Quarterly Environment Construction Monitoring Report

Q1 and Q2 2024 – January - June 2024

Pitt Street Integrated Station Development

Project number:	N01070
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Document approval:

Rev.	Date	Prepared by	Reviewed by	Approved by	Remarks
0	22/07/2024	E Eveleigh	T Taylor (Renzo Tonin)	S Knight	Submission to Sydney Metro, ER & AA
1	13/09/2024	E Eveleigh	T Taylor (Renzo Tonin)	S Knight	Response to R0 review
Signature		[redacted]		[redacted]	

APPROVAL

CITY & SOUTHWEST ACOUSTICS ADVISOR

Review of	**Quarterly Environment Construction Monitoring Report Q1 and Q2 2024 – January - June 2024 (PSISD)**	**Document reference:**	**Quarterly Environment Construction Monitoring Report Q1 and Q2 2024 – January- June 2024** **Pitt Street Integrated Station Development Prepared by CPB.** *Project Number: N01070* *Document number: SMCSWSPS-CPB-STA-EM-REP-000027* *Team Binder: SMCSWSPU-CPB-SPS-EM-REP-015099* *Revision date: 13/9/2024* *Revision: 1*
Prepared by:	Carl Fokkema Alternate Acoustics Advisor		
Date of issue:	27 September 2024		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed and provided comment on the Quarterly Environmental Construction Monitoring Report (CMR) for the Pitt Street Integrated Station Development, as required under A27 (d) of the project approval conditions (SSI 15-7400).

I reviewed and commented on previous revision (Rev 0) of the CMR Q1 and Q2 2024. This revision 1 includes minor amendments that required updating or were of an administrative or minor nature and are consistent with the terms of approval and the document approved by the Secretary.

I am satisfied that such amendments are necessary, approve revision 1 of the CMR Q1 and Q2 2024 (dated 13 September 2024), and consider that the document is appropriate for submission to the Secretary for information.

[redacted]

Carl Fokkema, City & Southwest Alternate Acoustics Advisor

Contents

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.

The Pitt Street Station was handed over to the Operators on 26 June 2024.

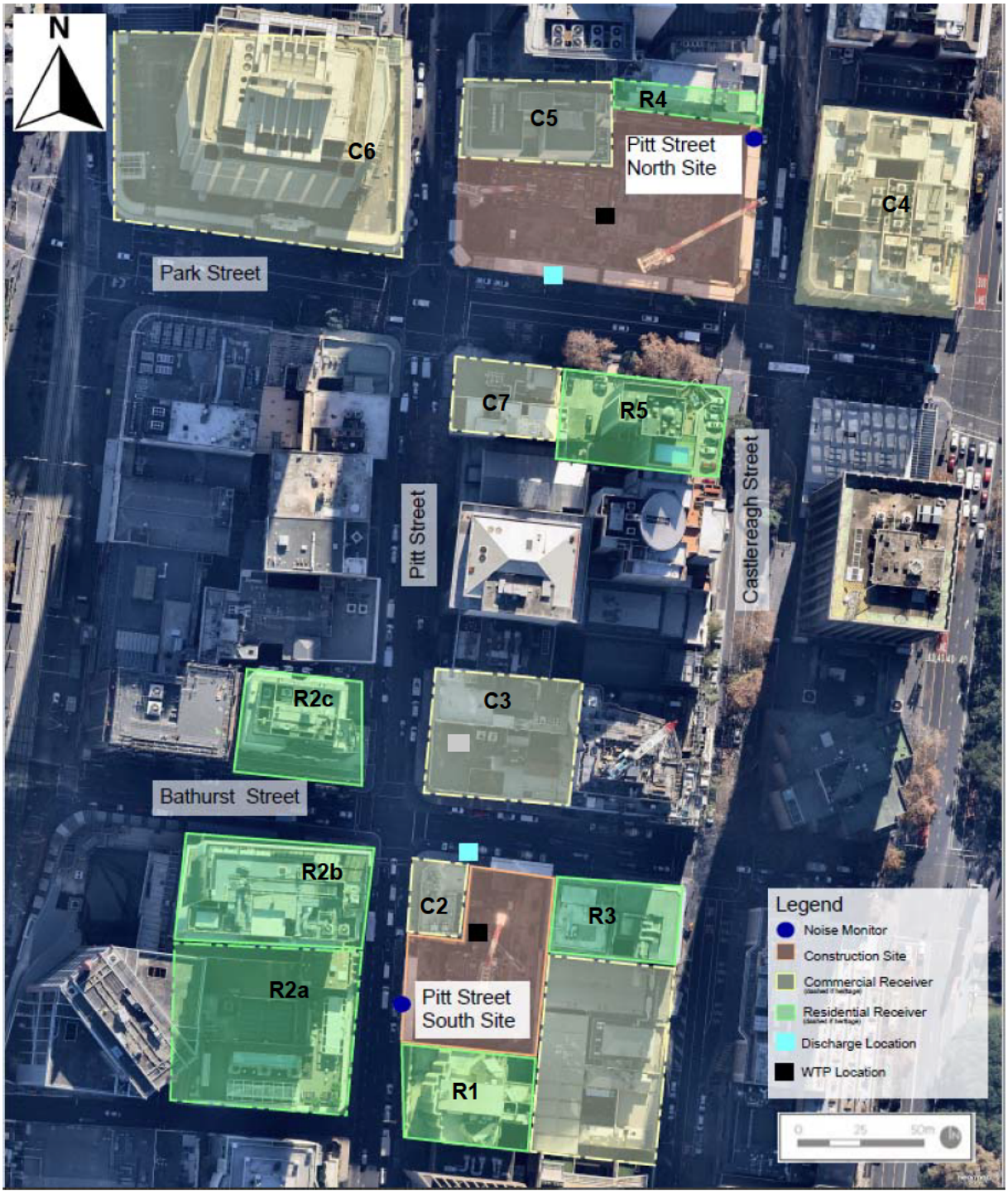


Figure 1-1 Pitt Street Station location and indicative monitoring layout

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. The project has been completed during this final reporting period Q1 and Q2 2024 and was handed over to the Operator on 26 June 2024. The CEMP was revised during this period to Revision 5 which was endorsed by the ER on 2 May 2024.

Due to accessibility restrictions once the façade was installed the real time monitors were decommissioned and removed during the reporting period; the PSN real time monitor was decommissioned on 9 April 2024 and the PSS real time monitor was decommissioned on 3 July 2024. Additional Outside of Hours Works may be required post July 2024 and additional attended noise monitoring will be conducted if required by the Acoustics Advisor.

This report covers the Construction Monitoring Report for Q1 and Q 2 2024 and reflects the monitoring that was conducted from January to June 2024 and is the last monitoring report to be issued due to handover of the station on 26 June 2024. **Table 1-1** outlines the site activities that occurred during the reporting period.

Table 1-1 Site Activities

Location	Site Activities
Pitt Street North	Final internal finishes works including waterproofing, blockwork, painting and door installation. Services commissioning all levels L00 main entry fitout, including baffle ceiling and colour back glass installation Defects rectification works all floors Signage installation all floors Façade installation L00 – L02 and Sandstone Fins L02-L04.
Pitt Street South	Completion of blockwork Completion of internal finishes Services testing and commissioning completed Façade and awning installation works from level 00 and 01 (Bathurst Street and Pitt Street) Installation of façade to The Edinburgh Castle from levels 3 - 6
Caverns	GRC panel rectification complete Platform PSD cladding complete Terrazzo flooring complete at all FOH areas Signage complete

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. The current CSSI modification is MOD 9 which was determined on 30 June 2022.

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 DPE (now DPHI) 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 (Revision 5) and its associated sub-plans.

A copy of the Planning Approval can be found by following the link below to the NSW Planning Portal 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 DPHI (formerly DPE) and being made publicly available on the project website located at Pitt Street Sydney Metro ISD – Pitt Street Sydney Metro ISD (wpcomstaging.com). 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 SEP inspections are documented in the CPB Environmental Inspection Checklist. Internal CPB inspections are conducted by the CPB Environmental and Project Team. ER inspections are attended by Sydney Metro, CPB, the DPHI (Formerly DPE) endorsed Acoustic Advisor (AA) and the ER.

During the reporting period there were six inspections conducted by Sydney Metro Environmental Representatives and the ER/AA. Additionally, CPB completed twenty-four internal environmental inspections during the reporting period.

2.2 Water Quality Monitoring

No water has been discharged to stormwater during the reporting period. Due to the progression of the site construction and rainwater are now captured and managed by the Pitt Street North and South Over station Development sites respectively. Water management was handed to the OSD sites in August 2023. Groundwater is collected by the sumps as part of the permanent works, located at both PSN and PSS.

2.3 Noise and Vibration Monitoring

2.3.1 Background

The Main Works Construction Noise and Vibration Impact Statement (CNVIS) did not require any updates during the reporting period as all major works have been completed. **Table 2-1** outlines the current CNVIS used during the reporting period. This CNVIS is also provided on the project website at Pitt Street Sydney Metro ISD – Pitt Street Sydney Metro ISD (wpcomstaging.com).

Table 2-1 CNVIS' developed and approved during the reporting period.

CNVIS	Details
CNVIS – Station Box Main Works	16/08/2023 – Revision 18.3 issued to Sydney Metro, ER and AA and endorsed by the AA on 16 August 2023

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 2-2**.

Table 2-2 Construction noise management levels at receivers 1 and 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)$L_{eq(15min)}$ (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)$L_{eq(15min)}$ (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)$L_{eq(15min)}$ (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)$L_{eq(15min)}$ (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)$L_{eq(15min)}$ (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)$L_{eq(15min)}$	45dB(A) $L_{eq(15min)}$ (internal noise level)	N/A	60dB(A)$L_{eq(15hr)}$	60dB(A)$L_{eq(15min)}$ (internal noise level)	N/A

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]
						80dB(A)$L_{eq(15min)}$ (external noise level)**	
	Evening	66dB(A)$L_{eq(15min)}$	40dB(A) $L_{eq(15min)}$ (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) $L_{eq(15min)}$ (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 receivers 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

Noise

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.

Some measurement locations are affected by road traffic noise, (buses/truck passing by etc.) intermittently generating noise levels similar to or higher than the construction noise. As such, conducting a long-term noise measurement ($L_{Aeq,\ 15\text{-}minute}$) was not possible – the measurement would be affected by extraneous noise. To address this, shorter duration measurements LAeq had to be made during breaks in traffic (to get measurement periods not affected by intermittent extraneous noise). Given that acoustic criteria are set using a $L_{Aeq,15minute}$ descriptor, it is necessary to account for the fact that the equipment item operates for only a percentage of the 15-minute period, i.e.:

- When determining the $L_{Aeq,15minute}$ noise level for equipment items such as a road saw, jackhammer, and compactor, we assume the item is used for approximately 50% of any 15-minute period.
- When determining the LAeq(15min) noise level for equipment items such as concrete pumps and vacuum trucks, these are assumed to operate continuously.

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.

Seven instances attended noise monitoring have been required during the reporting period.

