at the calibration check frequency")
The sound level meter shall be adjusted, if necessary, to indicate the required sound level for the environmental conditions under which the tests are performed. The indications of the sound level meter before and after adjustment shall be recorded.

4b. Long-term Stability (IEC 61672-3 Clause 15)
The long-term stability of a sound level meter is evaluated from the difference between the A-weighted sound levels indicated in response to steady 1 kHz signals applied at the beginning and end of a period of operation. For each indication, the level of the input signal shall be that which is required to display the reference sound pressure level on the reference level range for the first indication.

The period of continuous operation shall be between 25 min and 35 min during which any convenient set of tests that use electrical input signals are performed.

The measured difference between the initial and final indications of A-weighted sound level shall not exceed the acceptance limits given in IEC 61672-1.

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5. Self-Generated Noise

5(a). Self-Generated Noise, Microphone Installed

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	LOW
Measurement Function	Leq
Integration time (s)	30

Results		
Freq Wt	Observed	Quoted
A	17.0	16.6

Uncertainty (+/-) dB	0.09

Observed Values		
Leq	N/A	
17.0	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	Avg	

5(b). Self-Generated Noise, Electrical

SLM Settings	
Time Weighting	Fast
SLM Range	LOW
Measurement Function	Leq
Integration time (s)	30

Observed Values						
Leq			N/A			
A	C	Z	Obs	A	C	Z
10.7	14.5	20.2	1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			Avg			

Results		
Freq Wt	Observed	Quoted
A	10.7	12.4
C	14.5	13.5
Z	20.2	18.3-25.5

Uncertainty (+/-) dB	0.09

Descriptions of Tests

5(a) Self-Generated Noise, Microphone Installed (IEC 61672-3 Clause 11.1)
Measurements of the level of self-generated noise shall be made in a location that is available to the testing laboratory and where the level of background noise is minimized. Any supplied windscreen and windscreen accessory need not be installed around the microphone for measurement of the level of self-generated noise. The sound level meter shall be in the configuration submitted for periodic testing and with the most-sensitive level range and frequency-weighting A selected.

The indicated level of the A-weighted self-generated noise on the most-sensitive level range shall be recorded and reported. The level of self-generated noise is preferably measured as a time-averaged sound level with an averaging time of at least 30 s. Time-averaged sound level may be measured directly or calculated from an indication of sound exposure level and integration time. If time-averaged sound level cannot be determined, the time-weighted sound level from the average of ten observations taken at random over a 60 s interval shall be measured. If the time-weighted sound level is recorded, the S time weighting shall be used if available; otherwise the F time weighting shall be used.

5(b) Self-Generated Noise - Electrical (IEC 61672-3 Clause 11.2)
With the microphone replaced by the electrical input-signal device (or using the specified means of inserting electrical signals), and with the device terminated in the manner specified in the Instruction Manual for measurements of the level of self-generated noise, the indicated level of the time-averaged or time-weighted self-generated noise, measured by the same procedure as with the microphone installed, shall be recorded and reported for all frequency weightings and for the most-sensitive level range.

☑ Checked

6. Acoustical Signal Test

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Microphone Compensation Filter	OFF
B&K 4226 Calibrator Settings	
"Sound Field"	Pressure
"Microphone"	N/A
Reference Setting (Lin)	114

Freq	Observed Values			Mean Meter Reading	4226 calibrator corrections	Corrected Mean Readings	Pressure to Free Field	Case Effect Correction	Windscreen Effect Correction	Other Effect Correction	Equivalent Free Field	Response re 1kHz	C Weighting Response	Deviation from Expected	Tolerance		Conforming	Uncertainty		
															Type 1	Type 2		Total	Lab	Corrections
(Hz)	Set 1	Set 2	Set 3															(+/-) dB	(+/-) dB	(+/-) dB
31.5	110.9	110.8	110.8	110.83	0.10	110.93	0.00	0.00	0.00	0.00	110.93	-3.01	-3.00	-0.01	± 1.5	± 3.0	Yes	0.43	0.14	0.41
63	113.2	113.2	113.2	113.20	0.01	113.21	0.00	0.00	0.00	0.00	113.21	-0.73	-0.80	0.07	± 1.0	± 2.0	Yes	0.42	0.12	0.41
125	113.9	113.9	114.0	113.93	-0.02	113.91	0.00	0.00	0.00	0.00	113.91	-0.03	-0.20	0.17	± 1.0	± 1.5	Yes	0.42	0.12	0.41
250	114.1	114.1	114.0	114.07	-0.03	114.04	0.00	0.00	0.00	0.00	114.04	0.10	0.00	0.10	± 1.0	± 1.5	Yes	0.42	0.12	0.41
500	114.1	114.1	114.1	114.10	-0.03	114.07	0.00	0.00	0.00	0.00	114.07	0.13	0.00	0.13	± 1.0	± 1.5	Yes	0.42	0.12	0.41
1k	**114.0**	**114.0**	**114.0**	**114.00**	**-0.06**	**113.94**	**0.00**	**0.00**	**0.00**	**0.00**	**113.94**	**0.00**	**0.00**	0.00	± 0.7	± 1.0	Yes	0.42	0.11	0.41
2k	113.6	113.5	113.6	113.57	-0.01	113.56	0.30	0.00	0.00	0.00	113.86	-0.08	-0.20	0.12	± 1.0	± 2.0	Yes	0.43	0.13	0.41
4k	112.4	112.3	112.4	112.37	-0.20	112.17	0.70	0.00	0.00	0.00	112.87	-1.07	-0.80	-0.27	± 1.0	± 3.0	Yes	0.43	0.14	0.41
8k	108.6	108.4	108.5	108.50	-0.19	108.31	2.60	0.00	0.00	0.00	110.91	-3.03	-3.00	-0.03	+1.5; -2.5	± 5.0	Yes	0.60	0.15	0.58
12.5k	101.7	102.1	101.7	101.83	-0.10	101.73	6.00	0.00	0.00	0.00	107.73	-6.21	-6.20	-0.01	+2.0; -5.0	+5,-inf	Yes	0.68	0.21	0.64
16k	97.6	97.6	97.4	97.53	0.05	97.58	7.30	0.00	0.00	0.00	104.88	-9.06	-8.50	-0.56	+2.5; -16.0	+5,-inf	Yes	0.74	0.37	0.64

Description of Tests

6. Acoustical signal tests of a frequency weighting (IEC 61672-3 Clause 12)
The sound level meter shall be set for frequency-weighting C, if available, otherwise for frequencyweighting A. The frequency weighting for tests with acoustical signals shall be determined at 125 Hz, 1 kHz, and 8 kHz. However, for information, this laboratory tests from 31.5Hz to 16kHz.

For frequency-weighting tests using a multi-frequency sound calibrator, the sound pressure level in the coupler of the sound calibrator shall preferably be set to the reference sound pressure level at 1 kHz, but shall be in the range from 70 dB to 125 dB at all frequencies.

At the discretion of the laboratory, the sound level meter shall be set to measure F-timeweighted sound level or S-time-weighted sound level. As a minimum, two repetitions of the coupling and measurements shall be performed to give a total of at least three tests.

The relative frequency weighting, relative to the response at 1 kHz, shall be determined from the average equivalent free-field or random-incidence sound level at a test frequency minus the average equivalent free-field or random-incidence sound level at 1 kHz. (Clause 12.15)

☑ Checked

7. Electrical Frequency Weighting

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	20
Generator Frequency (Hz)	1k
SPL Reference (dB)	75
Integration Time (s)	N/A
Generator Output (mVrms)	52.00

Freq Hz	Output (mV)	Indication A	Output (mV)	Indication C	Output (mV)	Indication Z	Tolerance	
63	1061.70	74.9	57.02	74.9	52.00	74.9		
125	331.90	74.9	53.21	75.0	52.00	75.0		
250	139.96	74.9	52.00	75.0	52.00	75.0		
500	75.16	75.0	52.00	75.0	52.00	75.0		
1k	52.00	**75.0**	52.00	**75.0**	52.00	**75.0**		
2k	45.29	75.0	53.21	75.0	52.00	75.0		
4k	46.35	75.0	57.02	75.0	52.00	75.0		
8k	59.02	75.0	73.45	75.0	52.00	75.0		
16k	111.17	74.8	138.36	74.8	52.00	75.0		
Typical Microphone 0deg Free Field Response		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Case Effect Correction		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Windscreen Effect Correction		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
OtherCorrection		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Equivalent Free Field		74.90		74.90		74.90		
		74.90		75.00		75.00		
		74.90		75.00		75.00		
		75.00		75.00		75.00		
		75.00		**75.00**		**75.00**		
		75.00		75.00		75.00		
		75.00		75.00		75.00		
		75.00		75.00		75.00		
		74.80		74.80		75.00	Type 1	Type 2
Response re 1kHz (Deviation from Expected)		-0.10		-0.10		-0.10	± 1.0	± 2.0
		-0.10		0.00		0.00	± 1.0	± 1.5
		-0.10		0.00		0.00	± 1.0	± 1.5
		0.00		0.00		0.00	± 1.0	± 1.5
		0.00		**0.00**		**0.00**	± 0.7	± 1.0
		0.00		0.00		0.00	± 1.0	± 2.0
		0.00		0.00		0.00	± 1.0	± 3.0
		0.00		0.00		0.00	+1.5; -2.5	± 5.0
		-0.20		-0.20		0.00	+2.5; -16.0	+5,-inf
Conforming		**Yes**		**Yes**		**Yes**		

Uncertainty (+/-) dB	0.09

Description of Tests

7. Electrical signal tests of frequency weightings (IEC 61672-3 Clause 13)
Frequency weightings shall be determined using steady sinusoidal electrical input signals for all frequency weightings for which design goals and acceptance limits are specified in IEC 61672-1 and which are provided in the sound level meter. The sound level meter shall be set to display F-time-weighted sound level.

On the reference level range and for each frequency weighting to be tested, the level of a 1 kHz input signal shall be adjusted to yield an indication that is 45 dB less than the upper boundary stated in the Instruction Manual for the linear operating range at 1 kHz on the reference level range.

At test frequencies other than 1 kHz, the level of the input electrical signal shall be determined as the level of the input signal at 1 kHz minus the exact design-goal response, given in IEC 61672-1 for the selected frequency weighting at the test frequency.

☑ Checked

8. Frequency & Time Weightings 1kHz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	1k
SPL Reference (dB)	114.0
Output (mVrms)	464.4

8(a). Frequency Weightings 1kHz

Time Wt	Frequency Weighting				Tolerance	
Fast	A	C	Z	N/A		
1kHz	114.0	114.0	114.0		Type 1	Type 2
Difference		0.0	0.0		± 0.2	± 0.2

Conforming	Yes	Yes	N/A

Uncertainty (+/-) dB	0.09

8(b). Time Weightings 1kHz

Freq Wt	Time Weighting				Tolerance	
A	F	S	Leq			
1kHz	114.0	114.0	114.0		Type 1	Type 2
Difference		0.0	0.0		± 0.1	± 0.1

Conforming	Yes	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

8. Frequency and time weightings at 1 kHz (IEC 61672-3 Clause 14)
For a steady sinusoidal electrical input signal at 1 kHz on the reference level range and with an input signal that yields an indication of the reference sound pressure level with frequency weighting A, the indications shall be recorded for frequency weightings C and Z, as available, with the sound level meter set to display F-time-weighted sound level, or timeaveraged sound level, as available. In addition, the indications with frequency weighting A shall be recorded with the sound level meter set to display F-time-weighted sound level, S-timeweighted sound level, and time-averaged sound level, as available.

The measured deviation of the indication of the sound level frequency weightings and time weightings shall not exceed the acceptance limits given in IEC 61672-1.

☑ Checked

9(a). Level Linearity 8kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1878.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	± 0.8	± 1.1
21.0	104.0	104.0	0.0	± 0.8	± 1.1
16.0	109.0	109.0	0.0	± 0.8	± 1.1
11.0	114.0	114.0	0.0	± 0.8	± 1.1
10.0	115.0	115.0	0.0	± 0.8	± 1.1
9.0	116.0	116.0	0.0	± 0.8	± 1.1
8.0	117.0	117.0	0.0	± 0.8	± 1.1
7.0	118.0	118.0	0.0	± 0.8	± 1.1
6.0	119.0	119.0	0.0	± 0.8	± 1.1
5.0	120.0	120.0	0.0	± 0.8	± 1.1
4.0	121.0	121.0	0.0	± 0.8	± 1.1
3.0	122.0	122.0	0.0	± 0.8	± 1.1
2.0	123.0	123.0	0.0	± 0.8	± 1.1
1.0	124.0	124.0	0.0	± 0.8	± 1.1
0.0	125.0	125.0	0.0	± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

9(a). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator over-range.

☑ Checked

9(b). Level Linearity 8kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94
Output (mVrms)	52.9
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	± 0.8	± 1.1
10.0	84.0	84.0	0.0	± 0.8	± 1.1
15.0	79.0	79.0	0.0	± 0.8	± 1.1
20.0	74.0	74.0	0.0	± 0.8	± 1.1
25.0	69.0	69.0	0.0	± 0.8	± 1.1
30.0	64.0	64.0	0.0	± 0.8	± 1.1
35.0	59.0	59.0	0.0	± 0.8	± 1.1
40.0	54.0	54.0	0.0	± 0.8	± 1.1
45.0	49.0	49.0	0.0	± 0.8	± 1.1
49.0	45.0	45.0	0.0	± 0.8	± 1.1
50.0	44.0	44.0	0.0	± 0.8	± 1.1
51.0	43.0	43.0	0.0	± 0.8	± 1.1
52.0	42.0	42.0	0.0	± 0.8	± 1.1
53.0	41.0	41.0	0.0	± 0.8	± 1.1
54.0	40.0	40.0	0.0	± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

9(b). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

10. Level Linearity with Level Ranges 1kHz

10(a). Level Linearity Including the Level Range (Reference Signal)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0
Generator Frequency (Hz)	1k
Reference SPL (dB)	114
Output (mVrms)	464.4

Settings	Level (dB)			Tolerance	
Range	Expected	Indicated	Difference	Type 1	Type 2
HIGH	114.0	114.0	0.0	± 0.8	± 1.1
MID	114.0	114.0	0.0	± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

10(b). Level Linearity Including the Level range (5dB Above Under-range)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	HIGH
Generator & Attenuator Settings	
Attenuation (dB)	30
Generator Frequency (Hz)	1k
Reference SPL (dB)	65
Output (mVrms)	51.9

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	30.0	65.0	65.0	0.0	± 0.8	± 1.1
MID	50.0	45.0	44.9	-0.1	± 0.8	± 1.1
LOW	70.0	25.0	25.3	0.3	± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

10. Level linearity including the level range control (IEC 61672-3 Clause 17)
For sound level meters that have more than one level range, tests of level linearity errors including errors introduced by the level range control shall be performed with steady sinusoidal electrical input signals at a frequency of 1 kHz and with the sound level meter set for frequency weighting A. For each test, signal levels shall be recorded as indications of F-time-weighted sound level or time-average sound level. (61672-3 Clause 17.1).