Vibration

The CNVMP outlined the approach to manage potential vibration impacts on heritage items. The actions outlined in the CNVIS are:

- Identify heritage items where the 2.5 mm/s peak component particle velocity objective may be exceeded during specific construction activities.
- Structural engineering report to be undertaken on identified heritage items, to confirm structural integrity of the building and confirm if item is 'structurally sound'.
- If item confirmed as 'structurally sound', the screening criteria in Section 3.2.2 shall be adopted, or
- If the item confirmed as 'structurally unsound', the more conservative cosmetic damage objectives of 2.5 mm/s peak component particle velocity would be adopted.

When a structural engineering report is unable to be obtained the attended vibration monitor notification system was set to 2.5 mm/s PPV. No attended vibration monitoring was performed during the reporting period as no vibration generating activities with potential to adjacent structures were identified.

2.3.4 Attended Monitoring Results

2.3.4.1 Attended Monitoring Results – 24 January 2024 (South Site – Street Utilities Works, 3 Crews Working)

Site attendance to conduct noise measurements of Outside of Hours Works on 24/01/2024.

Works during the measurement period were three work crews at the South site - two crews on the Pitt Street frontage and a third at the Bathurst Street frontage. Works undertaken were utilities diversion works (hydraulic hammer, vacuum truck, excavator).

The purpose of the measurements was to examine the noise generation and compare the measured noise levels with the noise levels predicted in Outside of Hours Works Application OOH_059 (based on multiple crews on Pitt St and Bathurst St).

Equipment consisted of:

- Work Zone 1 (Bathurst Street):
  - Excavator with bucket attachment.
  - Vacuum truck.
- Work Zone 2 (Pitt St – Infront of Edinburgh Castle Hotel):
  - Vacuum truck.
- Work Zone 3 (Pitt St – Infront of 308 Pitt St, Sydney):
  - Excavator with bucket attachment.
  - Excavator with Jack hammer attachment.
  - Vacuum truck.

During the measurements, works were located near the Pitt Street/Bathurst Street intersections (most of the work being at Work Zone 3, see aerial photo below).

The noise impact in the nearest residences was examined being:

- The Greenland Tower Apartments (Pitt Street) identified as receiver R2.
- The Kimpton Margot Hotel (Pitt Street) identified as receiver R4.
- The Porterhouse Hotel (Bathurst Street) identified as receiver R5.

The receiver locations for PSS Street Utility works are as follows:

- R1 - Princeton
- R2 - Greenland Tower
- R3 - Euro Tower
- R4 - Kimpton Margot

- R5 - Porterhouse Hotel

Measurements were made using a XL2 type 1 sound level meter on a-weighted fast response mode.

See below **Figure 2-1** showing work and measurement locations.

See also photos in Appendix D.

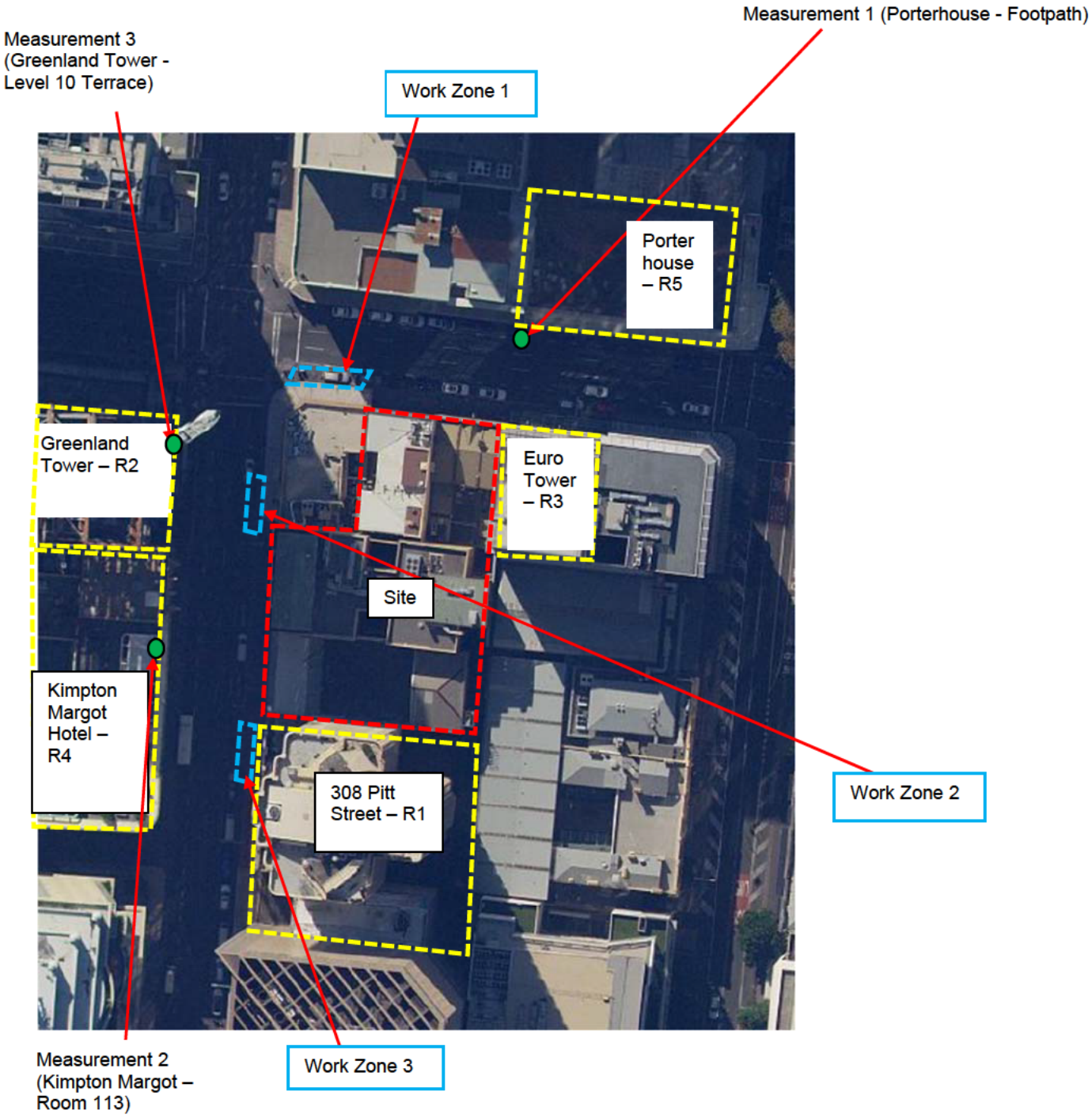


Figure 2-1 South Site (Street Utilities Works, 3 Crews Working) indicative attended monitoring locations

Results

Measurement results are presented in **Table 2-3, Table 2-4** and **Table 2-5**.

For the purpose of assessment, it is the $L_{eq(15min)}$ noise level at the receiver that is critical. This is shown in **bold** in the table below.

The vacuum truck pump speed was reduced at 12am in order to mitigate post-midnight noise impacts.

Measurements were made at the locations shown in **Figure 2-1**.

The table below shows both the measured noise levels and comparison against predicted levels from OOH_059 (where that scenario had a prediction made).

With respect to the measured noise levels, we note:

- Measurements at internal and external locations for all equipment items was conducted to the extent possible. In some cases, the noise level of a certain activity or source could not be measured internally due to practical limitations such as restricted access. In such situations, an approximate value was obtained by estimation. Whenever an estimation was used, it is clearly indicated in the below **Table 2-3**.

- During the measurement period, the three work zones did not usually have equipment operating at the same time. Typically, there were periods of set up for each activity and as a result, measurements were typically of one equipment item only.

With respect to predictions of internal/external noise levels:

- Measured noise levels are compared against predictions in OOH_059 as follows:
    - Generally, the measured noise levels are compared to the predicted levels in Appendix 6 of OOH_059.
    - For use of vacuum trucks prior to 12am and operating at full speed, this was not a prediction scenario covered in Appendix 6. Noise emissions are therefore compared against the worst-case noise emission (pre-12am) in Section 3 of OOH_059.
- To predict internal noise levels:
    - Whenever possible, measurements were made both inside and outside the receiver.
    - If internal and external measurements at a given location was possible for a given activity, this was used to predict the outside/inside noise difference for other activities at that location.
    - If this was not possible (i.e. – only an outside *or* inside measurement was possible), then the following noise reductions are used in order to make predictions of internal noise levels:
        - **R1** – Princeton Level 1 (20dB outside/inside noise reduction)
        - **R2** – Greenland Tower, Level 10 (25dB outside/inside noise reduction)
        - **R3** – Euro Tower Level 5 (25dB outside/inside noise reduction)
        - **R4** – Kimpton Margot Level 1 (30dB outside/inside noise reduction)
        - **R5** – Porterhouse Hotel Level 1 (35dB outside/inside noise reduction)

Table 2-3 Construction Noise Measurements – Porterhouse Hotel (Footpath) – R5 – 24/01/2024

Description	Activity	Noise Level	Comment/Comparison to Predictions
Work Zone 1			
Before 12am	Vacuum Truck (Speed – 1600rpm)	Outside (Measured): **82dB(A)$L_{eq(15min)}$** 83dB(A)L_{Max} Inside (Estimated): **47dB(A)$L_{eq(15min)}$** 48dB(A)L_{Max} (based on 35dB(A) noise reduction outside/inside)	Outside*: Consistent with prediction to R5 (85dB(A)$L_{eq(15min)}$)) Inside: 50dB(A)$L_{eq(15min)}$) (based on 35dB(A) noise reduction outside/inside)

*Vacuum truck at full speed prior to 12am not examined in OOHW 59. 85dB(A) is based on worst case activity up to 12am noise level in OOHW 59 Section 3.

Table 2-4 Construction Noise Measurements – Kimpton Margot Hotel (Level 1, Room 113) – R4 – 24/01/2024

Description	Activity	Measured Noise Level	Comment/Comparison to Predictions
Work Zone 3			
Before 12am	Excavator (Bucket attachment)	Outside (Measured): **76dB(A)$L_{eq(15min)}$** 83dB(A)L_{Max} Inside (Measured): **38dB(A)$L_{eq(15min)}$** 40dB(A)L_{Max}	Outside: Consistent with prediction to R4 (77dB(A)$L_{eq(15min))}$) – excavator located at south end of Pitt Street. Inside: Consistent with prediction to R4 (47dB(A)$L_{eq(15min))}$) – excavator located at south end of Pitt Street, 30dB(A) reduction outside/inside.
Before 12am	Jack Hammer	Outside (Estimated): **78dB(A)$L_{eq(15min)}$**** (83dB(A)$L_{eq(15min}$(if applying 5dB(A) penalty)*** 85dB(A)$L_{Max)}$ (based on 38dB(A) noise reduction outside/inside as measured above) Inside (Measured): **40dB(A)$L_{eq(15min)}$**** 45dB(A)$L_{eq(15min)}$ (if applying 5dB(A) penalty)*** 47dB(A)L_{Max}	Outside: Consistent with prediction to R4 (82dB(A)$L_{eq(15min))}$) – hammer located at south end of Pitt Street. Inside: Below prediction to R4 (52dB(A)$L_{eq(15min))}$) – excavator located at south end of Pitt Street, 30dB(A) reduction outside/inside.
Before 12am	Vacuum Truck (Speed – 2000rpm)	Outside (Estimated): **82dB(A)$L_{eq(15min)}$** 89dB(A)L_{Max} (based on 38dB(A) noise reduction outside/inside as measured above) Inside (Measured): **44dB(A)$L_{eq(15min)}$** 46dB(A)L_{Max}	Outside*: Consistent with prediction to R5 (85dB(A)$L_{eq(15min))}$) Inside: 55dB(A)$L_{eq(15min))}$ (based on 30dB(A) noise reduction outside/inside)

*Vacuum truck at full speed prior to 12am not examined in OOHW 59. 85dB(A) is based on worst case activity up to 12am noise level in OOHW 59 Section 3.

**Jackhammering noise will potentially have an irritating characteristic (impulsiveness). In this regard, guidance is taken from the EPA Industrial Noise Policy that identifies a noise as impulsive if there is a difference between the Max (Fast) and Max (Impulse) noise level is more than 5dB(A). In this case, Fast v Impulse noise level varied by only 1dB(A).

***For completeness, the noise level with 5dB penalty is presented in the table above. However, if applying the numerical test for impulsiveness as per the EPA Industrial Noise Policy, the measured noise would not be considered impulsive.

Table 2-5 Construction Noise Measurements – Greenland Tower (R2 – Level 10 Terrace Edge) – 24/01/2024

Description	Activity	Measured Noise Level	Comment/Comparison to Predictions
Before 12am	Work Zone 2 - Vacuum Truck (Speed – 2000rpm)	Outside (Measured): **80dB(A)$L_{eq(15min)}$** 81dB(A)L_{Max} Inside (Estimated): **55dB(A)$L_{eq(15min)}$** 56dB(A)L_{Max} (based on 25dB(A) noise reduction outside/inside)	Outside*: Consistent with prediction to R2 (85dB(A)$L_{eq(15min)}$) Inside: 60dB(A)$L_{eq(15min)}$ (based on 25dB(A) noise reduction outside/inside)
Before 12am	Work Zone 1 - Vacuum Truck (Speed – 1600rpm) Work Zone 2 - Vacuum Truck (Speed – 2000rpm) Work Zone 3 - Vacuum Truck (Speed – 1600rpm)	Outside (Measured): **81dB(A)$L_{eq(15min)}$** 82dB(A)L_{Max} Inside (Estimated): **56dB(A)$L_{eq(15min)}$** 57dB(A)L_{Max} (based on 25dB(A) noise reduction outside/inside)	Outside*: Consistent with prediction to R2 (85dB(A)$L_{eq(15min)}$) Inside: 60dB(A)$L_{eq(15min)}$ (based on 25dB(A) noise reduction outside/inside)
After 12am	Work Zone 1 - Vacuum Truck (Speed – 1600rpm) Work Zone 2 - Vacuum Truck (Speed – 1600rpm) Work Zone 3 - Vacuum Truck (Speed – 1600rpm)	Outside (Measured): **74dB(A)$L_{eq(15min)}$** 76dB(A)L_{Max} Inside (Estimated): **49dB(A)$L_{eq(15min)}$** 51dB(A)L_{Max} (based on 25dB(A) noise reduction outside/inside)	Outside: Consistent with prediction to R2 (72dB(A)$L_{eq(15min)}$) being vacuum truck, reduced speed Inside: 47dB(A)$L_{eq(15min)}$ (based on 25dB(A) noise reduction outside/inside)

*Vacuum truck at full speed prior to 12am not examined in OOHW 59. 85dB(A) is based on worst case activity up to 12am noise level in OOHW 59 Section 3.

Discussion

Noise levels at nearby residences were equal or below the predicted levels for these equipment and activities as outlined in OOH_059.

2.3.4.2 Attended Monitoring Results – 08 April 2024 (North Site – Ground Plane – Façade Installation and Hoarding Works)

Site attendance to conduct noise measurements of Outside of Hours Works on 8/4/2024.

Works consisted of façade and hoarding installation on the Park Street frontage of the North Site.

Measurements were conducted using an XL2 Type 1 Sound level meter.

Measurements were conducted between 9pm and 10.30pm.

Façade Work

The works comprised installation of window frames – fixing them to steel structural members.
This required:

- Use of an impact drill
- Use of an Elevated Work Platform (EWP)

The process involved drilling pilot holes into the steel (rotary drill setting) and followed by use of the dill on impact mode to compete the installation of the fixing.

With respect to the equipment operation:

- The EWP was located on ground level, behind the plywood hoarding that runs along the Park Street frontage, approximately mid-way across the frontage. The hoarding screens noise to the Park Street residences.
- The use of the drill was typically above the level of the hoarding (such that there is a line of sight between the work location and the nearest residences - Park Regis, across Park Street to the south).

With respect to the noise generated:

- EWP and drill (Rotary Setting):
    - Noise from the EWP and the drill on rotary setting mode was not audible/barely audible when measured at ground level at the boundary to the Park Regis building (ambient environment of 63dB(A)L90 at the time). This indicates that the noise from the EWP and Drill (rotary setting) is less than 55dB(A).
    - The post-midnight background noise level at Pitt Street North is 59dB(A), meaning the work would have been below background levels.
- Drill (Impact Setting):
    - Noise from the use of the drill in impact mode was audible at Park Regis and produced a momentary noise level of 70-73dB(A)L_{Max} at the Park Regis. This would occur for periods of approximately 3 seconds at a time, and typically 3-4 times per minute. This would continue for approximately 2 minutes, before there would be a longer break as materials would need to be repositioned, new pilot holes drilled etc.
    - Assuming that the drilling occurred for 12 seconds per min, and for three minutes out of 15 (these being very conservative compared to my site observation), the 15-minute average noise level at the nearest residence would be 59dB(A) L_{eq} (15min).
    - The post-midnight background noise level at Pitt Street North is 59dB(A), meaning the work would have been “Background+0dB(A)”.

- The measurements also confirm that the L_{AMax} noise emission is less then 15dB(A) above the background noise level and as such the Sleep Disturbance trigger level is not exceeded.

The momentary peak noise levels created during use of the impact drill is “Background+14dB(A)” if conducted post-midnight. This would comply with the commonly adopted “Background+15dB(A)” screening test used when considering potential sleep disturbance impacts.

The noise level from façade works that was predicted in CNVIS Rev 18.3 Table 18 was up to 72dB(A).

The reason for the lower noise level in reality compared to the CNVIS prediction is primarily due to the nature of the impact drill use (very short, infrequent duration).

Hoarding Work

The works comprised installation of plywood façade elements. The work location was on the Park Street frontage, western end.

This required:

- Use of an impact drill.
- Use of jig saw.

The works were not screened by any hoarding.

Similar to the façade work, the use of the drill involved drilling of pilot holes (barely audible when measured at Park Regis).

The use of the circular saw was faintly audible (approx. 65dB(A)) and the impact drill was more clearly audible (70dB(A)).

Similar to the façade work, the use of the saw was very infrequent (typically bursts of 3-5 seconds duration, once every five minutes as plywood pieces were cut prior to installation).

Similarly, the use of the drill in impact mode tended to be infrequent (typically bursts of 3-5 seconds duration, 3-4 times in a one-minute period. This would occur approx. 4 times in each 15-minute period).

If considering the 15-minute average noise level, the works produced a noise level of 61dB(A) L_{eq} (15min). This is within a “Background+5dB(A)” noise level.

The momentary noise maximum levels (70dB(A)) also comply with the “Background+15dB(A)” sleep disturbance screening test.

2.3.4.3 Attended Monitoring Results – 06 June 2024 (North Site – Capping Beam Demolition)

Attended noise measurements for Out of Hours works at Pitt St North (Removal of concrete capping beam to enable installation of new bollards) was conducted on 06/06/2024.

Relevant background noise levels across the evening/night time period are as follows:

- 6pm-8pm: 60dB(A)L_{90}
- 8pm-10pm: 59dB(A)L_{90}
- 10pm-12am: 59dB(A)L_{90}

Measured noise level and comparison against CNVIS predictions and background noise levels is presented in **Table 2-6**.

Table 2-6 Measured Noise Levels (Park Regis and Castlereagh Boutique Hotel)) – 06/06/2024

Measurement Location	Equipment measured	Measured SPL	Predicted Noise $L_{Aeq,15\text{-}min}$ (from Appendix 6 of OOH permit)	Sleep disturbance criteria for night-time OOH L_{Amax} (from Appendix 6 of OOH permit)	Comment
Park Regis – Podium Level	Kobelco 5tonne excavator with 250kg **Jack Hammer** attachment (At Park St frontage behind the hoarding)	External: **72 $L_{Aeq,15\text{-}min}$** **73 L_{Amax}** Internal: **52 $L_{Aeq,15\text{-}min}$** **53 L_{Amax}**	**79 $L_{Aeq,15\text{-}min}$**	**65 L_{Amax}** (Based on EIS) **74-75 L_{Amax}** (Based on BG+15)	Measured noise levels comply with the corresponding criteria
Park Regis – Podium Level	Kobelco 5tonne **excavator with bucket** attachment (At Park St frontage behind the hoarding)	External: **58 $L_{Aeq,15\text{-}min}$** **67 L_{Amax}** Internal: **38 $L_{Aeq,15\text{-}min}$** **47 L_{Amax}**	**79 $L_{Aeq,15\text{-}min}$**	**65 L_{Amax}** (Based on EIS) **74-75 L_{Amax}** (Based on BG+15)	Measured noise levels comply with the corresponding criteria
Castlereagh Boutique Hotel – Street Level	Kobelco 5tonne excavator with 250kg **Jack Hammer** attachment (At Park St frontage behind the hoarding)	External: **70 $L_{Aeq,15\text{-}min}$** **72 L_{Amax}** Internal: **50 $L_{Aeq,15\text{-}min}$** **50 L_{Amax}**	**79 $L_{Aeq,15\text{-}min}$**	**65 L_{Amax}** (Based on EIS) **74-75 L_{Amax}** (Based on BG+15)	Measured noise levels comply with the corresponding criteria

The works are anticipated to result in noise levels of no more than 6dB(A) above background noise levels for the loudest activity (hydraulic hammer) and below background noise levels during use of excavator with bucket. If a 5dB(A) penalty is applied to the hydraulic hammer the L_{eq} (average) emitted noise is 11dB(A) above background noise levels.

Up to 12am assessment:

- External L_{Max} noise levels are predicted to be less than 15dB(A) above ambient noise levels, and as such the screening test for sleep disturbance is not triggered.