With the input signal level kept constant, the indicated signal level shall be recorded for all level ranges where the signal level is displayed. The indicated signal levels and the corresponding anticipated indications of signal levels shall be recorded. (61672-3 Clause 17.3).

For each level range, the level of the input signal shall then be adjusted to yield a signal level that is expected to be 5 dB greater than the signal level that first causes an indication of under-range on a level range. The indicated signal levels and the corresponding anticipated levels shall be recorded. (61672-3 Clause 17.4).

Level linearity deviations shall be calculated as an indicated signal level minus the corresponding anticipated signal level. Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1.

☑ Checked

11. Toneburst Response

11(a). Fast ToneBurst

SLM Settings - Fast	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	585.7

Toneburst (ms)	# Cycles	LAFMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	116.0	116.0	0.0	± 0.5	± 1.0
2	8	99.0	99.0	0.0	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	90.0	89.9	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

11(b). Slow ToneBurst

SLM Settings - Slow	
Time Weighting	Slow
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	585.7

Toneburst (ms)	# Cycles	LASMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	109.6	109.6	0.0	± 0.5	± 1.0
2	8	90.0	90	0.0	+ 1.0; -3.0	+ 1.0; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

11(c). SEL ToneBurst

SLM Settings - SEL/Leq	
Function	SEL
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	585.7
Integration Time (if SEL not available) (s)	

Toneburst (ms)	# Cycles	SEL				Tolerance	
		Indicated	Calc'd	Expected	Difference	Type 1	Type 2
200	800	110.0	110.0	110.0	0.0	± 0.5	± 1.0
2	8	90.0	90.0	90.0	0.0	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	80.9	80.9	81.0	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

11. Toneburst response (IEC 61672-3 Clause 18)
The response of the sound level meter to short-duration signals shall be tested on the reference level range with 4 kHz tonebursts. The sound level meter shall be set to frequency weighting A. (61672-3 Clause 18.1).

For the toneburst signals, indications of the sound level meter to be recorded are maximum F-time-weighted sound level, maximum S-time-weighted sound level and sound exposure level, as applicable.

The level of the steady input signal shall be adjusted to display an F-time-weighted, Stime-weighted, or time-averaged sound level, as appropriate, that is 3 dB less than the upper boundary stated in the Instruction Manual for the linear operating range at 4 kHz on the reference level range. (61672-3 Clause 18.4).

Tonebursts are tested at 200ms, 2ms and, 0.25ms durations (the latter for Fast and SEL only) and the LMax or SEL recorded.

Measured deviations of the measured toneburst responses from the corresponding reference toneburst responses given in IEC 61672-1 shall not exceed the applicable

☑ Checked

12. Peak C sound level

12(a). Peak C 8 KHz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	8k
Reference SPL (dB)	112.0
Output (mVrms)	523.5

Test Signal	dB LCpeak Hold				Tolerance	
8 kHz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
1 Cycle	115.4	No	115.4	0.0	± 2.0	± 3.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

12(b). Peak C 500 Hz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	500
Reference SPL (dB)	112.0
Output (mVrms)	367.7

Test Signal	dB LCpeak Hold				Tolerance	
500 Hz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
One +ve 1/2 cycle	114.2	No	114.4	-0.2	± 1.0	± 2.0
One -ve 1/2 cycle	114.2	No	114.4	-0.2	± 1.0	± 2.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

12. Peak C sound level (IEC 61672-3 Clause 19)
Indications of C-weighted peak sound level shall be tested on the least-sensitive level range. The test signals consist of (a) a single complete cycle of an 8 kHz sinusoid starting and stopping at zero crossings and (b) positive and negative half cycles of a 500 Hz sinusoid that also start and stop at zero crossings.

The level of the steady sinusoidal 8 kHz electrical input signal, from which a single complete cycle is extracted, shall be adjusted to yield an indication of C-weighted, F-timeweighted sound level, or C-weighted, time-averaged sound level, that is 8 dB less than the upper boundary stated in the Instruction Manual for the peak level range at 8 kHz on the leastsensitive level range. The indication of steady sound level shall be recorded.

The indication of C-weighted peak sound level in response to a complete cycle of the 8 kHz signal shall be recorded. Application of the complete-cycle 8 kHz signal shall not cause indication of an overload condition.

The level of the steady sinusoidal 500 Hz electrical input signal, from which positive and negative half cycles are extracted, shall be adjusted to yield an indication of C-weighted, Ftime-weighted sound level, or C-weighted, time-averaged sound level, that is 8 dB less than the upper boundary stated in the Instruction Manual for the peak level range on the least-sensitive level range. The indications of steady sound levels shall be recorded.

The indications of C-weighted peak sound level in response to a single positive halfcycle 500 Hz signal and to a single negative half-cycle 500 Hz signal shall be recorded and reported. Applications of the 500 Hz half-cycle signals shall not cause indications of an overload condition.

☑ Checked

13. Overload indication

SLM Settings	
Function	Leq
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
Reference SPL (dB)	119.0
Output (mVrms)	763.6

	Half-Cycle Signal			Tolerance	
	Positive	Negative	Difference	Type 1	Type 2
Level (dB)	125.1	125.1	0.0	± 1.5	± 1.5
Generator Output (mVrms)	1549.0	1548.0			

Conforming	Yes

Uncertainty (+/-) dB	0.09

Overload Indicated	No
Overload Indicator Latches	N/A

Conforming	N/A

Description of Tests

13. Overload Indication (IEC 61672-3 Clause 20)
The test of overload indication shall only be performed for sound level meters capable of displaying time-average sound level.

Overload indication shall be tested on the least-sensitive level range with the sound level meter set to display A-weighted, time-average sound level. Positive and negative one-half-cycle sinusoidal electrical signals at a frequency of 4 kHz shall be used.(IEC 61672-3 Clause 20.2)

The test shall begin at an indicated time-averaged level for the steady input signal that corresponds to 1 dB less than the upper boundary specified for the linear operating range at 4 kHz. The level of the single positive one-half-cycle input signal shall be increased to the first indication of overload, to a resolution of 0.1 dB. The process shall be repeated for the single negative one-half-cycle signal. The levels of the single one-half-cycle input signals that produced the first indications of overload shall be recorded to a resolution of 0.1 dB.

It shall be verified that the overload indicator latches on as specified in IEC 61672-1 when an overload condition occurs.

☑ Checked

14. High-level Stability

SLM Settings	
Time Weighting	F
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	1k
Reference SPL (dB)	119.0
Output (mVrms)	826.1

Time Period to Apply Signal (min)	5.0
Record SPL at Conclusion of Time Period (dB)	119.0
Difference	0.0
Tolerance	± 0.1

Conforming	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

14. High-level Stability (IEC 61672-3 Clause 21)
The ability of a sound level meter to operate continuously in response to high signal levels without significant change in sensitivity is evaluated from the difference between the Aweighted sound levels indicated in response to a steady 1 kHz electrical signal at the beginning and end of a 5 min period of continuous exposure to the signal.

The level of the steady electrical input signal shall be that which is required to display the sound level that is 1 dB less than the upper boundary of the 1 kHz linear operating range on the least-sensitive level range.

☑ Checked

15(a). Octave Band Filter Relative Attenuation (≤2kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Range	HIGH
Set dB Below Full Scale	-1
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz		
0.06				41.5					48.9			
0.13				50.3					50.3			
0.25				58.7					53.8			
0.50				74.4					70.9			
0.71												
0.77				132.9					133.0			
0.84				132.9					133.0			
0.92				132.8					133.0			
1.00				**132.9**					**133.0**			
1.09				132.9					133.0			
1.19				132.9					133.0			
1.30				132.9					133.0			
1.41												
2.00				45.8					39.4			
4.00				40.9					31.5			
8.00				23.2					33.4			
16.00				23.6					32.3		Class 1	Class 2
Attenuation dB				91.4					84.1		+70/inf	+60/inf
				82.6					82.7		+60/inf	+54/inf
				74.2					79.2		+40.5/inf	+39.5/inf
				58.5					62.1		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
				0.0					0.0		-0.4/+1.4	-0.6/+1.7
				0.0					0.0		-0.4/+0.7	-0.6/+0.9
				0.1					0.0		-0.4/+0.5	-0.6/+0.7
				0.0					**0.0**		-0.4/+0.4	-0.6/+0.6
				0.0					0.0		-0.4/+0.5	-0.6/+0.7
				0.0					0.0		-0.4/+0.7	-0.6/+0.9
				0.0					0.0		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
				87.1					93.6		+16.6/inf	+15.6/inf
				92.0					101.5		+40.5/inf	+39.5/inf
				109.7					99.6		+60/inf	+54/inf
				109.3					100.7		+70/inf	+60/inf
Ins Loss				-0.1					0.0			
Conforming	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A		

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

15(a) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

15(b). Octave Band Filter Relative Attenuation (>2kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	8kHz	16kHz	32kHz								
0.06			50.7									
0.13			54.5									
0.25			55.4									
0.50			70.7									
0.71												
0.77			133.0									
0.84			133.0									
0.92			132.9									
1.00			**133.0**									
1.09			133.0									
1.19			133.0									
1.30			133.0									
1.41												
2.00			52.0									
4.00			45.9									
8.00			53.8									
16.00			51.7								Class 1	Class 2
Attenuation dB			82.3								+70/inf	+60/inf
			78.5								+60/inf	+54/inf
			77.6								+40.5/inf	+39.5/inf
			62.3								+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
			0.0								-0.4/+1.4	-0.6/+1.7
			0.0								-0.4/+0.7	-0.6/+0.9
			0.1								-0.4/+0.5	-0.6/+0.7
			0.0								-0.4/+0.4	-0.6/+0.6
			0.0								-0.4/+0.5	-0.6/+0.7
			0.0								-0.4/+0.7	-0.6/+0.9
			0.0								-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
			81.0								+16.6/inf	+15.6/inf
			87.1								+40.5/inf	+39.5/inf
			79.2								+60/inf	+54/inf
			81.3								+70/inf	+60/inf

Ins Loss			0.0							
Conforming	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

15(b) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

16. Octave Band Filter Relative Attenuation at Midband Frequency

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Attenuator dB	0.0
Reference SPL 1kHz	94.0
Output mVrms	42.9

	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	**4 Hz**	**8 Hz**	**16 Hz**	**31.5 Hz**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**Class 1**	**Class 2**
Measured			94.4	93.9	94.0	94.1	94.0	94.0	94.0	94.0		
Ins Loss			0.4	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**N/A**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**4kHz**	**8kHz**	**16kHz**	**32kHz**							**Class 1**	**Class 2**
Measured	94.0	94.0	94.0									
Ins Loss	0.0	0.0	0.0								-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**N/A**								

Uncert (+/-) dB	**0.09**

Description of Test

16. Octave Band Filter Relative Attenuation at Midband Frequency (IEC 61260-3 Clause 10.2)

10.2 Tests of relative attenuation at midband frequency
10.2.1 The relative attenuation at the exact midband frequency shall be measured for every filter in a set of filters. The relative attenuation $\Delta A(\Omega)$ at any midband frequency is determined from Formula (8) given in IEC 61260-1:2014. The reference level range shall be selected for the test. The level of the test signal shall be equal to the reference input signal level.
10.2.2 The measured relative attenuation shall not exceed the acceptance limits ± 0,4 dB for Class 1 filters or ± 0,6 dB for class 2 filters as specified in 5.10 in IEC 61260-1:2014.

Interpretation: The yellow cells are the observed values. The "Ins Loss" are the actual values of attenuation at the filter centre frequencies. The "Conforming" cells demonstrate compliance with the Tolerance limits depending upon the Class of filter.

☑ Checked

17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1669.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

17(b). Octave Band Filter Level Linearity 1kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1644.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

17(c). Octave Band Filter Level Linearity 16kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1641.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(c). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	47.1
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.1	0.1	±0.7	±0.9
50.0	44.0	44.1	0.1	±0.7	±0.9
51.0	43.0	43.0	0.0	±0.7	±0.9
52.0	42.0	42.0	0.0	±0.7	±0.9
53.0	41.0	40.9	-0.1	±0.7	±0.9
54.0	40.0	39.9	-0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.4
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
51.0	43.0	42.9	-0.1	±0.7	±0.9
52.0	42.0	41.9	-0.1	±0.7	±0.9
53.0	41.0	41.0	0.0	±0.7	±0.9
54.0	40.0	39.9	-0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.3
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
51.0	43.0	43.0	0.0	±0.7	±0.9
52.0	42.0	42.0	0.0	±0.7	±0.9
53.0	41.0	41.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(c). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

19. Octave Level Ranges

19(a). Octave Level Linearity Including the Level range (31.5Hz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	31.5
Reference SPL (dB)	94
Output (mVrms)	148.7

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

19(b). Octave Level Linearity Including the Level range (1kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	1k
Reference SPL (dB)	94
Output (mVrms)	146.5

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

19(c). Octave Level Linearity Including the Level range (16kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	16k
Reference SPL (dB)	94
Output (mVrms)	146.0

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	103.9	-0.1	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

19. Filter Level linearity including the level range control (IEC 61260-3 Clause 11.9)

11.9 For the same three filters as selected above, test each available level range in the following way: based on the same reference level, adjust the input level to be 30 dB below upper boundary of the linear operating range for each of the selected range settings. The measured level linearity deviation shall not exceed the acceptance limits given in 5.13.3 and 5.13.4 of IEC 61260-1:2014

The three filter frequencies are 31.5Hz, 1kHz and 16kHz.

The level linearity differences are calculated as the indicated signal level minus the corresponding expected signal level.