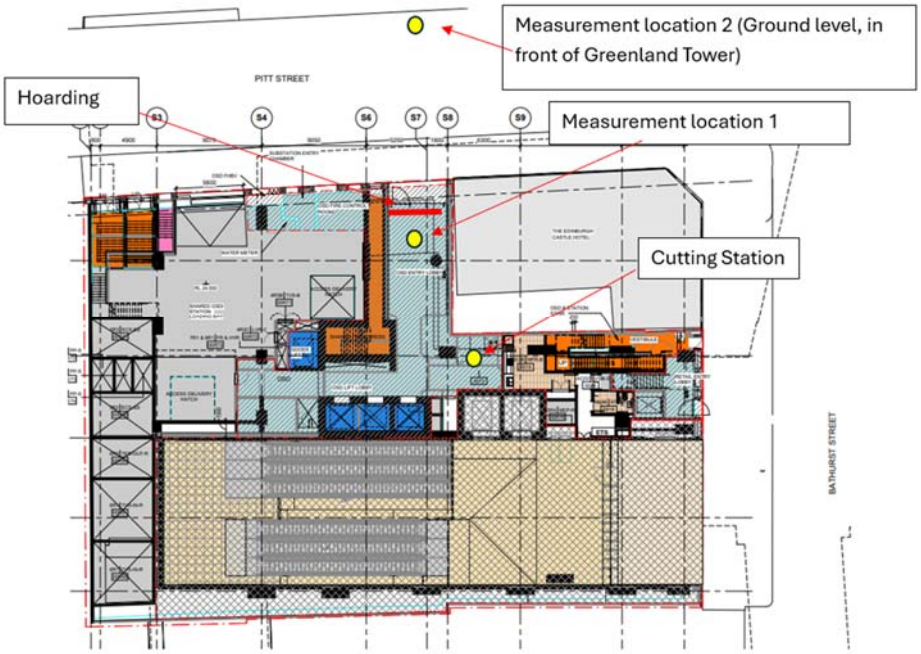
- The emitted noise would fall under a “Background+10-20dB” categorization, and as such, can be justified provided that there is Monitoring and Letter Box notification (pursuant to Sydney Metro Southwest Construction Noise and Vibration Strategy (see below). This mitigation measure had been adopted.

Time Period		Mitigation Measures Predicted LAeq(15minute) Noise Level Above Background (RBL)			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	-	-	M, LB,	M, LB
	Sat (8.00 am - 1.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW	Mon-Fri (6.00 pm - 10.00 pm)	-	LB	M, LB	M, IB, LB, PC, RO,SN
	Sat (1.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW	Mon-Fri (10.00 pm - 7.00 am)	-	M, LB,	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

2.3.4.4 Attended Monitoring Results – 26 June 2024 (South Site – Concrete Block Cutting Station Noise)

Attended noise measurements summary provided below for Out of Hours works at Pitt St North (cutting of concrete blocks works), were conducted by attended noise measurements at Pitt Street North on 26/06/2024.

- The cutting station was set up on the ground floor of the South building. The cutting station was in an alcove on the ground floor, as shown below.
- The cutting equipment consisted of a Diamond Cut Silent Blade Block Saw.
- Measurements were made between 7pm and 8pm.
- Measurements made using a Rion XL2 type 1 sound level meter.
- There was no rain or significant wind during the measurement.
- Cutting station and noise measurement positions are shown below.



- At measurement location 2, noise from the use of the saw was not audible in a 63dB(A)L90 noise environment. This indicates that the noise from the cutting would be less than 53dB(A) at the position of measurement 2.
- The noise level at position 2 is shielded by a hoarding that is presently on site.
- The apartments at Greenland Tower (Level 10) are sufficiently high to overlook the hoarding. These apartments would be approximately 40m from the cutting station (taking into account the horizontal and vertical distance).
- In order to determine the noise level at the nearest residences, a measurement at Location 1 was made.
- Measurement 1 was located 10m from the cutting station. The measured noise level at location 1 was 69dB(A)L_{eq}/71dBL_{Max}.
- The noise level that would be anticipated at the nearest apartments overlooking the hoarding would be 57dB(A)L_{eq}/59dB(A)L_{Max}.
- At 57dB(A), this is:
    - 1dB(A) below the 10pm-7am Rating Background Level (being 58dB(A)L90 based on CNVIS) and

- 4dB(A) below the 6pm-10pm Rating background Level (being 61dB(A)L90 based on CNVIS)

We note that a power saw is an equipment item listed as potentially irritating (attracting a 5dB(A) penalty) in the EPA Interim Construction Noise Guideline. In our view a penalty should not actually be applied – the saw noise itself does not have tonal characteristics. Further, the saw noise level will be below ambient levels at the nearest residences.

However, even if a 5dB(A) penalty is applied given the potential irritating nature of the equipment, the noise level would still comply with a "Background+5dB(A)" goal at the nearest residence.

Further, with the L_{Max} noise level being 59dB(A) at the nearest residence:

- This is less than the 65dB(A) threshold identified in the EIS Chapter 10 for potential sleep disturbance.
- Is less than the "Background+15dB(A) threshold typically adopted in assessment of sleep disturbance.

In light of the above, use of this equipment item can be justified at any time of day provided the work is conducted at the location indicated above.

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, DPHI (formerly DPE) and EPA and all records stored. The 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. Attended measurements have helped to determine the outside/inside noise reduction at various receivers (CNVIS Rev 18.3), which are:

- **R1** – Princeton Level 1 (20dB outside/inside noise reduction)
- **R2** – Greenland Tower, Level 10 (25dB outside/inside noise reduction)
- **R3** – Euro Tower Level 5 (25dB outside/inside noise reduction)
- **R4** – Kimpton Margot Level 1 (30dB outside/inside noise reduction)
- **R5** – Porterhouse Hotel Level 1 (35dB outside/inside noise reduction)
- **R4N** – Castlereagh Boutique Hotel (35dB outside/inside noise reduction)
- **R5N** – Park Regis (20dB outside/inside noise reduction)

Due to progress of works towards completion and limited high impact activities occurring within standard hours on site it was agreed with the ER and AA that no further monitoring of CoA E38 was required in 2024 therefore real-time monitoring data has not been provided within this report. It is noted however that the monitors were maintained on site to support monitoring during Out of Hours (OOH) works.

Due to the progression of construction the PSN noise monitor was decommissioned on 9 April 2024 and the PSS noise monitor will be decommissioned from 1 July 2024.

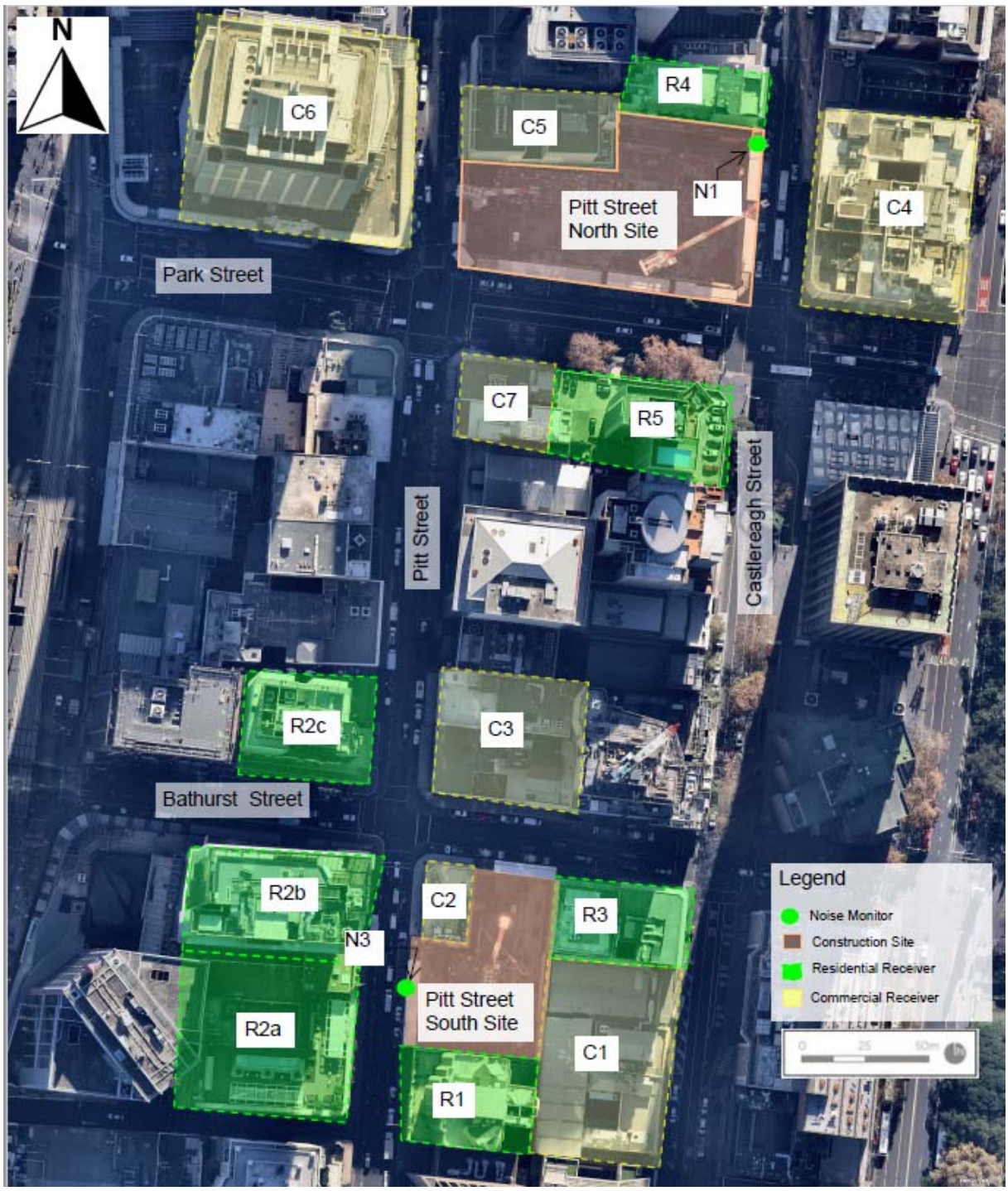


Figure 2-2 Pitt Street Station Real-Time Monitor Locations

The equipment used for noise measurements was an NTi Audio Type XL2 precision sound level analyzer 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 2-7 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 2-7** can be seen in **Appendix C.**

Table 2-7 Monitoring Equipment Details

Monitoring Type / Location	Equipment Details	Serial Number	Last Calibration Date	Off Hire Date
Attended Noise	NTi Audio Type XL2	A2A-05213-E0	22/02/2024	N/A
Noise calibrator	B&K 4231	3021352	17/01/2024	N/A
Real-Time Noise – N1	NTi Audio Type XL2	A2A-05312-E0	01/02/2023	On site
Real-Time Noise – N3	NTi Audio Type XL2	A2A-08038-E0	01/03/2023	On site

Refer to Appendix C for Calibration Certificates

3. Conclusion

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.

4. Appendices

Appendix A – Weather Data

Sydney, New South Wales
January 2024 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	18.6	24.8	7.4	2.2	0.7	ENE	41	14:45	20.7	98	6	W	7	1023.5	23.5	78	8	ENE	17	1021.0
2	Tu	20.7	27.6	0	5.2	10.8	NE	48	14:11	24.7	82	6	NE	20	1020.1	25.6	80	6	NE	26	1017.8
3	We	20.6	27.5	0	11.8	8.5	ENE	46	11:25	24.6	80	2	NE	17	1017.5	26.1	70	6	ENE	31	1014.9
4	Th	20.9	26.9	0	7.6	4.9	S	48	12:09	25.0	87	7	WNW	9	1015.5	22.9	91	8	SSW	17	1017.0
5	Fr	20.1	26.0	1.8	5.0	9.3	SSE	41	13:50	23.3	67	7	SSE	22	1022.0	24.6	59	6	SSE	26	1021.9
6	Sa	17.9	27.8	0	7.6	8.6	ENE	41	19:28	22.2	68	5	ESE	2	1022.7	26.0	56	5	E	17	1020.5
7	Su	19.5	27.8		8.0	11.4	NE	50	13:31	23.6	71	7	ENE	19	1019.4	26.6	68	7	NE	31	1015.6
8	Mo	21.4	27.3	0	11.8	0.8	NNE	39	23:02	25.3	75	7	ESE	7	1011.8	23.6	93	7	NNE	15	1010.0
9	Tu	21.2	28.0	2.8	3.2	9.9	S	44	09:10	23.7	80	2	S	28	1013.2	25.7	72	7	SSE	22	1012.6
10	We	21.4	29.3	0	7.0	6.8	E	35	12:42	24.1	82	8	E	9	1015.1	28.7	69	1	ENE	26	1013.2
11	Th	23.0	30.8	0	7.6	6.6	SSE	31	15:09	26.0	92	5	ESE	11	1018.8	29.1	76	7	SE	17	1019.8
12	Fr	22.6	30.1	0.4	7.2	10.9	E	37	17:04	25.0	92	7	NE	6	1021.4	29.2	70	3	E	28	1019.4
13	Sa	20.7	29.9	0	7.8	11.2	SSW	41	22:54	23.9	91	3	W	4	1016.5	28.9	69	2	E	26	1013.1
14	Su	20.3	26.7	5.0	10.8	4.2	SE	54	17:57	23.3	86	7	SSW	20	1017.9	25.8	82	7	SE	22	1017.5
15	Mo	19.3	23.7	62.2	6.6	1.2	SE	56	06:53	20.4	97	8	SE	33	1021.7	23.4	72	7	ESE	30	1021.9
16	Tu	19.0	26.0	4.4	5.8	0.7	E	41	02:39	21.5	94	7	W	11	1018.7	23.9	83	7	E	17	1015.1
17	We	21.0	28.6	0.8	2.4		NNE	44	21:44	24.2	84	6	NE	9	1010.0	26.2	83	7	NE	20	1005.5
18	Th	21.2	29.7	39.6			S	31	10:19	24.1	98	3	WNW	6	1002.9	28.7	75	1	ESE	20	1001.9
19	Fr	18.5	29.1	0		12.1	WSW	39	05:45	21.9	54	1	WSW	20	1007.3	28.5	44	1	ESE	20	1007.7
20	Sa	21.7	26.5	0	23.6	7.8	ENE	44	15:10	24.0	73	6	ENE	19	1012.4	25.3	69	7	ENE	22	1009.7
21	Su	20.6	33.9	0	8.0	12.5	S	78	22:23	23.4	88	1	WNW	9	1006.7	33.4	57	1	ENE	15	1002.0
22	Mo	21.2	24.9	0	12.0	2.8	S	56	23:01	21.9	72	8	S	20	1012.0	24.0	66	7	SSE	30	1013.1
23	Tu	19.0	27.0	2.0	7.4	4.3	E	37	18:17	19.8	100	7	ESE	6	1016.5	24.6	64	7	E	20	1014.7
24	We	18.4	29.8	0.2	4.6	7.3	E	35	11:27	22.6	81	1	N	17	1013.4	29.3	63	7	NE	13	1010.3
25	Th	22.6	32.1	0	7.2	1.5	S	33	12:32	26.6	81	7	W	22	1008.8	27.5	68	7	SSE	13	1008.9
26	Fr	24.0	38.5	0		4.7	S	65	13:16	30.5	54	4	WNW	15	1000.9	27.8	72	7	S	35	1001.5
27	Sa	20.5	24.6	0			E	31	15:54	21.1	88	8	NE	2	1008.1	21.5	89	8	E	11	1006.3
28	Su	19.0	27.8	0.2		7.8	SE	41	14:01	22.4	86	5	SSW	19	1011.0	25.4	70	3	SE	22	1011.6
29	Mo	21.1	29.4	0	21.2	12.4	NE	48	12:56	23.1	89	1	N	17	1013.0	28.5	73	1	NE	31	1009.2
30	Tu	23.1	27.0	0.6	10.0	3.1	S	44	11:57	24.1	96	7	S	9	1014.0	24.7	82	7	S	24	1013.3
31	We	21.9	28.0	2.4	4.0	4.4	SSE	41	14:28	23.6	90	7	SSW	19	1013.6	26.6	82	7	S	24	1012.6
Statistics for January 2024																					
	Mean	20.7	28.3		8.3	6.7				23.6	83	5		14	1014.4	26.3	72	5		22	1012.9
	Lowest	17.9	23.7		2.2	0.7				19.8	54	1	#	2	1000.9	21.5	44	1	E	11	1001.5
	Highest	24.0	38.5	62.2	23.6	12.5	S	78		30.5	100	8	SE	33	1023.5	33.4	93	8	S	35	1021.9
	Total			129.8	215.6	187.2															

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.

IDCJDW2124.202401 Prepared at 13:00 UTC on 6 Jul 2024

Sydney, New South Wales
February 2024 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	Th	20.4	29.0	0.4	6.8	8.2	ENE	33	15:46	21.8	87	8	SSW	9	1014.1	27.9	73	2	E	22	1008.8
2	Fr	21.7	31.2	0	6.6	9.8	S	39	10:51	24.6	91	2	S	11	1007.6	29.0	64	1	ESE	22	1006.6
3	Sa	21.9	28.4	0		6.6	NE	43	18:21	23.6	71	7	ENE	13	1014.0	27.7	61	1	NE	26	1011.5
4	Su	21.2	31.0	0		7.8	NNE	48	18:47	23.7	84	7	NNW	6	1010.8	29.5	66	7	ENE	20	1006.4
5	Mo	23.7	34.3	0		2.4	SSE	31	11:14	28.0	81	7	ESE	6	1008.3	29.6	75	7	SSE	15	1007.9
6	Tu	21.2	24.1	22.2	29.6	0.3	S	63	13:01	22.0	100	8	WSW	20	1009.9	21.7	85	8	S	35	1012.4
7	We	18.4	24.6	0	7.2	3.3	SSW	52	09:11	19.7	74	6	SSW	26	1020.9	22.7	73	7	SSW	28	1021.3
8	Th	19.6	25.1	0.2	6.8	5.7	SSE	43	10:50	22.3	60	5	SE	19	1025.2	23.0	62	7	S	17	1024.3
9	Fr	16.6	24.3	0	7.4	0.1	SSW	48	15:31	20.5	71	6	WNW	20	1022.3	23.7	63	7	SSW	24	1020.3
10	Sa	19.7	26.1	8.2	8.0	8.6	SSE	52	09:03	20.0	96	7	SSW	17	1024.3	24.5	61	4	SE	24	1024.7
11	Su	18.4	27.1	1.2	9.0	6.2	ENE	30	17:48	20.3	84	3	WNW	11	1024.2	26.5	61	7	E	17	1022.0
12	Mo	20.1		0		11.4	ENE	41	17:15	23.3	79	2	NNE	9	1021.5	28.4	56	1	ENE	24	1017.6
13	Tu	21.4	30.6	0	13.4	9.5	NNE	50	15:10	23.6	82	1	ENE	7	1016.8	30.2	53	2	NE	28	1011.9
14	We	21.9	31.1	0.2	9.0	4.6	SSE	57	14:49	26.2	65	6	NNW	9	1010.9	27.8	66	5	SSE	35	1013.4
15	Th	19.0	21.8	3.6	6.4	0.0	SSE	24	11:35	19.1	90	8	S	9	1021.6	21.4	80	8	S	11	1021.7
16	Fr	18.9	28.3	61.4	2.6	3.7	SSW	35	01:32	21.2	97	8	WNW	9	1022.2	27.1	73	6	E	19	1020.0
17	Sa	21.2	30.6	0	2.8	10.1	E	26	13:52	23.6	87	6	SE	4	1021.0	26.1	72	7	E	22	1018.7
18	Su	21.2	30.7	0	8.0	6.8	ESE	22	11:04	23.9	89	7	NW	6	1019.8	26.2	78	7	ENE	17	1016.6
19	Mo	22.4		0	4.2	0.5	SSE	63	11:25	22.9	87	7	SSW	19	1018.3			8	NNE	7	1019.9
20	Tu		23.1		9.0	3.2	NNW	44	10:33	21.9	87	7	SSW	9	1018.8	20.2	93	8	SSW	11	1018.1
21	We	18.8	27.7	22.6	5.6	9.1	E	43	23:11	21.5	95	7	W	9	1017.4	25.9	72	7	SSE	17	1015.5
22	Th	20.2	29.6	0	4.4	11.7	NE	30	18:36	21.7	94	4	WNW	11	1015.3	28.7	66	1	E	19	1010.2
23	Fr	21.6	36.8	0	7.0	6.9	S	59	15:48	23.4	91	3	WNW	13	1007.9	34.9	44	6	NW	13	1004.4
24	Sa	19.6	21.6	3.0	8.6	0.3	SSE	50	00:03	19.6	87	8	SSE	26	1016.0	21.0	71	8	SSE	20	1017.9
25	Su	15.9	28.3	0.6	4.0	11.7	E	31	15:58	17.9	85	1	W	17	1019.2	26.2	59	1	E	24	1014.3
26	Mo	17.9	27.9	0	6.6	7.2	SSE	50	15:38	21.1	90	5	WNW	13	1013.8	24.5	76	7	S	19	1015.1
27	Tu	20.4	24.6	1.0	6.6	0.0	SSE	28	23:02	20.5	91	8	SSW	6	1019.4	23.9	75	8	ENE	11	1018.3
28	We	20.4	29.4	1.6	0.8	5.9	NE	48	14:11	24.3	81	6	NE	20	1019.7	28.2	69	6	NE	28	1016.5
29	Th	22.6	32.8	0	6.8	9.1	SSW	46	20:33	24.7	86	2	ESE	7	1013.2	30.1	67	6	E	19	1010.7
Statistics for February 2024																					
	Mean	20.2	28.2		7.5	5.9				22.3	84	5		12	1017.0	26.3	68	5		20	1015.4
	Lowest	15.9	21.6		0.8	0.0				17.9	60	1	SE	4	1007.6	20.2	44	1	NNE	7	1004.4
	Highest	23.7	36.8	61.4	29.6	11.7	#	63		28.0	100	8	#	26	1025.2	34.9	93	8	#	35	1024.7
	Total			126.2	187.2	170.7															

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.