☑ Checked

20. Octave Band Filter Lower Limit

20(a). Octave Band Filter Lower Limit (Reference Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Lower Limit for the Range	40

	1	2	3	4	5	6	7	8	9	10
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Measured		15.4	12.8	9.3	7.3	6.4	6.2	6.3	7.2	9.0
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	11.2	14.0	17.4							
Conforming	Yes	Yes	Yes	N/A						

Conforming	Yes

Uncert (+/-) dB	0.09

20(b). Octave Band Filter Lower Limit (Lowest Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	LOW
Lower Limit for the Range	20

	1	2	3	4	5	6	7	8	9	10
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Measured		14.4	11.7	8.8	8.5	5.5	4.6	3.8	3.3	2.9
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	3.1	4.3	6.3							
Conforming	Yes	Yes	Yes	N/A						

Conforming	Yes

Uncert (+/-) dB	0.09

20. Octave Band Filter Lower LImit (IEC 61260-3 Clause 12)

12.2 Short-circuit the input terminal or use similar means to ensure that the level of the input signal is below the lower limit of the specified linear operating range. Record the output level from each filter in the set. The output level shall not exceed the specified lower limit for the appropriate filter and range.

Interpretation: The yellow cells are the observed values. The measured value must not exceed the Lower LImit for the Range.

☑ Checked

21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz		
0.18										48.7		
0.33										57.5		
0.53										70.3		
0.77										69.6		
0.89												
0.92										132.4		
0.95										132.9		
0.97										132.9		
1.00										**132.8**		
1.03										132.9		
1.06										132.9		
1.09										132.2		
1.12												
1.30										66.2		
1.89										20.3		
3.07										18.8		
5.43										20.5	Class 1	Class 2
Attenuation dB										84.1	+70/inf	+60/inf
										75.3	+60/inf	+54/inf
										62.5	+40.5/inf	+39.5/inf
										63.2	+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
										0.4	-0.4/+1.4	-0.6/+1.7
										-0.1	-0.4/+0.7	-0.6/+0.9
										-0.1	-0.4/+0.5	-0.6/+0.7
										0.0	-0.4/+0.4	-0.6/+0.6
										-0.1	-0.4/+0.5	-0.6/+0.7
										-0.1	-0.4/+0.7	-0.6/+0.9
										0.6	-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
										66.6	+16.6/inf	+15.6/inf
										112.5	+40.5/inf	+39.5/inf
										114.0	+60/inf	+54/inf
										112.3	+70/inf	+60/inf
Ins Loss										**-0.2**		
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes		

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(a) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz		
0.18									48.9			
0.33									54.3			
0.53									65.9			
0.77									70.9			
0.89												
0.92									132.7			
0.95									133.1			
0.97									133.0			
1.00									**133.0**			
1.03									133.0			
1.06									133.0			
1.09									132.3			
1.12												
1.30									58.1			
1.89									51.6			
3.07									23.2			
5.43									23.2		Class 1	Class 2
Attenuation dB									84.1		+70/inf	+60/inf
									78.7		+60/inf	+54/inf
									67.1		+40.5/inf	+39.5/inf
									62.1		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
									0.3		-0.4/+1.4	-0.6/+1.7
									-0.1		-0.4/+0.7	-0.6/+0.9
									0.0		-0.4/+0.5	-0.6/+0.7
									0.0		-0.4/+0.4	-0.6/+0.6
									0.0		-0.4/+0.5	-0.6/+0.7
									0.0		-0.4/+0.7	-0.6/+0.9
									0.7		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
									74.9		+16.6/inf	+15.6/inf
									81.4		+40.5/inf	+39.5/inf
									109.8		+60/inf	+54/inf
									109.8		+70/inf	+60/inf

Ins Loss									0.0	
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(b) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz		
0.18					45.6							
0.33					48.8							
0.53					58.6							
0.77					70.6							
0.89												
0.92					132.7							
0.95					133.0							
0.97					133.0							
1.00					**133.0**							
1.03					133.0							
1.06					133.0							
1.09					132.2							
1.12												
1.30					58.1							
1.89					51.6							
3.07					26.9							
5.43					27.4						Class 1	Class 2
Attenuation dB					87.4						+70/inf	+60/inf
					84.2						+60/inf	+54/inf
					74.4						+40.5/inf	+39.5/inf
					62.4						+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
					0.3						-0.4/+1.4	-0.6/+1.7
					0.0						-0.4/+0.7	-0.6/+0.9
					0.0						-0.4/+0.5	-0.6/+0.7
					0.0						-0.4/+0.4	-0.6/+0.6
					0.0						-0.4/+0.5	-0.6/+0.7
					0.0						-0.4/+0.7	-0.6/+0.9
					0.8						-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
					74.9						+16.6/inf	+15.6/inf
					81.4						+40.5/inf	+39.5/inf
					106.1						+60/inf	+54/inf
					105.6						+70/inf	+60/inf

Ins Loss					0.0					
Conforming	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(c) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	3827.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz		
0.18							49.7					
0.33							53.9					
0.53							53.3					
0.77							70.5					
0.89												
0.92							132.7					
0.95							133.0					
0.97							133.0					
1.00							**133.0**					
1.03							133.0					
1.06							133.0					
1.09							132.2					
1.12												
1.30							58.3					
1.89							42.4					
3.07							38.1					
5.43							55.1				Class 1	Class 2
Attenuation dB							83.3				+70/inf	+60/inf
							79.1				+60/inf	+54/inf
							79.7				+40.5/inf	+39.5/inf
							62.5				+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
							0.3				-0.4/+1.4	-0.6/+1.7
							0.0				-0.4/+0.7	-0.6/+0.9
							0.0				-0.4/+0.5	-0.6/+0.7
							0.0				-0.4/+0.4	-0.6/+0.6
							0.0				-0.4/+0.5	-0.6/+0.7
							0.0				-0.4/+0.7	-0.6/+0.9
							0.8				-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
							74.7				+16.6/inf	+15.6/inf
							90.6				+40.5/inf	+39.5/inf
							94.9				+60/inf	+54/inf
							77.9				+70/inf	+60/inf

Ins Loss							0.0			
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(d) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

22. Third Octave Band Filter Relative Attenuation at Midband Frequency

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Attenuator dB	0.0
Reference SPL 1kHz	94.0
Output mVrms	42.9

	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	**4Hz**	**5Hz**	**6.3Hz**	**8Hz**	**10Hz**	**12.5Hz**	**16Hz**	**20Hz**	**25Hz**	**31.5Hz**	**Class 1**	**Class 2**
Measured							94.3	94.1	93.9	93.8		
Ins Loss							0.3	0.1	-0.1	-0.2	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**40Hz**	**50Hz**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**	**200Hz**	**250Hz**	**315Hz**	**Class 1**	**Class 2**
Measured	93.9	93.9	94.0	94.0	94.0	94.1	94.1	94.0	94.0	94.0		
Ins Loss	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**400Hz**	**500Hz**	**630Hz**	**800Hz**	**1kHz**	**1.25kHz**	**1.6kHz**	**2kHz**	**2.5kHz**	**3.15kHz**	**Class 1**	**Class 2**
Measured	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0		
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**4kHz**	**5kHz**	**6.3kHz**	**8kHz**	**10kHz**	**12.5kHz**	**16kHz**	**20kHz**	**25kHz**	**31.5kHz**	**Class 1**	**Class 2**
Measured	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.1				
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1			-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**		

Uncert (+/-) dB	**0.09**

Description of Test

22. Octave Band Filter Relative Attenuation at Midband Frequency (IEC 61260-3 Clause 10.2)

10.2 Tests of relative attenuation at midband frequency
10.2.1 The relative attenuation at the exact midband frequency shall be measured for every filter in a set of filters. The relative attenuation $\Delta A(\Omega)$ at any midband frequency is determined from Formula (8) given in IEC 61260-1:2014. The reference level range shall be selected for the test. The level of the test signal shall be equal to the reference input signal level.
10.2.2 The measured relative attenuation shall not exceed the acceptance limits ± 0,4 dB for Class 1 filters or ± 0,6 dB for class 2 filters as specified in 5.10 in IEC 61260-1:2014.

Interpretation: The yellow cells are the observed values. The "Ins Loss" are the actual values of attenuation at the filter centre frequencies. The "Conforming" cells demonstrate compliance with the Tolerance limits depending upon the Class of filter.

☑ Checked

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1669.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1644.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1641.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(c). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator over-range.

☑ Checked

24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	47.1
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.1	0.1	±0.7	±0.9
50.0	44.0	44.1	0.1	±0.7	±0.9
51.0	43.0	43.0	0.0	±0.7	±0.9
52.0	42.0	42.0	0.0	±0.7	±0.9
53.0	41.0	40.9	-0.1	±0.7	±0.9
54.0	40.0	39.9	-0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(a). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.4
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
51.0	43.0	42.9	-0.1	±0.7	±0.9
52.0	42.0	41.9	-0.1	±0.7	±0.9
53.0	41.0	40.9	-0.1	±0.7	±0.9
54.0	40.0	39.9	-0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(b). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.2
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
49.0	45.0	45.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
51.0	43.0	43.0	0.0	±0.7	±0.9
52.0	42.0	42.0	0.0	±0.7	±0.9
53.0	41.0	41.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(c). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

25. Third Octave Level Ranges

25(a). Third Octave Level Linearity Including the Level range (31.5Hz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	31.5
Reference SPL (dB)	94
Output (mVrms)	148.6

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

25(b). Third Octave Level Linearity Including the Level range (1kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	1k
Reference SPL (dB)	94
Output (mVrms)	146.4

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

25(c). Third Octave Level Linearity Including the Level range (16kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	16k
Reference SPL (dB)	94
Output (mVrms)	145.9

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	103.9	-0.1	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

25. Filter Level linearity including the level range control (IEC 61260-3 Clause 11.9)

11.9 For the same three filters as selected above, test each available level range in the following way: based on the same reference level, adjust the input level to be 30 dB below upper boundary of the linear operating range for each of the selected range settings. The measured level linearity deviation shall not exceed the acceptance limits given in 5.13.3 and 5.13.4 of IEC 61260-1:2014

The three filter frequencies are 31.5Hz, 1kHz and 16kHz.

The level linearity differences are calculated as the indicated signal level minus the corresponding expected signal level.

☑ Checked

26. Third Octave Band Filter Lower Limit

26(a). Octave Band Filter Lower Limit (Reference Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	MID
Lower Limit for the Range	40

	1	2	3	4	5	6	7	8	9	10
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz
Measured			12.0	9.2	8.3	8.7	7.9	8.8	4.7	4.6
Conforming	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz
Measured	4.4	5.1	2.8	2.6	2.1	1.2	1.9	1.4	1.3	1.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz
Measured	0.9	1.6	1.2	1.8	2.1	3.0	3.5	4.1	4.8	5.5
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz
Measured	6.3	7.3	8.2	9.0	10.2	11.2	12.5	13.8		
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A

Conforming	Yes

Uncert (+/-) dB	0.09

26(b). Octave Band Filter Lower Limit (Lowest Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	LOW
Lower Limit for the Range	20

	1	2	3	4	5	6	7	8	9	10
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz
Measured			6.5	8.8	10.1	9.2	8.7	5.6	4.4	4.2
Conforming	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz
Measured	2.7	4.6	1.4	1.7	1.3	0.7	0.1	0.3	0.0	0.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz
Measured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz
Measured	0.0	0.0	0.0	0.0	0.1	0.7	1.5	2.3		
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A

Conforming	Yes

Uncert (+/-) dB	0.09

26. Third Octave Band Filter Lower LImit (IEC 61260-3 Clause 12)
12.2 Short-circuit the input terminal or use similar means to ensure that the level of the input signal is below the lower limit of the specified linear operating range. Record the output level from each filter in the set. The output level shall not exceed the specified lower limit for the appropriate filter and range.
Interpretation: The yellow cells are the observed values. The measured value must not exceed the Lower LImit for the Range.

☑ Checked

NATacoustic
Acoustic Calibration & Testing Laboratory
Level 1, 418A Elizabeth Street., Surry Hills NSW 2010 AUSTRALIA
Ph: (02) 8218 0570 email: service@natacoustic.com.au website: www.natacoustic.com.au
A division of Renzo Tonin & Associates (NSW) Pty Ltd ABN 29 117 462 861

Certificate of Calibration
Sound Level Meter

Calibration Date	26/02/2021	**Job No**	RB858	**Operator**	AH
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

Test Item

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-12491-E0 #RTA07-ATP0
Microphone Make	NTI	**Model**	MC230	**Serial No**	#9681
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#6476
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.21

SLM Type	1
Filters Class	1

Environmental Conditions	**Measured**	
	Start	**End**
Air Temp. (°C)	23.5	23.6
Rel. Humidity (%)	65.0	63.7
Air Pressure (kPa)	100.5	100.4

Applicable Standards:
Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Function Generator Model 33220A SN MY43004013
Agilent Digital Multimeter Model 34401A SN MY41004386

Traceability:
The results of the tests and measurements included in this document are traceable via the test methods described under each test, and by the use of the above equipment, which has been calibrated by NATA accredited calibration facilities.
This document shall not be reproduced, except in full.

Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification.
See "Sound Level Meter Verification - Summary of Tests" page for an itemised list of results for each test.

Uncertainty:
The uncertainty is stated at a confidence level of 95% using a k factor of 2.

Calibration Statement:
The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013 and IEC 61260-3:2016, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2017 and IEC 61260-2:2017, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 and IEC 61260-1:2014, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013 and IEC 61260-1:2014.