IDCJDW2124.202402 Prepared at 13:00 UTC on 5 Jul 2024

Sydney, New South Wales
March 2024 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	21.9	27.9	0.2	8.0	0.8	S	41	23:54	23.6	85	8	S	6	1016.2	25.6	76	7	E	17	1013.0
2	Sa	23.5	25.7	0	4.0	0.0	SSW	46	11:04	25.7	79	7	SSE	24	1012.1	22.3	91	8	SSW	11	1013.9
3	Su	18.8	31.0	1.8	3.4	10.7	SSE	39	22:45	20.5	90	5	W	11	1014.6	28.8	60	1	ENE	22	1010.1
4	Mo	20.3	23.3	0	8.0	1.5	SSE	50	08:15	21.2	61	7	SSE	30	1021.7	22.0	59	7	SSE	20	1022.7
5	Tu	16.3	26.6	0	8.0	10.7	ENE	35	14:24	17.9	80	1	WNW	13	1024.2	25.9	51	1	E	22	1020.8
6	We	17.9	28.3	0	6.8	8.7	ENE	33	14:33	20.0	82	1	WNW	9	1021.1	27.4	63	7	ENE	20	1017.5
7	Th	20.0	28.1	0	6.0	9.6	SSW	43	13:35	23.3	87	1	SSW	17	1021.2	26.3	71	6	SSW	26	1021.7
8	Fr	21.0	29.3	0	4.4	10.6	ENE	35	15:32	22.5	88	1	WNW	7	1025.2	29.1	57	1	NE	19	1023.6
9	Sa	19.7	30.5	0	7.2	10.7	E	31	12:45	21.3	88	1	W	11	1026.5	29.7	53	1	ENE	20	1024.8
10	Su	19.9	29.6	0	8.6	10.6	NNE	37	10:01	21.1	91	1	WNW	11	1028.0	29.1	54	1	NE	22	1026.1
11	Mo	19.9	29.4	0	9.6	8.8	NNE	35	23:51	21.3	91	2	W	9	1027.1	26.9	55	7	ENE	20	1023.9
12	Tu	19.0	30.1	0	9.0	10.8				20.3	85	1	WNW	9	1019.6	29.9	56	1	E	15	1014.8
13	We	20.3	30.1	0	7.0	7.4	NE	26	11:22	23.5	80	7	NNE	4	1017.8	26.3	59	7	E	20	1015.0
14	Th	20.2	32.0	0	6.2	6.6	SSE	54	17:04	21.4	81	1	ESE	4	1010.7	27.1	62	7	S	20	1009.1
15	Fr	17.6	25.4	5.2	6.6	8.8	SE	46	14:05	20.9	65	7	SE	22	1019.8	25.0	56	6	SE	31	1020.6
16	Sa	16.7	26.8	1.2	5.6	7.1	SSE	35	23:34	18.0	87	7	WNW	15	1022.6	25.6	59	6	ESE	15	1019.9
17	Su	17.5	22.8	36.4	7.0	0.4	NNE	31	00:07	17.7	96	8	NW	9	1017.6	21.3	78	8	ESE	15	1015.3
18	Mo	17.7	26.4	0.8	1.2	2.4	ENE	39	18:00	19.6	86	7	W	13	1015.8	26.0	65	6	ESE	11	1014.4
19	Tu	19.6	27.1	3.4	3.8	8.6	NNE	37	19:26	21.1	95	7	W	4	1017.4	26.1	68	3	ENE	20	1014.9
20	We	21.0	25.0	0	8.0	0.6	SSE	65	22:16	22.7	86	7	W	19	1014.5	23.8	84	7	S	28	1016.6
21	Th	13.6	22.4	1.8	3.8	5.6	S	59	23:21	14.9	67	1	W	19	1029.2	20.6	54	8	SSE	22	1027.6
22	Fr	14.9	24.5	0	6.8	4.9	E	28	13:51	17.5	76	7	W	17	1026.2	22.4	63	7	ENE	15	1023.5
23	Sa	16.3	27.4	0.2	4.0	5.8	ESE	22	13:39	17.6	89	7	W	11	1023.9	25.4	58	7	ESE	17	1021.6
24	Su	17.6	27.3	0	4.0	7.4	E	26	12:09	19.9	86	7	WNW	6	1020.9	25.5	64	2	E	17	1018.2
25	Mo	17.1	30.0	0	1.4	10.7	E	26	14:29	18.3	88	1	WNW	13	1019.4	29.6	47	1	NE	9	1016.3
26	Tu	18.3	28.4	0	5.4	9.3	SSE	26	17:39	19.5	81	7	W	17	1020.5	27.1	60	1	ESE	15	1018.0
27	We	19.0	26.4	0	6.8	9.3	SE	33	12:47	22.1	76	5	SSE	17	1024.0	25.3	58	1	SE	15	1023.1
28	Th	20.0	25.7	0.4	4.6	5.1	SE	31	06:06	21.8	83	7	SSE	15	1024.9	25.6	67	5	SE	19	1024.4
29	Fr	17.8	26.7	1.0	4.6	9.2	E	22	15:15	19.3	93	3	WNW	11	1027.8	25.7	54	3	E	17	1026.0
30	Sa	16.3	26.9	0	6.4	10.7	E	28	14:27	17.5	89	1	WNW	19	1026.5	25.9	67	1	E	22	1023.0
31	Su	17.1	27.5	0	4.8	8.4	ENE	22	13:54	18.0	96	3	WNW	11	1024.2	24.2	66	7	E	17	1020.4
Statistics for March 2024																					
Mean		18.6	27.4		5.8	7.2				20.3	84	4		13	1021.3	25.9	62	4		18	1019.4
Lowest		13.6	22.4		1.2	0.0				14.9	61	1	#	4	1010.7	20.6	47	1	NE	9	1009.1
Highest		23.5	32.0	36.4	9.6	10.8	SSE	65		25.7	96	8	SSE	30	1029.2	29.9	91	8	SE	31	1027.6
Total				52.4	181.0	221.8															

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.

IDCJDW2124.202403 Prepared at 13:00 UTC on 4 Jul 2024

Sydney, New South Wales
April 2024 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	18.0	28.6	0	4.4	10.5	NE	41	16:19	19.1	90	1	WNW	2	1020.7	27.7	53	1	NE	20	1016.8
2	Tu	19.1	25.3	0	5.4	3.7	NW	33	18:17	21.5	71	7	NE	4	1012.1	21.5	89	7	N	7	1009.3
3	We	16.4	25.3	2.8	4.0	8.9	W	37	04:10	17.4	65	2	W	19	1018.3	22.5	68	5	SE	20	1018.8
4	Th	17.4	21.3	0	6.2	0.0	SSE	46	22:53	20.7	70	7	SSE	22	1023.8	18.1	91	8	ESE	13	1023.5
5	Fr	17.8	20.5	111.0	4.4	0.0	ESE	70	22:32	19.1	97	8	SE	6	1024.8	17.5	97	8	S	17	1021.3
6	Sa	17.4	28.5			9.5	E	87	01:08	19.5	98	6	NNW	9	1014.8	28.2	44	1	NW	15	1011.7
7	Su	17.7	27.9	0	6.6	7.8	NE	24	13:05	20.8	71	3	W	11	1012.1	25.3	55	4	ENE	11	1007.7
8	Mo	16.4	25.5	0	4.6	8.4	SSE	30	10:01	20.7	73	7	SSW	15	1011.3	23.4	63	7	ESE	15	1009.4
9	Tu	16.5	22.5	0	4.0	5.2	SW	57	13:14	19.5	70	7	WNW	11	1009.9	16.0	80	7	SSW	33	1009.7
10	We	11.9	21.4	18.2	4.4	5.4	SW	63	01:06	14.8	61	7	WSW	15	1015.9	20.7	51	3	S	26	1015.0
11	Th	12.1	22.4	0	4.0	9.1	SSE	35	14:40	17.0	62	2	WNW	22	1020.3	21.5	49	3	S	20	1019.6
12	Fr	13.0	24.7	0	4.2		WNW	24	00:06	18.2	74	1	WNW	17	1022.5	23.6	51	1	E	13	1018.6
13	Sa	14.4	25.0	0	5.8	10.1	ESE	24	12:24	18.6	79	1	WNW	11	1021.9	24.1	62	1	ESE	11	1020.0
14	Su	15.8	25.7	0	2.2	10.5	E	20	13:26	20.3	82	1	WNW	11	1023.5	24.1	66	1	E	13	1020.3
15	Mo	16.4	26.2	0	3.6	9.4	W	26	04:26	20.1	78	1	WNW	15	1023.6	24.4	52	6	ESE	13	1020.9
16	Tu	14.8	25.0	0	4.8	8.3	ESE	24	14:57	18.7	78	7	WNW	15	1024.5	23.5	64	1	ESE	19	1021.4
17	We	16.3	23.3	0	4.0	8.4	S	33	10:19	20.7	81	3	S	22	1024.7	21.3	74	7	SSE	20	1021.4
18	Th	16.7	24.8	1.4	4.6	7.4	SSE	35	14:28	17.6	95	7	W	13	1018.5	20.2	86	7	SSE	15	1014.0
19	Fr	12.2	22.5	7.4	1.2	5.6	S	44	16:01	16.5	68	2	W	17	1016.9	19.3	63	7	S	19	1017.7
20	Sa	15.5	18.9	2.2	4.2	2.4	SSW	59	12:46	17.4	86	6	SSW	26	1024.1	18.0	85	7	SSW	26	1024.6
21	Su	14.5	21.6	12.8	3.6	8.6	SSW	37	11:14	16.6	77	3	W	17	1028.8	20.1	64	6	SSW	17	1027.0
22	Mo	13.2	24.3	0	3.2	9.9	W	22	02:34	17.0	82	1	WNW	17	1029.2	23.6	58	3	E	11	1026.4
23	Tu	14.0	25.7	0	3.4		NE	33	15:23	17.8	84	1	WNW	17	1025.7	24.4	56	0	ENE	22	1020.0
24	We	17.8	26.3	0	5.8	4.6	SSE	57	16:54	20.9	54	7	NNW	20	1016.5	25.6	40	2	SSW	11	1015.3
25	Th	12.5	22.4	0	4.4	10.3	ESE	31	13:50	17.2	66	1	WNW	17	1020.7	21.4	46	1	SSE	13	1019.0
26	Fr	11.5	21.2	0	4.6	10.4	SW	39	10:23	16.0	64	1	W	19	1024.0	20.8	51	1	SSE	22	1022.9
27	Sa	12.0	23.4	0	3.2	6.2	W	28	00:07	16.5	73	6	W	20	1027.9	22.7	58	2	ESE	11	1025.7
28	Su	13.5	24.9	0	2.6	9.2	NE	31	14:18	17.3	87	1	WNW	13	1027.6	24.0	59	2	NE	19	1023.3
29	Mo	14.4	27.7	0	4.6	9.1	W	28	21:27	17.3	83	6	WNW	13	1024.5	25.2	59	7	E	11	1020.8
30	Tu	17.2	19.8	0	4.0	0.9	SSE	52	22:56	19.0	81	7	SSW	15	1025.4	17.1	86	8	SSW	24	1025.3
Statistics for April 2024																					
Mean		15.2	24.1		4.2	7.1				18.5	76	4		15	1021.2	22.2	64	4		16	1018.9
Lowest		11.5	18.9		1.2	0.0				14.8	54	1	WNW	2	1009.9	16.0	40	0	N	7	1007.7
Highest		19.1	28.6	111.0	6.6	10.5	E	87		21.5	98	8	SSW	26	1029.2	28.2	97	8	SSW	33	1027.0
Total				155.8	122.0	199.8															

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.

IDCJDW2124.202404 Prepared at 13:00 UTC on 3 Jul 2024

Sydney, New South Wales
May 2024 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	12.9	18.9	22.8		5.1	SSW	46	14:48	13.8	90	8	W	20	1030.4	17.9	79	6	SSW	24	1028.6
2	Th	12.9	19.8	23.2		3.0	W	30	03:25	15.0	93	7	W	17	1031.6	19.2	67	7	S	15	1029.3
3	Fr	13.6	16.8	6.8		0.0	SSW	28	13:00	14.8	96	7	W	17	1029.9	16.1	93	8	SSW	9	1027.2
4	Sa	13.7	19.5	18.6	1.0	1.1	SSE	30	14:33	14.7	98	7	W	15	1025.4	17.2	87	7	SSW	13	1022.4
5	Su	14.7	19.2	21.4	3.2	0.1	SE	44	22:50	15.3	96	8	WSW	7	1022.4	16.3	91	8	SSW	11	1020.9
6	Mo	15.2	22.3	31.2	0.0	7.6	ESE	57	02:54	19.1	64	4	SE	26	1026.7	21.4	51	6	SE	26	1028.0
7	Tu	13.8	23.3	3.0	4.8	2.6	ESE	39	00:29	15.5	95	7	W	17	1030.8	17.6	82	7	S	6	1029.1
8	We	13.6	21.3	8.8		4.8	E	37	15:31	17.4	91	7	WNW	7	1031.3	19.2	75	7	ESE	20	1028.8
9	Th	14.6	20.1	8.4		1.6	ESE	24	17:56	17.1	92	7	W	15	1031.9	19.4	76	7	SE	7	1029.9
10	Fr	14.9	19.8	5.2		1.7	SE	31	23:40	16.0	97	8	WNW	13	1030.7	19.2	85	7	S	9	1027.6
11	Sa	15.6	17.1	21.6		0.0	ESE	33	00:28	15.8	96	8	NNW	4	1026.9	16.1	92	8	NNE	6	1024.0
12	Su	14.3	22.5	31.2	3.2	2.4	W	39	19:31	15.2	98	8	WNW	15	1021.1	19.4	72	7	SSW	13	1017.7
13	Mo	14.5	21.3	10.6	0.8	5.7	SSW	56	12:24	16.4	93	7	W	22	1019.3	20.3	70	5	SSW	22	1019.4
14	Tu	12.8	23.1	0.2	1.4	9.6	W	28	08:33	16.5	78	1	WNW	22	1025.2	22.3	52	1	ESE	13	1024.2
15	We	13.0		0	2.4	8.7	WNW	20	03:14	16.6	84	6	WNW	17	1029.4	20.0	67	1	E	11	1025.8
16	Th	12.4	22.6		3.0	4.9	W	22	05:45	15.1	84	7	WNW	17	1029.7	22.0	61	6	E	6	1026.8
17	Fr	13.1	23.7		3.0	9.1	W	22	05:45	16.1	92	1	WNW	17	1025.3	23.2	51	1	NNW	4	1020.2
18	Sa	12.7	15.9	0.6	2.8	4.4	SSW	69	13:56	13.7	62	6	SW	24	1022.9	13.8	72	5	SW	31	1022.3
19	Su	8.7	20.0	4.4	3.8	9.0	W	41	00:29	11.8	59	2	W	28	1022.5	19.3	35	1	WSW	17	1019.5
20	Mo	8.7	18.5	0	3.4	5.2	SSW	43	11:04	13.9	56	5	WNW	26	1022.7	16.9	64	7	SSW	26	1022.1
21	Tu	11.5	18.7	0.8	1.6	7.3	SSW	48	00:41	15.0	73	7	W	17	1027.2	18.0	63	4	S	26	1025.5
22	We	9.2	20.7	0.2	2.2	9.1	W	30	01:18	13.6	71	1	WNW	22	1027.2	18.9	44	1	SSE	11	1024.0
23	Th	8.9	21.3	0	3.6	9.4	W	35	08:19	13.2	70	1	W	22	1027.4	20.8	43	4	NW	4	1025.2
24	Fr	9.5	21.9	0	2.2	8.6	W	28	07:30	13.7	76	3	W	19	1027.6	20.7	54	7	SE	11	1025.4
25	Sa	10.9	19.0	0	3.2	2.9	WNW	26	08:20	13.2	84	7	W	17	1028.6	17.6	70	7	WNW	7	1025.6
26	Su	11.1	22.1	0	0.2	9.4	W	24	07:08	13.7	86	1	W	15	1025.9	20.5	59	1	ESE	13	1022.7
27	Mo	10.2	21.3	0	3.0	9.5	W	30	08:57	13.8	76	1	W	24	1025.4	19.6	51	1	S	13	1024.1
28	Tu	9.7	22.4	0	2.4	9.1	WNW	26	04:41	12.7	82	0	W	20	1028.8	20.7	58	0	E	13	1026.0
29	We	9.4	21.3	0	1.4	9.3	WNW	22	07:44	13.1	87	0	WNW	15	1029.5	20.2	68	0	ENE	15	1025.4
30	Th	10.8	24.2	0	2.6	8.3	NNW	31	12:35	14.2	90	1	WNW	13	1026.7	23.0	48	7	NNE	11	1021.9
31	Fr	14.2	20.8	0	4.4	0.0	NNW	43	14:24	19.7	60	7	N	19	1017.6	20.4	65	7	N	26	1014.5
Statistics for May 2024																					
	Mean	12.3	20.6		2.5	5.5				15.0	82	4		17	1026.7	19.3	65	4		14	1024.3
	Lowest	8.7	15.9		0.0	0.0				11.8	56	0	NNW	4	1017.6	13.8	35	0	#	4	1014.5
	Highest	15.6	24.2	31.2	4.8	9.6	SSW	69		19.7	98	8	W	28	1031.9	23.2	93	8	SW	31	1029.9
	Total			219.0	59.6	169.5															

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.

IDCJDW2124.202405 Prepared at 16:00 UTC on 2 Jul 2024

Sydney, New South Wales
June 2024 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	Sa	13.8	15.8	0.4	3.2	0.0	S	65	13:04	14.4	73	8	W	19	1019.3	14.5	96	8	S	7	1018.7
2	Su	11.4	16.6	142.6		3.7	SW	48	05:55	13.7	63	6	W	24	1016.8	15.7	64	7	W	15	1014.4
3	Mo	9.8	19.0	0	4.0	7.8	W	41	22:09	13.7	64	1	WNW	20	1012.2	17.9	38	6	W	20	1010.0
4	Tu	8.9	18.2	0	3.0	4.7	W	37	09:53	11.9	65	4	W	19	1015.7	16.5	56	7	NW	9	1014.9
5	We	11.0	18.5	0	1.8	0.0	W	31	03:43	12.1	73	7	W	15	1019.1	16.2	78	7	SW	13	1017.5
6	Th	11.6	16.3	7.0	0.6	0.0	W	43	21:42	13.3	95	7	WNW	11	1018.5	14.0	92	8	W	11	1016.7
7	Fr	12.9	19.3	62.0		3.8				13.3	97	7	WNW	19	1013.7	17.3	79		WNW	13	1011.1
8	Sa	11.6	19.1	11.8	0.2	1.3	W	35	10:36	13.2	89	7	W	20	1012.3	18.8	60	6	W	17	1009.7
9	Su	10.8	21.2	0	1.4	8.1	SW	35	19:44	12.4	88	6	W	13	1017.1	20.5	48	1	NW	9	1015.7
10	Mo	9.0	18.3	0	2.6	8.9	WSW	44	10:19	12.8	68	2	W	15	1021.6	16.6	53	2	S	19	1020.7
11	Tu	8.1	16.6	0	3.8	2.5	NW	50	20:41	10.1	82	7	W	15	1020.2	16.0	55	7	WNW	4	1014.0
12	We	10.1	19.1	0	2.8	6.6	W	76	11:30	15.2	58	2	W	9	1009.3	13.6	61	7	SSW	31	1011.3
13	Th	8.2	16.8	0	3.6	3.1	W	41	06:27	11.6	57	7	W	28	1020.2	15.2	57	7	SSW	19	1019.7
14	Fr	9.9	14.4	0	2.6	0.0	W	33	02:59	11.4	74	7	WNW	19	1019.8	12.9	96	8	SSW	7	1018.0
15	Sa	10.9	13.9	70.2		0.0	S	46	15:38	11.7	93	8	WSW	15	1017.6	12.8	87	7	SSW	22	1015.6
16	Su	7.7	17.1	6.4	1.2	8.9	W	39	08:07	10.8	64	1	W	22	1016.0	16.3	39	1	WSW	19	1012.9
17	Mo	8.9	16.3	0.2	2.4	1.6	SW	52	11:41	12.3	60	6	W	28	1013.8	15.4	63	5	SW	24	1013.6
18	Tu	8.4	18.4	0	2.8	8.2	W	37	08:20	11.5	62	1	W	28	1016.6	15.7	54	4	S	11	1014.4
19	We	6.5	17.7	0	3.4	9.4	W	37	09:17	10.4	62	1	W	24	1017.2	17.4	42	1	WNW	13	1014.5
20	Th	5.7	17.8	0	2.8	9.1	W	30	08:02	8.1	76	6	W	17	1018.4	17.1	40	3	E	7	1015.7
21	Fr	7.9	19.5	0	1.0	6.6	W	33	13:47	11.1	74	5	W	22	1018.4	16.0	57	5	S	11	1017.5
22	Sa	9.0	12.1	25.0		0.0	WSW	41	16:00	9.6	97	8	W	20	1025.4	11.2	96	8	W	6	1024.0
23	Su	9.5	16.1	35.2	2.0	3.4	SW	35	11:05	11.7	94	5	W	19	1024.7	14.4	85	7	W	13	1021.7
24	Mo	7.1	18.7	0.2	1.0	7.9	WNW	30	05:01	9.5	89	6	W	19	1020.7	17.6	60	7	ENE	11	1018.0
25	Tu	7.4	20.5	0	0.6	9.2	WNW	26	08:50	10.1	86	1	WNW	22	1022.8	20.0	43	1	NW	13	1019.3
26	We	8.8	22.0	0.2	2.2	8.9	NNW	30	12:56	11.6	88	1	W	11	1020.5	21.6	52	4	N	15	1016.6
27	Th	8.9	20.4	0	3.0	9.3	W	33	12:45	13.0	63	1	WNW	9	1022.9	19.8	37	1	W	17	1020.3
28	Fr	7.8	19.7	0	4.0	9.0	W	30	08:33	11.5	71	1	WNW	24	1026.7	19.5	39	1	NW	7	1023.2
29	Sa	7.3	20.4	0	2.6	3.6	WNW	24	09:49	8.8	79	6	W	15	1021.6	18.5	55	6	ENE	11	1016.5
30	Su	8.8	14.5	7.2	2.4	0.0	SSW	44	12:48	13.3	94	7	W	11	1013.7	13.7	78	6	S	22	1014.4
Statistics for June 2024																					
Mean		9.3	17.8		2.3	4.9				11.8	76	4		18	1018.4	16.4	62	5		13	1016.4
Lowest		5.7	12.1		0.2	0.0				8.1	57	1	#	9	1009.3	11.2	37	1	WNW	4	1009.7
Highest		13.8	22.0	142.6	4.0	9.4	W	76		15.2	97	8	W	28	1026.7	21.6	96	8	SSW	31	1024.0
Total				368.4	61.0	145.6															

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.