NATA WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Accredited for compliance with ISO/IEC 17025 - Calibration

Authorized Signatory:

Print Name: Ariel Michael Date: 26/02/2021

Template Document Name: RQT-05 (rev 72) SLM ISO Verification

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	26/02/2021	**Job No**	RB858	**Operator**	AH
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Instrument Make	NTI	**Model**	XL2-TA	**Serial No**	#A2A-12491-E0 #RTA07-ATP03
Microphone Make	NTI	**Model**	MC230	**Serial No**	#9681
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#6476
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	4.21

Freq Weightings	**FLAT**	No	**A**	Yes	**C**	Yes	**Z**	Yes	
Time Weightings	**Fast**	Yes	**Slow**	Yes	**Impulse**	Yes			

SLM Type	1
Filter Class	1

Instruction Manual is Available	Yes

2. Preliminary Inspection and Power Supply	**Logger Inspected**	Yes
	Calibration Equipment Okay	Yes
	Power Supply Ok (Start)	Yes
	Power Supply Ok (End)	Yes

		Measured	
3. Environmental Conditions	**Environmental Conditions**	**Start**	**End**
	Air Temp. (°C)	23.5	23.6
	Rel. Humidity (%)	65.0	63.7
	Air Pressure (kPa)	100.5	100.4
	Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	113.9	0.11
		Indicated Level After Adjustment (dB)	114.0	0.11
		Stability During Continuous Operation (dB)	Yes	N/A
5(a). Self-Generated Noise, Microphone Installed		**A**	16.2	0.09
5(b). Self-Generated Noise, Electrical		**A**	8.5	0.09
		C	12.9	0.09
		Z	18.6	0.09
6. Acoustical Signal Test		**125 Hz**	Yes	0.42
		1 kHz	Yes	0.42
		8 kHz	Yes	0.60
7. Electrical Frequency Weighting		**A**	Yes	0.09
		C	Yes	0.09
		Z	Yes	0.09
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.09
		Z	Yes	0.09
		FLAT	N/A	0.09
	8(b). Time Weighting	**Slow**	Yes	0.09
		Leq	Yes	0.09
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.13
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.13
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.13
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.13
11. Toneburst Response		**Fast**	Yes	0.13
		Slow	Yes	0.13
		SEL/Leq	Yes	0.13
12. Peak C sound level		**8 kHz**	Yes	0.09
		500 Hz	Yes	0.09
13. Overload indication		**Conforming**	Yes	0.09
		Latches	N/A	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.09
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.09
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.13
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.13
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.13
18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.13
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.13
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.13
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.13
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.13
20(a). Octave Band Filter Lower Limit (Reference Range)		**Conforming**	Yes	0.09
20(b). Octave Band Filter Lower Limit (Lowest Range)		**Conforming**	Yes	0.09
21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)		**Conforming**	Yes	0.09
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.09
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.09
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.09
22. Third Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.09

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.13
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.13
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.13
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.13
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.13
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.13
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.13
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.13
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.13
26(a). Octave Band Filter Lower Limit (Reference Range)	**Conforming**	Yes	0.09
26(b). Octave Band Filter Lower Limit (Lowest Range)	**Conforming**	Yes	0.09
SLM Overall Conforming		**Yes**	

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Periodic tests were performed in accordance with procedures from IEC 61672-3 :2013 and IEC 61260-3 :2016.

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Template Document Name: RQT-05 (rev 72) SLM ISO Verification

1(a). Instrument Information

Calibration Date	26/02/2021	Job No	RB858	Operator	AH

Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010

1. Instrument Information

Instrument Make	NTI	Model	XL2-TA	Serial	#A2A-12491-E0 #RTA07-ATP03		
Microphone Make	NTI	Model	MC230	Serial	#9681	pF	15
Preampifier Make	NTI	Model	MA220	Serial	#6476		
Ext'n Cable Make	NTI	Model		Serial			
Accessories	Nil			Firmware	4.21		

Freq Weightings		
	A	Yes
	C	Yes
	Z	Yes
	FLAT	No

Time Weightings		
	Fast	Yes
	Slow	Yes
	Impulse	Yes

Functions		
	Leq	Yes
	SEL	Yes
	Peak	Yes

Instrument Ranges	Range Name	Indicator Range		Primary Range	
		Low dB	High dB	Low dB	High dB
1	HIGH	40	140	60	134
2	MID	20	120	40	120
3	LOW	0	100	20	100
4					
5					
6					
7					
8					
9					
10					
Check List	OK				

Reference Range	MID
Ref. SPL @ 1kHz	114

Linearity Limits on Ref range	Low dB	High dB
1kHz Leq (A weighting)	35.0	120.0
4kHz Leq	35.0	120.0
8kHz Leq	35.0	120.0

Highest Range for 10(b),12,13	MID

SLM Class	1
Filter Class	1
Filter Base	2

Colour Legend	
Enter Value	110
Operator Action	110
Difference	1.0
Error/Outside Tolerance	2.0
Tolerance	+/-1
Select Toggle	Val
Informative	110
Conforming	Yes

Instruction Manual Title (Clause 3.1&3.2, IEC 61672-3:2013)	NTI XL2 Operating Manual
Version	2.5
Publication Date	2/11/2012
Source of Document (& Date of Download if Applicable)	N/A

Conforming	Yes

Pattern Evaluation Test Report (Clause 3.5, IEC 61672-3:2013)	Type Approval Certificate
Reference Number or Page Number	1.63-4093096
Publication Date	3/09/2019
Source of Document (& Date of Download if Applicable)	PTB

Conforming	Yes

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1(b). Acoustic Corrections

	Absolute Corrections and Uncertainties									
Freq	Mic FF to Pressure		Case		Windscreen		Other *		Total	
(Hz)	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB
31.5	0.00								0.00	0.41
63	0.00								0.00	0.41
125	0.00								0.00	0.41
250	0.00								0.00	0.41
500	0.00								0.00	0.41
1k	0.00								0.00	0.41
2k	0.30								0.30	0.41
4k	0.70								0.70	0.41
8k	2.60								2.60	0.58
12.5k	6.00								6.00	0.64
16k	7.30								7.30	0.64

Source of Mic FF to Pressure Correction	Nti Microphone Specifications M2230
Source of Case Correction	Not Available
Source of Windscreen Correction	Not Available
***Description of Other Correction**	N/A

Descriptions of Tests

1(b). Acoustical signal tests of a frequency weighting (IEC 61672-3)
(Clause 12.2)
Correction data shall account for:
- the equivalent free-field or random-incidence frequency response of the sound level meter if the source of sound or simulated sound is the pressure field in a multi-frequency sound calibrator, in a comparison coupler, or from an electrostatic actuator; and,
- if applicable, the average influence on the frequency response of a typical microphone of a windscreen and any accessories that are part of the configuration of the sound level meter for normal use.

(Clause 12.3)
Correction data shall be obtained from tables in the Instruction Manual for the sound level meter.
(Clause 12.4)
If the necessary correction data are not available from the Instruction Manual, data from the manufacturer of the microphone, multi-frequency sound calibrator, comparison coupler, or electrostatic actuator may then be used. This data shall be publicly available
(Clause 12.5)
The source for the free-field or random-incidence correction data shall be stated in the documentation for the results of the periodic tests. The source for the associated uncertainties of measurement shall be the same as the source for the corresponding correction data. If the uncertainties of the corresponding free-field correction data are not available, the applicable maximum-permitted uncertainties given in IEC 62585 shall be used in the calculation of the laboratory's total uncertainty budget.

NOTE: Where the uncertainties due to the "Mic FF to Pressure", "Case" or "Windscreen" are omitted in the table above, the following statement applies:

No information on the uncertainty of measurement, required by IEC 61672-3:2013, for the correction data given in the Instruction Manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was provided in the Instruction Manual or made available by the manufacturer or supplier of the sound level meter. The uncertainty of measurement of the correction data was therefore assumed to be the maximum-permitted uncertainty given in IEC 62585 for the corresponding free-field correction data and for a coverage probability of 95 %.

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1(c). Electrical Corrections

	Absolute Corrections and Uncertainties									
Freq	Mic 0 deg FF Resp		Case		Windscreen		Other *		Total	
(Hz)	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB	dB	Uncert dB
31.5			0.00		0.00		0.00		0.00	0.41
63			0.00		0.00		0.00		0.00	0.41
125			0.00		0.00		0.00		0.00	0.41
250			0.00		0.00		0.00		0.00	0.41
500			0.00		0.00		0.00		0.00	0.41
1k			0.00		0.00		0.00		0.00	0.41
2k			0.00		0.00		0.00		0.00	0.41
4k			0.00		0.00		0.00		0.00	0.41
8k			0.00		0.00		0.00		0.00	0.58
12.5k			0.00		0.00		0.00		0.00	0.64
16k			0.00		0.00		0.00		0.00	0.64

Source of Mic 0 deg Free-field Response	Not Available
Source of Case Correction	Not Available
Source of Windscreen Correction	Not Available
*Description of Other Correction	N/A

Descriptions of Tests

1(c). Acoustical signal tests of a frequency weighting (IEC 61672-3)
(Clause 13.6)
For each frequency weighting and at each test frequency, corrections shall be applied to the relative frequency weightings determined in 13.5 to account for:
– the deviation of the free-field or random-incidence frequency response of the microphone in the reference direction from a uniform frequency response;
– the average effects of reflections from the case of the sound level meter and of diffraction of sound around the microphone and preamplifier; and,
– if applicable, the average influence on the frequency response of a typical microphone of a windscreen and any accessories that are part of the configuration of the sound level meter for normal use.
(Clause 13.7)
Corrections for the effects of reflections and diffraction and for the influence of the windscreen and windscreen accessories on the free-field or random-incidence frequency response shall be the same as used for the frequency-weighting tests with acoustical signals.

NOTE: Where the uncertainties due to the "Mic FF to Pressure", "Case" or "Windscreen" are omitted in the table above, the following statement applies:

No information on the uncertainty of measurement, required by IEC 61672-3:2013, for the correction data given in the Instruction Manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was provided in the Instruction Manual or made available by the manufacturer or supplier of the sound level meter. The uncertainty of measurement of the correction data was therefore assumed to be the maximum-permitted uncertainty given in IEC 62585 for the corresponding free-field correction data and for a coverage probability of 95 %.

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2. Preliminary,3.Environmental Conditions & 4. Calibration

2. Preliminary Inspection and Power Supply

Instrument Inspected	Yes
Laboratory Calibration Equipment Ok	Yes
Power Supply Ok (Start)	Yes
Power Supply Ok (End)	Yes

3. Environmental Conditions

Environmental Conditions	Measured		Devn from Mid Limits		Uncert.	Expanded Deviation			Complies	Limits	
	Start	End	Start	End		Start	End	Tolerance		Min	Max
Air Temp. (°C)	23.5	23.6	0.5	0.6	0.5	1.00	1.10	3	Yes	20	26
Rel. Humidity (%)	65.0	63.7	17.5	16.2	4.8	22.30	21.00	22.5	Yes	25	70
Air Pressure (kPa)	100.5	100.4	8.0	7.9	0.63	8.63	8.53	12.5	Yes	80	105

Conforming	Yes

4(a). Initial Calibration

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Microphone / Windshield Correction	OFF
Polarization Voltage (V)	0
Microphone Sensitivity (mV/Pa)	45.8

B&K 4226 Calibrator Settings	
"Sound Field"	Pressure
"Microphone"	N/A
Calibration Level (Lin)	114
Calibration Frequency (Hz)	1000

Calibration	
Indicated Level before adjust. (dB)	113.9
Adjustment required	Yes
Indicated level after adjust. (dB)	114

4(b). Final Calibration

Level at conclusion of testing (dB)	114.1
Difference	0.1
Tolerance	± 0.1

Conforming	Yes

Uncertainty (+/-) dB	0.11

Descriptions of Tests

2. Preliminary Inspection and Power Supply (IEC 61672-3 Clause 5 "Preliminary Inspection" & Clause 6 "Power Supply")
Prior to any measurements, the sound level meter and all accessories shall be visually inspected, paying particular attention to damage to, or accumulation of foreign material on, the protection grid or diaphragm of the microphone. All relevant controls shall be operated to
ensure that they are in working order. If the controls, display, and other essential elements are not in proper working order, no periodic tests shall be performed.

For all tests, the sound level meter shall be powered from its preferred supply or a suitable alternative. Before and after conducting the set of tests with acoustical signals and before and after conducting the set of tests with electrical signals, the power supply for the sound level meter shall be checked by the method stated in the Instruction Manual to ensure that it is within the specified operating limits. If the voltage or the equivalent indication of the status of the power supply is not within the operating limits and the reason cannot be attributed to partially discharged batteries or an incorrect selection of the voltage of the public power supply, then no periodic tests shall be performed as a malfunction is indicated.

3. Environmental conditions (IEC 61672-3 Clause 7 "Environmental Conditions")
Periodic tests shall be performed within the following ranges of environmental conditions: 80 kPa to 105 kPa for static air pressure, 20 °C to 26 °C for air temperature and 25 % to 70 % for relative humidity. These conditions are recorded at the start and end of the testing.

4a. Calibration (IEC 61672-3 Clause 10 "Indication at the calibration check frequency")
The sound level meter shall be adjusted, if necessary, to indicate the required sound level for the environmental conditions under which the tests are performed. The indications of the sound level meter before and after adjustment shall be recorded.

4b. Long-term Stability (IEC 61672-3 Clause 15)
The long-term stability of a sound level meter is evaluated from the difference between the A-weighted sound levels indicated in response to steady 1 kHz signals applied at the beginning and end of a period of operation. For each indication, the level of the input signal shall be that which is required to display the reference sound pressure level on the reference level range for the first indication.

The period of continuous operation shall be between 25 min and 35 min during which any convenient set of tests that use electrical input signals are performed.

The measured difference between the initial and final indications of A-weighted sound level shall not exceed the acceptance limits given in IEC 61672-1.

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5. Self-Generated Noise

5(a). Self-Generated Noise, Microphone Installed

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	LOW
Measurement Function	Leq
Integration time (s)	30

Results		
Freq Wt	Observed	Quoted
A	16.2	16.6

Uncertainty (+/-) dB	0.09

Observed Values		
Leq	N/A	
16.2	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	Avg	

5(b). Self-Generated Noise, Electrical

SLM Settings	
Time Weighting	Fast
SLM Range	LOW
Measurement Function	Leq
Integration time (s)	30

Observed Values						
Leq			N/A			
A	C	Z	Obs	A	C	Z
8.5	12.9	18.6	1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			Avg			

Results		
Freq Wt	Observed	Quoted
A	8.5	12.4
C	12.9	13.5
Z	18.6	18.3-25.5

Uncertainty (+/-) dB	0.09

Descriptions of Tests

5(a) Self-Generated Noise, Microphone Installed (IEC 61672-3 Clause 11.1)
Measurements of the level of self-generated noise shall be made in a location that is available to the testing laboratory and where the level of background noise is minimized. Any supplied windscreen and windscreen accessory need not be installed around the microphone for measurement of the level of self-generated noise. The sound level meter shall be in the configuration submitted for periodic testing and with the most-sensitive level range and frequency-weighting A selected.

The indicated level of the A-weighted self-generated noise on the most-sensitive level range shall be recorded and reported. The level of self-generated noise is preferably measured as a time-averaged sound level with an averaging time of at least 30 s. Time-averaged sound level may be measured directly or calculated from an indication of sound exposure level and integration time. If time-averaged sound level cannot be determined, the time-weighted sound level from the average of ten observations taken at random over a 60 s interval shall be measured. If the time-weighted sound level is recorded, the S time weighting shall be used if available; otherwise the F time weighting shall be used.

5(b) Self-Generated Noise - Electrical (IEC 61672-3 Clause 11.2)
With the microphone replaced by the electrical input-signal device (or using the specified means of inserting electrical signals), and with the device terminated in the manner specified in the Instruction Manual for measurements of the level of self-generated noise, the indicated level of the time-averaged or time-weighted self-generated noise, measured by the same procedure as with the microphone installed, shall be recorded and reported for all frequency weightings and for the most-sensitive level range.

☑ Checked

6. Acoustical Signal Test

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Microphone Compensation Filter	OFF
B&K 4226 Calibrator Settings	
"Sound Field"	Pressure
"Microphone"	N/A
Reference Setting (Lin)	114

Freq	Observed Values			Mean Meter Reading	4226 calibrator corrections	Corrected Mean Readings	Pressure to Free Field	Case Effect Correction	Windscreen Effect Correction	Other Effect Correction	Equivalent Free Field	Response re 1kHz	C Weighting Response	Deviation from Expected	Tolerance		Conforming	Uncertainty		
															Type 1	Type 2		Total	Lab	Corrections
(Hz)	Set 1	Set 2	Set 3															(+/-) dB	(+/-) dB	(+/-) dB
31.5	110.9	110.9	110.8	110.87	0.10	110.97	0.00	0.00	0.00	0.00	110.97	-3.04	-3.00	-0.04	± 1.5	± 3.0	Yes	0.43	0.14	0.41
63	113.2	113.2	113.2	113.20	0.01	113.21	0.00	0.00	0.00	0.00	113.21	-0.80	-0.80	0.00	± 1.0	± 2.0	Yes	0.42	0.12	0.41
125	114.0	113.9	114.0	113.97	-0.02	113.95	0.00	0.00	0.00	0.00	113.95	-0.06	-0.20	0.14	± 1.0	± 1.5	Yes	0.42	0.12	0.41
250	114.1	114.1	114.1	114.10	-0.03	114.07	0.00	0.00	0.00	0.00	114.07	0.06	0.00	0.06	± 1.0	± 1.5	Yes	0.42	0.12	0.41
500	114.1	114.1	114.1	114.10	-0.03	114.07	0.00	0.00	0.00	0.00	114.07	0.06	0.00	0.06	± 1.0	± 1.5	Yes	0.42	0.12	0.41
1k	**114.1**	**114.1**	**114.0**	**114.07**	**-0.06**	**114.01**	**0.00**	**0.00**	**0.00**	**0.00**	**114.01**	**0.00**	**0.00**	0.00	± 0.7	± 1.0	Yes	0.42	0.11	0.41
2k	113.7	113.7	113.7	113.70	-0.01	113.69	0.30	0.00	0.00	0.00	113.99	-0.02	-0.20	0.18	± 1.0	± 2.0	Yes	0.43	0.13	0.41
4k	112.7	112.7	112.7	112.70	-0.20	112.50	0.70	0.00	0.00	0.00	113.20	-0.81	-0.80	-0.01	± 1.0	± 3.0	Yes	0.43	0.14	0.41
8k	108.7	108.8	108.8	108.77	-0.19	108.58	2.60	0.00	0.00	0.00	111.18	-2.83	-3.00	0.17	+1.5; -2.5	± 5.0	Yes	0.60	0.15	0.58
12.5k	102.5	102.5	102.6	102.53	-0.10	102.43	6.00	0.00	0.00	0.00	108.43	-5.57	-6.20	0.63	+2.0; -5.0	+5,-inf	Yes	0.68	0.21	0.64
16k	97.1	97.0	97.5	97.20	0.05	97.25	7.30	0.00	0.00	0.00	104.55	-9.46	-8.50	-0.96	+2.5; -16.0	+5,-inf	Yes	0.74	0.37	0.64

Description of Tests

6. Acoustical signal tests of a frequency weighting (IEC 61672-3 Clause 12)
The sound level meter shall be set for frequency-weighting C, if available, otherwise for frequencyweighting A. The frequency weighting for tests with acoustical signals shall be determined at 125 Hz, 1 kHz, and 8 kHz. However, for information, this laboratory tests from 31.5Hz to 16kHz.

For frequency-weighting tests using a multi-frequency sound calibrator, the sound pressure level in the coupler of the sound calibrator shall preferably be set to the reference sound pressure level at 1 kHz, but shall be in the range from 70 dB to 125 dB at all frequencies.

At the discretion of the laboratory, the sound level meter shall be set to measure F-timeweighted sound level or S-time-weighted sound level. As a minimum, two repetitions of the coupling and measurements shall be performed to give a total of at least three tests.

The relative frequency weighting, relative to the response at 1 kHz, shall be determined from the average equivalent free-field or random-incidence sound level at a test frequency minus the average equivalent free-field or random-incidence sound level at 1 kHz. (Clause 12.15)

☑ Checked

7. Electrical Frequency Weighting

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	20
Generator Frequency (Hz)	1k
SPL Reference (dB)	75
Integration Time (s)	N/A
Generator Output (mVrms)	54.60

Freq Hz	Output (mV)	Indication A	Output (mV)	Indication C	Output (mV)	Indication Z	Tolerance	
63	1114.79	74.9	59.87	74.9	54.60	74.9		
125	348.49	74.9	55.87	75.0	54.60	75.0		
250	146.96	74.9	54.60	75.0	54.60	75.0		
500	78.92	74.9	54.60	75.0	54.60	75.0		
1k	54.60	**75.0**	54.60	**75.0**	54.60	**75.0**		
2k	47.55	75.0	55.87	75.0	54.60	75.0		
4k	48.66	75.0	59.87	75.0	54.60	75.0		
8k	61.97	75.0	77.12	75.0	54.60	75.0		
16k	116.73	74.8	145.28	74.8	54.60	75.0		
Typical Microphone 0deg Free Field Response		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Case Effect Correction		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Windscreen Effect Correction		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
OtherCorrection		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		**0.00**		**0.00**		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
		0.00		0.00		0.00		
Equivalent Free Field		74.90		74.90		74.90		
		74.90		75.00		75.00		
		74.90		75.00		75.00		
		74.90		75.00		75.00		
		75.00		**75.00**		**75.00**		
		75.00		75.00		75.00		
		75.00		75.00		75.00		
		75.00		75.00		75.00		
		74.80		74.80		75.00	Type 1	Type 2
Response re 1kHz (Deviation from Expected)		-0.10		-0.10		-0.10	± 1.0	± 2.0
		-0.10		0.00		0.00	± 1.0	± 1.5
		-0.10		0.00		0.00	± 1.0	± 1.5
		-0.10		0.00		0.00	± 1.0	± 1.5
		0.00		**0.00**		**0.00**	± 0.7	± 1.0
		0.00		0.00		0.00	± 1.0	± 2.0
		0.00		0.00		0.00	± 1.0	± 3.0
		0.00		0.00		0.00	+1.5; -2.5	± 5.0
		-0.20		-0.20		0.00	+2.5; -16.0	+5,-inf
Conforming		**Yes**		**Yes**		**Yes**		

Uncertainty (+/-) dB	0.09

Description of Tests

7. Electrical signal tests of frequency weightings (IEC 61672-3 Clause 13)
Frequency weightings shall be determined using steady sinusoidal electrical input signals for all frequency weightings for which design goals and acceptance limits are specified in IEC 61672-1 and which are provided in the sound level meter. The sound level meter shall be set to display F-time-weighted sound level.

On the reference level range and for each frequency weighting to be tested, the level of a 1 kHz input signal shall be adjusted to yield an indication that is 45 dB less than the upper boundary stated in the Instruction Manual for the linear operating range at 1 kHz on the reference level range.

At test frequencies other than 1 kHz, the level of the input electrical signal shall be determined as the level of the input signal at 1 kHz minus the exact design-goal response, given in IEC 61672-1 for the selected frequency weighting at the test frequency.

☑ Checked

8. Frequency & Time Weightings 1kHz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	1k
SPL Reference (dB)	114.0
Output (mVrms)	487.7

8(a). Frequency Weightings 1kHz

Time Wt	Frequency Weighting				Tolerance	
Fast	A	C	Z	N/A		
1kHz	114.0	114.0	114.0		Type 1	Type 2
Difference		0.0	0.0		± 0.2	± 0.2

Conforming	Yes	Yes	N/A

Uncertainty (+/-) dB	0.09

8(b). Time Weightings 1kHz

Freq Wt	Time Weighting				Tolerance	
A	F	S	Leq			
1kHz	114.0	114.0	114.0		Type 1	Type 2
Difference		0.0	0.0		± 0.1	± 0.1

Conforming	Yes	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

8. Frequency and time weightings at 1 kHz (IEC 61672-3 Clause 14)
For a steady sinusoidal electrical input signal at 1 kHz on the reference level range and with an input signal that yields an indication of the reference sound pressure level with frequency weighting A, the indications shall be recorded for frequency weightings C and Z, as available, with the sound level meter set to display F-time-weighted sound level, or timeaveraged sound level, as available. In addition, the indications with frequency weighting A shall be recorded with the sound level meter set to display F-time-weighted sound level, S-timeweighted sound level, and time-averaged sound level, as available.

The measured deviation of the indication of the sound level frequency weightings and time weightings shall not exceed the acceptance limits given in IEC 61672-1.

☑ Checked

9(a). Level Linearity 8kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1972.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	± 0.8	± 1.1
21.0	104.0	104.0	0.0	± 0.8	± 1.1
16.0	109.0	109.0	0.0	± 0.8	± 1.1
11.0	114.0	114.0	0.0	± 0.8	± 1.1
10.0	115.0	115.0	0.0	± 0.8	± 1.1
9.0	116.0	116.0	0.0	± 0.8	± 1.1
8.0	117.0	117.0	0.0	± 0.8	± 1.1
7.0	118.0	118.0	0.0	± 0.8	± 1.1
6.0	119.0	119.0	0.0	± 0.8	± 1.1
5.0	120.0	120.0	0.0	± 0.8	± 1.1
4.0	121.0	121.0	0.0	± 0.8	± 1.1
3.0	122.0	122.0	0.0	± 0.8	± 1.1
2.0	123.0	123.0	0.0	± 0.8	± 1.1
1.0	124.0	124.0	0.0	± 0.8	± 1.1
0.0	125.0	Y		± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

9(a). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator over-range.

☑ Checked

9(b). Level Linearity 8kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94
Output (mVrms)	55.6
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	± 0.8	± 1.1
10.0	84.0	84.0	0.0	± 0.8	± 1.1
15.0	79.0	79.0	0.0	± 0.8	± 1.1
20.0	74.0	74.0	0.0	± 0.8	± 1.1
25.0	69.0	69.0	0.0	± 0.8	± 1.1
30.0	64.0	64.0	0.0	± 0.8	± 1.1
35.0	59.0	59.0	0.0	± 0.8	± 1.1
40.0	54.0	54.0	0.0	± 0.8	± 1.1
45.0	49.0	49.0	0.0	± 0.8	± 1.1
50.0	44.0	44.0	0.0	± 0.8	± 1.1
54.0	40.0	40.0	0.0	± 0.8	± 1.1
55.0	39.0	39.0	0.0	± 0.8	± 1.1
56.0	38.0	38.0	0.0	± 0.8	± 1.1
57.0	37.0	37.0	0.0	± 0.8	± 1.1
58.0	36.0	36.0	0.0	± 0.8	± 1.1
59.0	35.0	35.0	0.0	± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

9(b). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

10. Level Linearity with Level Ranges 1kHz

10(a). Level Linearity Including the Level Range (Reference Signal)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0
Generator Frequency (Hz)	1k
Reference SPL (dB)	114
Output (mVrms)	487.6

Settings	Level (dB)			Tolerance	
Range	Expected	Indicated	Difference	Type 1	Type 2
HIGH	114.0	114.0	0.0	± 0.8	± 1.1
MID	114.0	114.0	0.0	± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1
				± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

10(b). Level Linearity Including the Level range (5dB Above Under-range)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	HIGH
Generator & Attenuator Settings	
Attenuation (dB)	30
Generator Frequency (Hz)	1k
Reference SPL (dB)	65
Output (mVrms)	54.7

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	30.0	65.0	64.9	-0.1	± 0.8	± 1.1
MID	50.0	45.0	44.9	-0.1	± 0.8	± 1.1
LOW	70.0	25.0	25.0	0.0	± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1
					± 0.8	± 1.1

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

10. Level linearity including the level range control (IEC 61672-3 Clause 17)
For sound level meters that have more than one level range, tests of level linearity errors including errors introduced by the level range control shall be performed with steady sinusoidal electrical input signals at a frequency of 1 kHz and with the sound level meter set for frequency weighting A. For each test, signal levels shall be recorded as indications of F-time-weighted sound level or time-average sound level. (61672-3 Clause 17.1).

With the input signal level kept constant, the indicated signal level shall be recorded for all level ranges where the signal level is displayed. The indicated signal levels and the corresponding anticipated indications of signal levels shall be recorded. (61672-3 Clause 17.3).

For each level range, the level of the input signal shall then be adjusted to yield a signal level that is expected to be 5 dB greater than the signal level that first causes an indication of under-range on a level range. The indicated signal levels and the corresponding anticipated levels shall be recorded. (61672-3 Clause 17.4).

Level linearity deviations shall be calculated as an indicated signal level minus the corresponding anticipated signal level. Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1.

☑ Checked

11. Toneburst Response

11(a). Fast ToneBurst

SLM Settings - Fast	
Time Weighting	Fast
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	615.0

Toneburst (ms)	# Cycles	LAFMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	116.0	116.0	0.0	± 0.5	± 1.0
2	8	99.0	98.9	-0.1	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	90.0	89.9	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

11(b). Slow ToneBurst

SLM Settings - Slow	
Time Weighting	Slow
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	615.0

Toneburst (ms)	# Cycles	LASMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	109.6	109.6	0.0	± 0.5	± 1.0
2	8	90.0	89.9	-0.1	+ 1.0; -3.0	+ 1.0; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

11(c). SEL ToneBurst

SLM Settings - SEL/Leq	
Function	SEL
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
dB Down from Linearity Limit	3
Reference SPL (dB)	117.0
Output (mVrms)	615.0
Integration Time (if SEL not available) (s)	

Toneburst (ms)	# Cycles	SEL				Tolerance	
		Indicated	Calc'd	Expected	Difference	Type 1	Type 2
200	800	109.8	109.8	110.0	-0.2	± 0.5	± 1.0
2	8	90.0	90.0	90.0	0.0	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	80.9	80.9	81.0	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

11. Toneburst response (IEC 61672-3 Clause 18)
The response of the sound level meter to short-duration signals shall be tested on the reference level range with 4 kHz tonebursts. The sound level meter shall be set to frequency weighting A. (61672-3 Clause 18.1).

For the toneburst signals, indications of the sound level meter to be recorded are maximum F-time-weighted sound level, maximum S-time-weighted sound level and sound exposure level, as applicable.

The level of the steady input signal shall be adjusted to display an F-time-weighted, Stime-weighted, or time-averaged sound level, as appropriate, that is 3 dB less than the upper boundary stated in the Instruction Manual for the linear operating range at 4 kHz on the reference level range. (61672-3 Clause 18.4).

Tonebursts are tested at 200ms, 2ms and, 0.25ms durations (the latter for Fast and SEL only) and the LMax or SEL recorded.

Measured deviations of the measured toneburst responses from the corresponding reference toneburst responses given in IEC 61672-1 shall not exceed the applicable

☑ Checked

12. Peak C sound level

12(a). Peak C 8 KHz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	8k
Reference SPL (dB)	112.0
Output (mVrms)	549.7

Test Signal	dB LCpeak Hold				Tolerance	
8 kHz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
1 Cycle	115.4	No	115.4	0.0	± 2.0	± 3.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

12(b). Peak C 500 Hz

SLM Settings	
Time Weighting	Fast
Frequency Weighting	C
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	500
Reference SPL (dB)	112.0
Output (mVrms)	386.3

Test Signal	dB LCpeak Hold				Tolerance	
500 Hz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
One +ve 1/2 cycle	114.2	No	114.4	-0.2	± 1.0	± 2.0
One -ve 1/2 cycle	114.2	No	114.4	-0.2	± 1.0	± 2.0

Conforming	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

12. Peak C sound level (IEC 61672-3 Clause 19)
Indications of C-weighted peak sound level shall be tested on the least-sensitive level range. The test signals consist of (a) a single complete cycle of an 8 kHz sinusoid starting and stopping at zero crossings and (b) positive and negative half cycles of a 500 Hz sinusoid that also start and stop at zero crossings.

The level of the steady sinusoidal 8 kHz electrical input signal, from which a single complete cycle is extracted, shall be adjusted to yield an indication of C-weighted, F-timeweighted sound level, or C-weighted, time-averaged sound level, that is 8 dB less than the upper boundary stated in the Instruction Manual for the peak level range at 8 kHz on the leastsensitive level range. The indication of steady sound level shall be recorded.

The indication of C-weighted peak sound level in response to a complete cycle of the 8 kHz signal shall be recorded. Application of the complete-cycle 8 kHz signal shall not cause indication of an overload condition.

The level of the steady sinusoidal 500 Hz electrical input signal, from which positive and negative half cycles are extracted, shall be adjusted to yield an indication of C-weighted, Ftime-weighted sound level, or C-weighted, time-averaged sound level, that is 8 dB less than the upper boundary stated in the Instruction Manual for the peak level range on the least-sensitive level range. The indications of steady sound levels shall be recorded.

The indications of C-weighted peak sound level in response to a single positive halfcycle 500 Hz signal and to a single negative half-cycle 500 Hz signal shall be recorded and reported. Applications of the 500 Hz half-cycle signals shall not cause indications of an overload condition.

☑ Checked

13. Overload indication

SLM Settings	
Function	Leq
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	4k
Reference SPL (dB)	119.0
Output (mVrms)	774.6

	Half-Cycle Signal			Tolerance	
	Positive	Negative	Difference	Type 1	Type 2
Level (dB)	124.6	124.6	0.0	± 1.5	± 1.5
Generator Output (mVrms)	1531.0	1530.0			

Conforming	Yes

Uncertainty (+/-) dB	0.09

Overload Indicated	No
Overload Indicator Latches	N/A

Conforming	N/A

Description of Tests

13. Overload Indication (IEC 61672-3 Clause 20)
The test of overload indication shall only be performed for sound level meters capable of displaying time-average sound level.

Overload indication shall be tested on the least-sensitive level range with the sound level meter set to display A-weighted, time-average sound level. Positive and negative one-half-cycle sinusoidal electrical signals at a frequency of 4 kHz shall be used.(IEC 61672-3 Clause 20.2)

The test shall begin at an indicated time-averaged level for the steady input signal that corresponds to 1 dB less than the upper boundary specified for the linear operating range at 4 kHz. The level of the single positive one-half-cycle input signal shall be increased to the first indication of overload, to a resolution of 0.1 dB. The process shall be repeated for the single negative one-half-cycle signal. The levels of the single one-half-cycle input signals that produced the first indications of overload shall be recorded to a resolution of 0.1 dB.

It shall be verified that the overload indicator latches on as specified in IEC 61672-1 when an overload condition occurs.

☑ Checked

14. High-level Stability

SLM Settings	
Time Weighting	F
Frequency Weighting	A
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	0.0
Generator Frequency (Hz)	1k
Reference SPL (dB)	119.0
Output (mVrms)	846.8

Time Period to Apply Signal (min)	5.0
Record SPL at Conclusion of Time Period (dB)	119.0
Difference	0.0
Tolerance	± 0.1

Conforming	Yes

Uncertainty (+/-) dB	0.09

Description of Tests

14. High-level Stability (IEC 61672-3 Clause 21)
The ability of a sound level meter to operate continuously in response to high signal levels without significant change in sensitivity is evaluated from the difference between the Aweighted sound levels indicated in response to a steady 1 kHz electrical signal at the beginning and end of a 5 min period of continuous exposure to the signal.

The level of the steady electrical input signal shall be that which is required to display the sound level that is 1 dB less than the upper boundary of the 1 kHz linear operating range on the least-sensitive level range.

☑ Checked

15(a). Octave Band Filter Relative Attenuation (≤2kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Range	HIGH
Set dB Below Full Scale	-1
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz		
0.06				61.5					49.3			
0.13				69.3					50.4			
0.25				67.0					54.2			
0.50				82.1					71.1			
0.71												
0.77				132.8					133.0			
0.84				133.0					133.0			
0.92				132.8					133.0			
1.00				**132.9**					**133.0**			
1.09				132.9					133.0			
1.19				132.9					133.0			
1.30				132.9					133.0			
1.41												
2.00				72.5					40.3			
4.00				68.3					36.1			
8.00				64.9					37.5			
16.00				61.6					36.7		Class 1	Class 2
Attenuation dB				71.4					83.7		+70/inf	+60/inf
				63.6					82.6		+60/inf	+54/inf
				65.9					78.8		+40.5/inf	+39.5/inf
				50.8					61.9		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
				0.1					0.0		-0.4/+1.4	-0.6/+1.7
				-0.1					0.0		-0.4/+0.7	-0.6/+0.9
				0.1					0.0		-0.4/+0.5	-0.6/+0.7
				0.0					**0.0**		-0.4/+0.4	-0.6/+0.6
				0.0					0.0		-0.4/+0.5	-0.6/+0.7
				0.0					0.0		-0.4/+0.7	-0.6/+0.9
				0.0					0.0		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
				60.4					92.7		+16.6/inf	+15.6/inf
				64.6					96.9		+40.5/inf	+39.5/inf
				68.0					95.5		+60/inf	+54/inf
				71.3					96.3		+70/inf	+60/inf
Ins Loss				-0.1					0.0			
Conforming	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A		

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

15(a) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

15(b). Octave Band Filter Relative Attenuation (>2kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	8kHz	16kHz	32kHz								
0.06			50.4									
0.13			54.3									
0.25			55.3									
0.50			70.7									
0.71												
0.77			133.0									
0.84			133.0									
0.92			133.0									
1.00			**133.0**									
1.09			133.0									
1.19			133.0									
1.30			133.0									
1.41												
2.00			51.8									
4.00			44.8									
8.00			43.7									
16.00			58.5								Class 1	Class 2
Attenuation dB			82.6								+70/inf	+60/inf
			78.7								+60/inf	+54/inf
			77.7								+40.5/inf	+39.5/inf
			62.3								+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
			0.0								-0.4/+1.4	-0.6/+1.7
			0.0								-0.4/+0.7	-0.6/+0.9
			0.0								-0.4/+0.5	-0.6/+0.7
			0.0								-0.4/+0.4	-0.6/+0.6
			0.0								-0.4/+0.5	-0.6/+0.7
			0.0								-0.4/+0.7	-0.6/+0.9
			0.0								-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
			81.2								+16.6/inf	+15.6/inf
			88.2								+40.5/inf	+39.5/inf
			89.3								+60/inf	+54/inf
			74.5								+70/inf	+60/inf

Ins Loss			0.0							
Conforming	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

15(b) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

16. Octave Band Filter Relative Attenuation at Midband Frequency

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Attenuator dB	0.0
Reference SPL 1kHz	94.0
Output mVrms	45.0

	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	**4 Hz**	**8 Hz**	**16 Hz**	**31.5 Hz**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**Class 1**	**Class 2**
Measured			94.3	93.8	93.9	94.0	94.0	94.0	94.0	94.0		
Ins Loss			0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**N/A**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**4kHz**	**8kHz**	**16kHz**	**32kHz**							**Class 1**	**Class 2**
Measured	94.0	94.0	94.0									
Ins Loss	0.0	0.0	0.0								-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**N/A**								

Uncert (+/-) dB	**0.09**

Description of Test

16. Octave Band Filter Relative Attenuation at Midband Frequency (IEC 61260-3 Clause 10.2)

10.2 Tests of relative attenuation at midband frequency
10.2.1 The relative attenuation at the exact midband frequency shall be measured for every filter in a set of filters. The relative attenuation $\Delta A(\Omega)$ at any midband frequency is determined from Formula (8) given in IEC 61260-1:2014. The reference level range shall be selected for the test. The level of the test signal shall be equal to the reference input signal level.
10.2.2 The measured relative attenuation shall not exceed the acceptance limits ± 0,4 dB for Class 1 filters or ± 0,6 dB for class 2 filters as specified in 5.10 in IEC 61260-1:2014.

Interpretation: The yellow cells are the observed values. The "Ins Loss" are the actual values of attenuation at the filter centre frequencies. The "Conforming" cells demonstrate compliance with the Tolerance limits depending upon the Class of filter.

☑ Checked

17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1753.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

17(b). Octave Band Filter Level Linearity 1kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1727.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

17(c). Octave Band Filter Level Linearity 16kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1722.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

17(c). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.3
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.2	0.2	±0.7	±0.9
56.0	38.0	38.3	0.3	±0.7	±0.9
57.0	37.0	37.3	0.3	±0.7	±0.9
58.0	36.0	36.4	0.4	±0.7	±0.9
59.0	35.0	35.4	0.4	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	48.9
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.2	0.2	±0.7	±0.9
56.0	38.0	38.2	0.2	±0.7	±0.9
57.0	37.0	37.3	0.3	±0.7	±0.9
58.0	36.0	36.4	0.4	±0.7	±0.9
59.0	35.0	35.4	0.4	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	48.6
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.0	0.0	±0.7	±0.9
56.0	38.0	38.1	0.1	±0.7	±0.9
57.0	37.0	37.1	0.1	±0.7	±0.9
58.0	36.0	36.2	0.2	±0.7	±0.9
59.0	35.0	35.2	0.2	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

18(c). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

19. Octave Level Ranges

19(a). Octave Level Linearity Including the Level range (31.5Hz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	31.5
Reference SPL (dB)	94
Output (mVrms)	156.8

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

19(b). Octave Level Linearity Including the Level range (1kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	1k
Reference SPL (dB)	94
Output (mVrms)	154.0

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

19(c). Octave Level Linearity Including the Level range (16kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	16k
Reference SPL (dB)	94
Output (mVrms)	153.4

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

19. Filter Level linearity including the level range control (IEC 61260-3 Clause 11.9)

11.9 For the same three filters as selected above, test each available level range in the following way: based on the same reference level, adjust the input level to be 30 dB below upper boundary of the linear operating range for each of the selected range settings. The measured level linearity deviation shall not exceed the acceptance limits given in 5.13.3 and 5.13.4 of IEC 61260-1:2014

The three filter frequencies are 31.5Hz, 1kHz and 16kHz.

The level linearity differences are calculated as the indicated signal level minus the corresponding expected signal level.

☑ Checked

20. Octave Band Filter Lower Limit

20(a). Octave Band Filter Lower Limit (Reference Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Lower Limit for the Range	40

	1	2	3	4	5	6	7	8	9	10
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Measured		14.5	11.6	8.7	7.6	6.1	5.0	4.8	6.6	8.1
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	10.5	13.5	17.0							
Conforming	Yes	Yes	Yes	N/A						

Conforming	Yes

Uncert (+/-) dB	0.09

20(b). Octave Band Filter Lower Limit (Lowest Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	LOW
Lower Limit for the Range	20

	1	2	3	4	5	6	7	8	9	10
Freq	4 Hz	8 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Measured		12.5	13.3	5.2	7.0	4.7	2.9	1.7	0.3	0.2
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	1.2	2.7	5.1							
Conforming	Yes	Yes	Yes	N/A						

Conforming	Yes

Uncert (+/-) dB	0.09

20. Octave Band Filter Lower LImit (IEC 61260-3 Clause 12)

12.2 Short-circuit the input terminal or use similar means to ensure that the level of the input signal is below the lower limit of the specified linear operating range. Record the output level from each filter in the set. The output level shall not exceed the specified lower limit for the appropriate filter and range.

Interpretation: The yellow cells are the observed values. The measured value must not exceed the Lower LImit for the Range.

☑ Checked

21(a). Third Octave Band Filter Relative Attenuation (≤31.5Hz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz		
0.18										56.8		
0.33										58.1		
0.53										73.1		
0.77										70.6		
0.89												
0.92										132.4		
0.95										132.9		
0.97										132.9		
1.00										**132.9**		
1.03										132.9		
1.06										132.9		
1.09										132.2		
1.12												
1.30										66.7		
1.89										54.9		
3.07										60.7		
5.43										59.5	Class 1	Class 2
Attenuation dB										76.1	+70/inf	+60/inf
										74.8	+60/inf	+54/inf
										59.8	+40.5/inf	+39.5/inf
										62.3	+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
										0.5	-0.4/+1.4	-0.6/+1.7
										0.0	-0.4/+0.7	-0.6/+0.9
										0.0	-0.4/+0.5	-0.6/+0.7
										0.0	-0.4/+0.4	-0.6/+0.6
										0.0	-0.4/+0.5	-0.6/+0.7
										0.0	-0.4/+0.7	-0.6/+0.9
										0.7	-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
										66.2	+16.6/inf	+15.6/inf
										78.0	+40.5/inf	+39.5/inf
										72.2	+60/inf	+54/inf
										73.4	+70/inf	+60/inf
Ins Loss										**-0.1**		
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes		

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(a) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz		
0.18									50.1			
0.33									55.8			
0.53									66.9			
0.77									70.8			
0.89												
0.92									132.7			
0.95									133.1			
0.97									133.0			
1.00									**133.0**			
1.03									133.0			
1.06									133.0			
1.09									132.3			
1.12												
1.30									58.1			
1.89									52.4			
3.07									42.4			
5.43									39.3		Class 1	Class 2
Attenuation dB									82.9		+70/inf	+60/inf
									77.2		+60/inf	+54/inf
									66.1		+40.5/inf	+39.5/inf
									62.2		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
									0.3		-0.4/+1.4	-0.6/+1.7
									-0.1		-0.4/+0.7	-0.6/+0.9
									0.0		-0.4/+0.5	-0.6/+0.7
									0.0		-0.4/+0.4	-0.6/+0.6
									0.0		-0.4/+0.5	-0.6/+0.7
									0.0		-0.4/+0.7	-0.6/+0.9
									0.7		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
									74.9		+16.6/inf	+15.6/inf
									80.6		+40.5/inf	+39.5/inf
									90.6		+60/inf	+54/inf
									93.7		+70/inf	+60/inf
Ins Loss									**0.0**			
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A		

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(b) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz		
0.18					45.8							
0.33					48.1							
0.53					59.2							
0.77					70.6							
0.89												
0.92					132.7							
0.95					133.0							
0.97					133.0							
1.00					**133.0**							
1.03					133.0							
1.06					133.0							
1.09					132.2							
1.12												
1.30					58.0							
1.89					51.6							
3.07					32.3							
5.43					31.4						Class 1	Class 2
Attenuation dB					87.2						+70/inf	+60/inf
					84.9						+60/inf	+54/inf
					73.8						+40.5/inf	+39.5/inf
					62.4						+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
					0.3						-0.4/+1.4	-0.6/+1.7
					0.0						-0.4/+0.7	-0.6/+0.9
					0.0						-0.4/+0.5	-0.6/+0.7
					0.0						-0.4/+0.4	-0.6/+0.6
					0.0						-0.4/+0.5	-0.6/+0.7
					0.0						-0.4/+0.7	-0.6/+0.9
					0.8						-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
					75.0						+16.6/inf	+15.6/inf
					81.4						+40.5/inf	+39.5/inf
					100.7						+60/inf	+54/inf
					101.6						+70/inf	+60/inf

Ins Loss					0.0					
Conforming	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(c) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	HIGH
Set dB Below Full Scale	-1.0
Attenuator dB	0.0
Reference SPL 1kHz	133.0
Output mVrms	4028.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz		
0.18							49.5					
0.33							53.3					
0.53							52.8					
0.77							70.5					
0.89												
0.92							132.7					
0.95							133.0					
0.97							133.0					
1.00							**133.0**					
1.03							133.0					
1.06							133.0					
1.09							132.2					
1.12												
1.30							58.2					
1.89							42.7					
3.07							38.2					
5.43							36.5				Class 1	Class 2
Attenuation dB							83.5				+70/inf	+60/inf
							79.7				+60/inf	+54/inf
							80.2				+40.5/inf	+39.5/inf
							62.5				+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
							0.3				-0.4/+1.4	-0.6/+1.7
							0.0				-0.4/+0.7	-0.6/+0.9
							0.0				-0.4/+0.5	-0.6/+0.7
							0.0				-0.4/+0.4	-0.6/+0.6
							0.0				-0.4/+0.5	-0.6/+0.7
							0.0				-0.4/+0.7	-0.6/+0.9
							0.8				-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
							74.8				+16.6/inf	+15.6/inf
							90.3				+40.5/inf	+39.5/inf
							94.8				+60/inf	+54/inf
							96.5				+70/inf	+60/inf

Ins Loss							0.0			
Conforming	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Uncert (+/-) dB	≤80dB	0.09	>80dB	0.46

Description of Test

21(d) Octave Filter (IEC 61260-3 Clause 13)

13 Measurement of relative attenuation
13.1 The relative attenuation on the reference level range shall be tested for the same three filters as selected in Clause 11.
13.2 The measurements of relative attenuation are made as the response to constant amplitude sinusoidal signals at various frequencies. The level of the input signals shall be (1 ± 0,1) dB below the specified upper boundary of the linear operating range.
13.6 The measured relative attenuation shall not exceed the acceptance limits given in Table 1 for the appropriate class of filter.

Interpretation: The three filters specified in "Clause 11" are 31.5Hz, 1kHz and 16kHz unless the client expands this range. The limits in "Table 1" are the Tolerance values shown in green above. The yellow cells are the observed values. The "Attenuation dB" cells are the attenuation values of each filter with the filter's centre frequency attenuation assumed to be zero (i.e. the relative attenuation). The "Ins Loss" are the actual values of attenuation at the filter centre frequencies.

☑ Checked

22. Third Octave Band Filter Relative Attenuation at Midband Frequency

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Reference Range	MID
Attenuator dB	0.0
Reference SPL 1kHz	94.0
Output mVrms	45.0

	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	**4Hz**	**5Hz**	**6.3Hz**	**8Hz**	**10Hz**	**12.5Hz**	**16Hz**	**20Hz**	**25Hz**	**31.5Hz**	**Class 1**	**Class 2**
Measured			93.7	94.0	94.1	93.9	94.0	94.0	94.0	94.0		
Ins Loss			-0.3	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**N/A**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**40Hz**	**50Hz**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**	**200Hz**	**250Hz**	**315Hz**	**Class 1**	**Class 2**
Measured	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0		
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**400Hz**	**500Hz**	**630Hz**	**800Hz**	**1kHz**	**1.25kHz**	**1.6kHz**	**2kHz**	**2.5kHz**	**3.15kHz**	**Class 1**	**Class 2**
Measured	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0		
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**4kHz**	**5kHz**	**6.3kHz**	**8kHz**	**10kHz**	**12.5kHz**	**16kHz**	**20kHz**	**25kHz**	**31.5kHz**	**Class 1**	**Class 2**
Measured	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0				
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			-0.4/+0.4	-0.6/+0.6
Conforming	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**		

Uncert (+/-) dB	**0.09**

Description of Test

22. Octave Band Filter Relative Attenuation at Midband Frequency (IEC 61260-3 Clause 10.2)

10.2 Tests of relative attenuation at midband frequency
10.2.1 The relative attenuation at the exact midband frequency shall be measured for every filter in a set of filters. The relative attenuation $\Delta A(\Omega)$ at any midband frequency is determined from Formula (8) given in IEC 61260-1:2014. The reference level range shall be selected for the test. The level of the test signal shall be equal to the reference input signal level.
10.2.2 The measured relative attenuation shall not exceed the acceptance limits ± 0,4 dB for Class 1 filters or ± 0,6 dB for class 2 filters as specified in 5.10 in IEC 61260-1:2014.

Interpretation: The yellow cells are the observed values. The "Ins Loss" are the actual values of attenuation at the filter centre frequencies. The "Conforming" cells demonstrate compliance with the Tolerance limits depending upon the Class of filter.

☑ Checked

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1753.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(a). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1727.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(b). Filter Level linearity on the reference level range (IEC 61260-3 Clause 11)

The level linearity shall be tested for three filters in a set of filters. For a set of filters covering the audible range of frequencies, it is recommended to test filters with frequencies close to 31.5 Hz,1 kHz and 16 kHz.

The test shall be performed on the reference level range for levels from the specified lower boundary of the specified linear operating range up to a level where the overload indicator displays an overload. Adjust the level of the input signal with steps that are not greater than 5 dB. The difference between successive steps of the input signal level shall be reduced to 1 dB when the distance to the lower or upper boundaries of a linear operating range is less than 5 dB and when the level is above the upper boundary. The boundaries are as stated in the instruction manual for the filter. If no overload is displayed, the filter does not conform to the requirements.

The measured level linearity deviation shall not exceed the acceptance limits given in 5.13 in IEC 61260-1:2014 for all measured levels between the lower boundary of the linear operating range, as stated in the instruction manual for the filter, and up to the highest level, measured as described above, without an overload indication.

An overload shall not be indicated if the level of the input signal is below the stated upper boundary of each appropriate linear operating range.

"Y" means indicator over-range.

☑ Checked

23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Over SLM Range	5
Attenuation (dB)	31.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	1722.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
26.0	99.0	99.0	0.0	±0.5	±0.6
21.0	104.0	104.0	0.0	±0.5	±0.6
16.0	109.0	109.0	0.0	±0.5	±0.6
11.0	114.0	114.0	0.0	±0.5	±0.6
10.0	115.0	115.0	0.0	±0.5	±0.6
9.0	116.0	116.0	0.0	±0.5	±0.6
8.0	117.0	117.0	0.0	±0.5	±0.6
7.0	118.0	118.0	0.0	±0.5	±0.6
6.0	119.0	119.0	0.0	±0.5	±0.6
5.0	120.0	120.0	0.0	±0.5	±0.6
4.0	121.0	121.0	0.0	±0.5	±0.6
3.0	122.0	122.0	0.0	±0.5	±0.6
2.0	123.0	123.0	0.0	±0.5	±0.6
1.0	124.0	124.0	0.0	±0.5	±0.6
0.0	125.0	125.0	0.0	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

23(c). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator over-range.

☑ Checked

24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	46.3
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.0	0.0	±0.7	±0.9
56.0	38.0	38.0	0.0	±0.7	±0.9
57.0	37.0	37.0	0.0	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	35.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(a). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	48.9
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.0	0.0	±0.7	±0.9
56.0	38.0	38.0	0.0	±0.7	±0.9
57.0	37.0	37.0	0.0	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	35.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(b). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Select dB Under SLM Range	0
Attenuation (dB)	0.0
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	48.6
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
5.0	89.0	89.0	0.0	±0.5	±0.6
10.0	84.0	84.0	0.0	±0.5	±0.6
15.0	79.0	79.0	0.0	±0.7	±0.9
20.0	74.0	74.0	0.0	±0.7	±0.9
25.0	69.0	69.0	0.0	±0.7	±0.9
30.0	64.0	64.0	0.0	±0.7	±0.9
35.0	59.0	59.0	0.0	±0.7	±0.9
40.0	54.0	54.0	0.0	±0.7	±0.9
45.0	49.0	49.0	0.0	±0.7	±0.9
50.0	44.0	44.0	0.0	±0.7	±0.9
54.0	40.0	40.0	0.0	±0.7	±0.9
55.0	39.0	39.0	0.0	±0.7	±0.9
56.0	38.0	38.0	0.0	±0.7	±0.9
57.0	37.0	37.0	0.0	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	35.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

24(c). Level linearity on the reference level range (IEC 61672-3 Clause 16)
Level linearity shall be tested with steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A. (61672-3 Clause 16.1).

Level linearity shall be measured in 5 dB steps of increasing input signal level from the starting point up to within 5 dB of the upper boundary stated in the Instruction Manual for the linear operating range at 8 kHz, then at 1 dB steps of increasing input signal level up to, but not including, the first indication of overload. The test of level linearity shall then be continued at 5 dB steps of decreasing input signal level from the starting point down to within 5 dB of the specified lower boundary, then at 1 dB steps of decreasing input signal level down to, but not including, the first indication of an under-range condition.

Measured level linearity deviations shall not exceed the applicable acceptance limits given in IEC 61672-1 from the specified upper boundary of the linear operating range up to, but not including, the first indication of overload and also from the specified lower boundary of the linear operating range down to, but not including, the first indication of an under-range condition.

"Y" means indicator under-range. However, if 20dB above noise floor is reached then no results are reported.

☑ Checked

25. Third Octave Level Ranges

25(a). Third Octave Level Linearity Including the Level range (31.5Hz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	31.5
Reference SPL (dB)	94
Output (mVrms)	156.8

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	103.9	-0.1	± 0.5	± 0.6
MID	14.0	90.0	89.9	-0.1	± 0.5	± 0.6
LOW	34.0	70.0	70.0	0.0	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

25(b). Third Octave Level Linearity Including the Level range (1kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	1k
Reference SPL (dB)	94
Output (mVrms)	154.0

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	89.9	-0.1	± 0.5	± 0.6
LOW	34.0	70.0	69.8	-0.2	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

25(c). Third Octave Level Linearity Including the Level range (16kHz)

SLM Settings	
Time Weighting	Fast
Frequency Weighting	Z
SLM Range	MID
Generator & Attenuator Settings	
Attenuation (dB)	10
Generator Frequency (Hz)	16k
Reference SPL (dB)	94
Output (mVrms)	153.4

Settings		Level (dB)			Tolerance	
Range	Atten	Expected	Indicated	Difference	Type 1	Type 2
HIGH	0.0	104.0	104.0	0.0	± 0.5	± 0.6
MID	14.0	90.0	90.0	0.0	± 0.5	± 0.6
LOW	34.0	70.0	69.9	-0.1	± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.13

Description of Tests

25. Filter Level linearity including the level range control (IEC 61260-3 Clause 11.9)

11.9 For the same three filters as selected above, test each available level range in the following way: based on the same reference level, adjust the input level to be 30 dB below upper boundary of the linear operating range for each of the selected range settings. The measured level linearity deviation shall not exceed the acceptance limits given in 5.13.3 and 5.13.4 of IEC 61260-1:2014

The three filter frequencies are 31.5Hz, 1kHz and 16kHz.

The level linearity differences are calculated as the indicated signal level minus the corresponding expected signal level.

☑ Checked

26. Third Octave Band Filter Lower Limit

26(a). Octave Band Filter Lower Limit (Reference Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	MID
Lower Limit for the Range	40

	1	2	3	4	5	6	7	8	9	10
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz
Measured			7.1	10.9	4.7	6.4	12.7	6.1	5.6	5.3
Conforming	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz
Measured	0.1	6.4	0.0	1.2	1.9	1.8	0.0	0.2	0.5	0.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz
Measured	0.8	0.6	0.7	1.4	2.6	1.6	2.6	3.5	4.4	4.5
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz
Measured	6.1	6.5	8.0	8.8	9.8	10.8	12.1	13.3		
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A

Conforming	Yes

Uncert (+/-) dB	0.09

26(b). Octave Band Filter Lower Limit (Lowest Range)

SLM, Attenuator & Generator Settings	
Time Weighting	Fast
Frequency Weighting	Z
Lowest Range	LOW
Lower Limit for the Range	20

	1	2	3	4	5	6	7	8	9	10
Freq	4Hz	5Hz	6.3Hz	8Hz	10Hz	12.5Hz	16Hz	20Hz	25Hz	31.5Hz
Measured			6.2	7.4	5.8	6.7	5.8	4.3	5.4	5.1
Conforming	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz
Measured	2.0	4.7	0.0	2.7	0.0	0.1	0.0	0.0	0.0	0.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz
Measured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz	25kHz	31.5kHz
Measured	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1		
Conforming	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A

Conforming	Yes

Uncert (+/-) dB	0.09

26. Third Octave Band Filter Lower LImit (IEC 61260-3 Clause 12)
12.2 Short-circuit the input terminal or use similar means to ensure that the level of the input signal is below the lower limit of the specified linear operating range. Record the output level from each filter in the set. The output level shall not exceed the specified lower limit for the appropriate filter and range.
Interpretation: The yellow cells are the observed values. The measured value must not exceed the Lower LImit for the Range.

☑ Checked

E – Water Management Protocol

RESPONSIBILITY

WATER REUSE AND DISCHARGE MANAGEMENT

Site Supervisor
Environmental Coordinator

SITE TESTING AND TREATMENT OF WATER
Site testing of water must occur prior to discharge.
A sample of water is to be taken from the sample valve to confirm the pH and NTU values and that there is no visibility of oil and grease, as per the criteria in the table on page 2. If the parameters tested are outside of the discharge criteria, all water is to be pumped back into the stormwater pit and treated with the appropriate chemicals and retested again until compliant values are obtained. A diagram of the dewatering set up can be seen on page 2.

Pitt Street South

Pitt Street North

WATER REUSE WITHIN THE PREMISES (Pitt Street North site only)
If there is capacity in the 5000L reuse tank (specified in the diagram on page 2), water must be pumped into the reuse tank before discharged to stormwater.
Water from the 5000L reuse tank can be reused for dust suppression, site amenities or other purposes.

HOLD POINT

Site Supervisor
Environmental Coordinator

DISCHARGE OFF THE PREMISES
Prior to any water discharge into the stormwater, a Permit to Dewater must be given by the Environmental Team. This will be given when the water has been tested and is within the compliant values on page 2.
Excess water from the Pitt Street North storm water pit can be discharged to stormwater once the reuse tank is at capacity.

Excess water

Environmental Coordinator

All discharge Information is to be recorded on the **Permit to Dewater.**
Environmental team is to keep records of water reuse/ discharge quantities through recording water meter values.

NOTES

Safety Requirements

- Always wear appropriate PPE (refer to Work Pack and SWMS)
- Avoid eye and skin contact with material sampled, flocculants, or products used to adjust pH. The first aid shed contains eye wash equipment if it is required.
- DO NOT breathe gases or aerosols formed from sampled material or associated preservatives in sample bottles.
- Maintain high standards of personal hygiene when sampling, DO NOT eat or smoke when sampling and ALWAYS wash hands following sampling.

Training
All personnel must receive site inductions and on-going Toolbox Talks which will include requirements of Water Management on site.
Only authorised persons to issue the permit to dewater and undertake site testing/sampling.

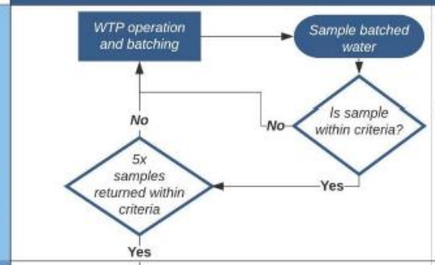
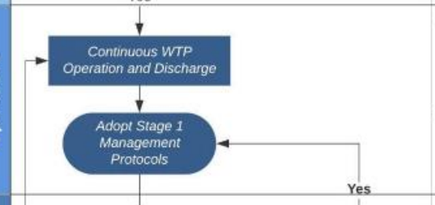
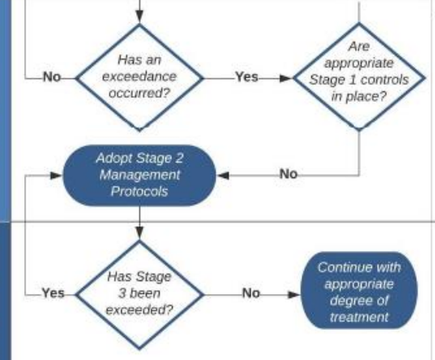
Monitoring

- Undertake water quality monitoring and visual inspection as per this procedures discharge requirements.
- Regular inspection of controls and discharge points are required prior to and during discharge.
- Where observations or conditions change, stop the discharge and contact Environment Team immediately.

Recording

- Records of water quality analysis on permits.
- Records of water reuse.
- Records of inspections including site inspections, on going monitoring of discharge and site diaries.
- Records of toolbox talks.

DISCHARGE MANAGEMENT PROTOCOL

Management Workflow	Analytes & Period	Operation & Trigger Guidelines	Management Actions
Stage 0 - Verification 	1. Real Time (daily): i. Turbidity ii. pH iii. Oil & Grease 2. Per Batch i. Full Suite at NATA accredited lab	• Normal operation of water treatment plant (WTP) in the commissioning phase with batching of waste water	• Standard WTP operation • Water treatment using a batching process without discharge • Continuous sampling of discharge ◦ After five (5) consecutive sampling events without an exceedance of the target criteria adopt Stage 1 Protocols
Stage 1 - Standard Operations 	1. Real Time (daily): i. Turbidity ii. pH iii. Oil & Grease 2. Per Month[1] i. Full Suite at NATA accredited lab	• Normal operation of WTP with continuous discharge of treated water	• Standard WTP operation
Stage 2 - Exceedance 	As per Stage 1	• 50th percentile discharge limit exceeded across three (3) consecutive sampling events • 100th percentile discharge limit exceeded across one (1) sampling event	• Notify WTP operator of trigger • Investigate the cause of the exceedance and examine the WTP processes immediately • Implement new controls to address any issues identified • Undertake sample of the exceeded parameter at the next available discharge
Stage 3 - Stop Work 		• 50th percentile discharge limit exceeded across five (5) consecutive sampling events • 100th percentile discharge limit exceeded across two (2) consecutive sampling events	• Implement Stage 1 & 2 management protocols • Inform Client and Environmental Representative • Implement batch verification with 2x samples of the exceeded parameter to meet the criteria prior to discharge

Note: 1. Water samples will be collected monthly, where treated water is available.In the event that insufficient treated water is available for collection, a water sample is to be collected upon commencement of the next available discharge event.

RESPONSIBILITY

Environmental Coordinator/ authorised delegate

LABRATORY GRAB SAMPLE PROCESS

Monthly (or on the available discharge) sampling must be undertaken in accordance with the Discharge Management Protocol.

Water samples to be taken by environmental team or authorised delegate and sent to a NATA accredited laboratory for testing. The sample is to be taken at the point of the sample valve.

HOLD POINT

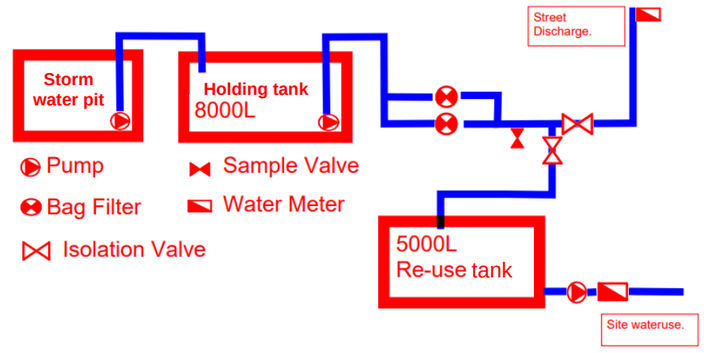
Management actions determined by the Discharge Management Protocol Stages depending on the water results

WATER QUALITY CRITERIA FOR DISCHARGE AND LABORATORY SAMPING

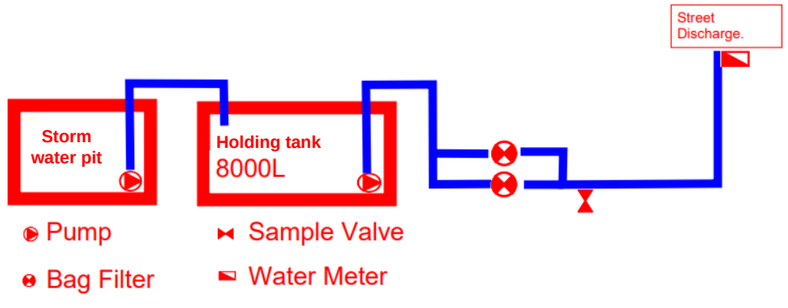
Parameter	Percentile Concentration Limit	Sample Method & Frequency	Units	Discharge Criteria
pH	100	Probe/ grab sample Prior to discharge	pH	6.5-8.5
Total Suspended Solids (TSS)*	100	Probe/ grab sample Prior to discharge	mg/L	<50
Oil and Grease	100	Visual Prior to discharge	None visual	None visual
Copper	50	Grab Sample Monthly	mg/L	0.0013
Copper	100	Grab Sample Monthly	mg/L	0.0048
Zinc	50	Grab Sample Monthly	mg/L	0.015
Zinc	100	Grab Sample Monthly	mg/L	0.043

Note: an equivalent NTU value of 50 will be used instead of TSS for site testing as per correlation.

NORTH DEWATERING SET UP



SOUTH DEWATERING SET UP



F – Laboratory Results

CPB Contractors Pty Ltd
Level 4, 177 Pacific Highway
North Sydney
NSW 2060

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Olivia Cooper**

Report **831188-W-V2**
Project name PITT ST ISD
Project ID N01070
Received Date Oct 11, 2021

Client Sample ID			**S01**	**S02**	**S03**	**S04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S21-Oc21066**	**S21-Oc21067**	**S21-Oc21068**	**S21-Oc21069**
Date Sampled			**Oct 11, 2021**	**Oct 11, 2021**	**Oct 11, 2021**	**Oct 11, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			**S05**	**S01**	**S02**	**S03**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S21-Oc21070**	**S21-Oc21071**	**S21-Oc21072**	**S21-Oc21073**
Date Sampled			**Oct 11, 2021**	**Oct 11, 2021**	**Oct 11, 2021**	**Oct 11, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Copper (filtered)	0.001	mg/L	< 0.001	-	-	-
Zinc (filtered)	0.005	mg/L	< 0.005	-	-	-
Oil & Grease (HEM)	10	mg/L	-	< 10	< 10	< 10
pH (at 25 °C)	0.1	pH Units	-	7.7	7.6	7.5
Total Suspended Solids Dried at 103–105°C	5	mg/L	-	< 5	< 5	< 5
Turbidity	1	NTU	-	2.2	2.4	2.3

Client Sample ID			**S04**	**S05**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**S21-Oc21074**	**S21-Oc21075**
Date Sampled			**Oct 11, 2021**	**Oct 11, 2021**
Test/Reference	LOR	Unit		
Oil & Grease (HEM)	10	mg/L	< 10	< 10
pH (at 25 °C)	0.1	pH Units	7.6	7.5
Total Suspended Solids Dried at 103–105°C	5	mg/L	< 5	< 5
Turbidity	1	NTU	2.3	2.3

eurofins | Environment Testing

Certificate of Analysis

CPB Contractors Pty Ltd
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North Sydney
NSW 2060

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Attention: **Olivia Cooper**

Report **842993-W**
Project name PITT ST ISD
Project ID N01070
Received Date Nov 22, 2021

Client Sample ID			**S01**
Sample Matrix			**Water**
Eurofins Sample No.			**S21-No50469**
Date Sampled			**Nov 22, 2021**
Test/Reference	LOR	Unit	
Heavy Metals			
Copper (filtered)	0.001	mg/L	0.003
Zinc (filtered)	0.005	mg/L	0.047

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Attention: **CC invoices; Emma Eveleigh**

Report **842996-W**
Project name PITT ST ISD
Project ID N01070
Received Date Nov 22, 2021

Client Sample ID			**S01**
Sample Matrix			**Water**
Eurofins Sample No.			**S21-No50470**
Date Sampled			**Nov 22, 2021**
Test/Reference	LOR	Unit	
Oil & Grease (HEM)	10	mg/L	< 10
pH (at 25 °C)	0.1	pH Units	7.9
Total Suspended Solids Dried at 103–105°C	5	mg/L	10
Turbidity	1	NTU	8.3

eurofins | Environment Testing

Certificate of Analysis

CPB Contractors Pty Ltd
Level 4, 177 Pacific Highway
North Sydney
NSW 2060

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Accreditation Number 1261
Site Number 18217

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Attention: **CC invoices; Emma Eveleigh**

Report **844348-W**
Project name PITT ST ISD
Project ID N01070
Received Date Nov 25, 2021

Client Sample ID			**S4**
Sample Matrix			**Water**
Eurofins Sample No.			**S21-No61175**
Date Sampled			**Nov 25, 2021**
Test/Reference	LOR	Unit	
Heavy Metals			
Zinc (filtered)	0.005	mg/L	0.036