IDCJDW2124.202406 Prepared at 13:00 UTC on 7 Jul 2024

Appendix B – Photos of Real-Time Equipment

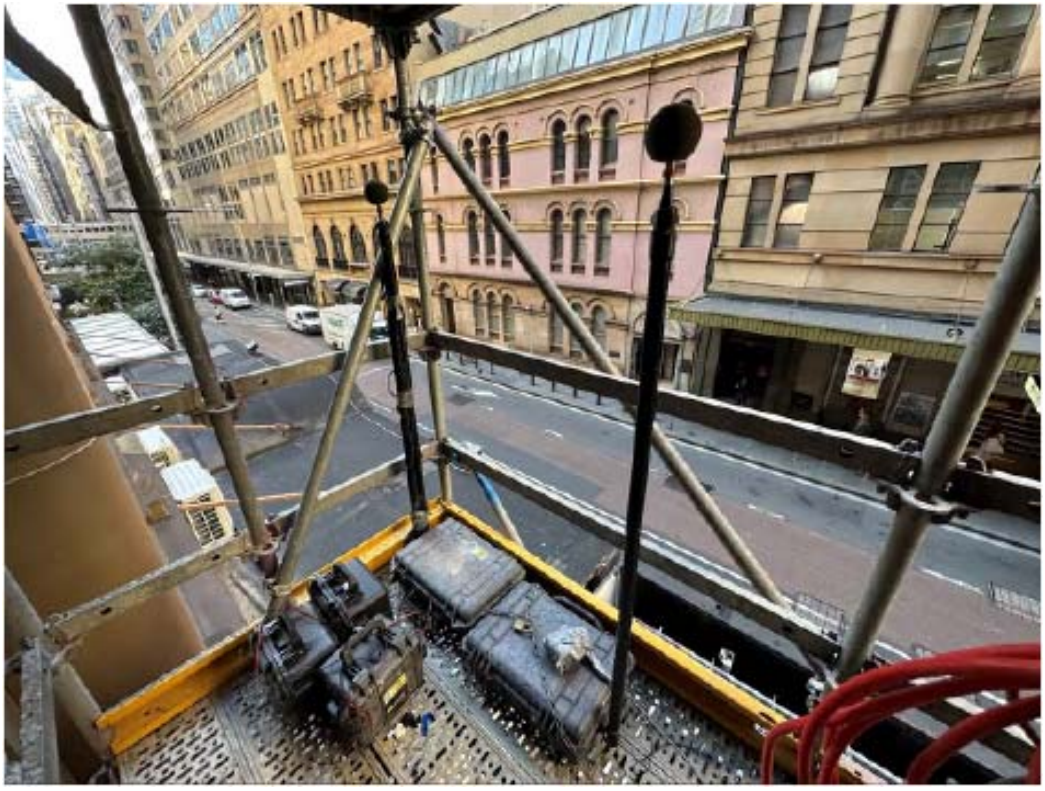


Figure B-1 N1 Pitt Street North (adjacent Castlereagh Street)

Figure B-2 N3 Pitt Street South (facing Pitt Street)

Appendix C – 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	22/02/2024	Job No	RD071	Operator	KW
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-05213-E0 #RTA06-003
Microphone Make	GRAS	Model	40AE	Serial No	#261084
Preamplifier Make	NTi	Model	MA220	Serial No	#2617
Ext'n Cable Make	RTA	Model	N/A	Serial No	N/A
Accessories	Nil			Firmware	V4.84

SLM Class	1
Filters Class	1

Environmental Conditions	Measured	
	Start	End
Air Temp. (°C)	24.2	24.9
Rel. Humidity (%)	62.3	60.1
Air Pressure (kPa)	100.9	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 33511B SN MY59001831
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 through an unbroken chain of calibrations, is ultimately traceable to the International System of Units (SI).

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 2.04.

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:

[redacted]

Print Name: Ariel Michael Date: 04/03/2024

Template Document Name: RQT-05 SLM IEC61672 Verification (r93)

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	22/02/2024	**Job No**	RD071	**Operator**	KW
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-05213-E0 #RTA06-003
Microphone Make	GRAS	**Model**	40AE	**Serial No**	#261084
Preamplifier Make	NTi	**Model**	MA220	**Serial No**	#2617
Ext'n Cable Make	RTA	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	V4.84

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

SLM Class	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)	24.2	24.9
Rel. Humidity (%)	62.3	60.1
Air Pressure (kPa)	100.9	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**	16.6	0.09
5(b). Self-Generated Noise, Electrical		**A**	7.2	0.09
		C	11.5	0.09
		Z	19.1	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	0.00
		C	Yes	0.00
		Z	Yes	0.00
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.14
		Z	Yes	0.14
		FLAT	N/A	0.14
	8(b). Time Weighting	**Slow**	Yes	0.14
		Leq	Yes	0.14
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.21
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.21
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.15
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.15
11. Toneburst Response		**Fast**	Yes	0.20
		Slow	Yes	0.20
		SEL/Leq	Yes	0.20
12. Peak C sound level		**8 kHz**	Yes	0.26
		500 Hz	Yes	0.26
13. Overload indication		**Conforming**	Yes	0.20
		Latches	Yes	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.16
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.16
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.18
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.21
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.13
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.21
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.19
18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.15
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.19
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.19
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.15
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.19
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	0.16
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.16
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.16

21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)	**Conforming**	Yes	0.16
22. Third Octave Band Filter Relative Attenuation at Midband Frequency	**Conforming**	Yes	0.18
23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.21
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	0.21
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.19
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.15
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.19
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.19
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.15
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.19
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**	

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

☑ Checked

Template Document Name: RQT-05 SLM IEC61672 Verification (r93)

1(a). Instrument Information

Calibration Date	22/02/2024	Job No	RD071	Operator	KW

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	Serial	#A2A-05213-E0 #RTA06-003		
Microphone Make	GRAS	Model	40AE	Serial	#261084	pF	15
Preampifier Make	NTi	Model	MA220	Serial	#2617		
Ext'n Cable Make	RTA	Model		Serial			
Accessories	Nil			Firmware	V4.84		

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

Notes
Some low frequency values removed from midband attenuation tests
16 and 22 due to an unremovable filter in the preamp.
Octave filter relative attenuation test 15a and stability test 14 carried out
at lower levels; linearity range adjusted as per XL2 manual instructions
for a higher than normal microphone sensitivity

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)	31.0	126.0
4kHz Leq (A weighting)	31.0	127.0
8kHz Leq (A weighting)	31.0	125.0

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	4.02.01
Publication Date	April 2018
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

☑ Checked

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	0.20								0.20	0.41
2k	0.45								0.45	0.41
4k	1.05								1.05	0.41
8k	3.20								3.20	0.58
12.5k	5.60								5.60	0.64
16k	7.10								7.10	0.64

Source of Mic FF to Pressure Correction	Interpolated from GRAS calibration curve
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 %.

☑ Checked

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 %.

☑ Checked

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

2. Preliminary Inspection and Power Supply

Instrument Inspected	Yes
Laboratory Calibration Equipment Ok	Yes
Laboratory Equipment Check	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)	24.2	24.9	1.2	1.9	0.4	1.60	2.30	3	Yes	20	26
Rel. Humidity (%)	62.3	60.1	14.8	12.6	6.8	21.60	19.40	22.5	Yes	25	70
Air Pressure (kPa)	100.9	101.5	8.4	9.0	0.13	8.50	9.08	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)	53.8

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)	114.2
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.

☑ Checked

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

Observed Values		
Leq	N/A	
16.6	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	Avg	

Results				
Freq Wt	Observed	Quoted	Tolerance	Conforming
A	16.6	17.0	+5,-inf	Yes

Uncertainty (+/-) dB	0.09

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
7.2	11.5	19.1	1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			Avg			

Results		
Freq Wt	Observed	Quoted
A	7.2	12.4
C	11.5	13.5
Z	19.1	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.
For information purposes, this laboratory compares the quoted noise floor to the measured value. This comparison is not used to check conformance to a specific requirement.

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	110.9	110.87	0.11	110.98	0.00	0.00	0.00	0.00	110.98	-3.19	-3.00	-0.19	± 1.5	± 3.0	Yes	0.43	0.14	0.41
63	113.2	113.2	113.3	113.23	0.01	113.24	0.00	0.00	0.00	0.00	113.24	-0.93	-0.80	-0.13	± 1.0	± 2.0	Yes	0.42	0.12	0.41
125	114.0	114.0	114.0	114.00	-0.01	113.99	0.00	0.00	0.00	0.00	113.99	-0.18	-0.20	0.02	± 1.0	± 1.5	Yes	0.42	0.12	0.41
250	114.1	114.1	114.2	114.13	-0.01	114.12	0.00	0.00	0.00	0.00	114.12	-0.05	0.00	-0.05	± 1.0	± 1.5	Yes	0.42	0.12	0.41
500	114.1	114.1	114.2	114.13	-0.01	114.12	0.00	0.00	0.00	0.00	114.12	-0.05	0.00	-0.05	± 1.0	± 1.5	Yes	0.42	0.12	0.41
1k	**114.0**	**114.0**	**114.0**	**114.00**	**-0.03**	**113.97**	**0.20**	**0.00**	**0.00**	**0.00**	**114.17**	**0.00**	**0.00**	0.00	± 0.7	± 1.0	Yes	0.42	0.11	0.41
2k	113.5	113.5	113.5	113.50	0.01	113.51	0.45	0.00	0.00	0.00	113.96	-0.21	-0.20	-0.01	± 1.0	± 2.0	Yes	0.43	0.13	0.41
4k	112.0	112.0	111.9	111.97	-0.38	111.59	1.05	0.00	0.00	0.00	112.64	-1.53	-0.80	-0.73	± 1.0	± 3.0	Yes	0.47	0.24	0.41
8k	107.9	107.9	107.8	107.87	-0.12	107.75	3.20	0.00	0.00	0.00	110.95	-3.22	-3.00	-0.22	+1.5; -2.5	± 5.0	Yes	0.60	0.15	0.58
12.5k	102.4	102.4	102.3	102.37	0.05	102.42	5.60	0.00	0.00	0.00	108.02	-6.15	-6.20	0.05	+2.0; -5.0	+5,-inf	Yes	0.68	0.21	0.64
16k	98.9	98.9	98.9	98.90	0.28	99.18	7.10	0.00	0.00	0.00	106.28	-7.89	-8.50	0.61	+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)	81
Integration Time (s)	N/A
Generator Output (mVrms)	128.10

Freq Hz	Output (mV)	Indication A	Output (mV)	Indication C	Output (mV)	Indication Z	Tolerance		Uncertainty		
63	2615.47	80.9	140.46	80.9	128.10	80.9					
125	817.62	80.9	131.08	81.0	128.10	81.0					
250	344.79	80.9	128.10	81.0	128.10	81.0					
500	185.16	81.0	128.10	81.0	128.10	81.0					
1k	128.10	**81.0**	128.10	**81.0**	128.10	**81.0**					
2k	111.57	81.0	131.08	81.0	128.10	81.0					
4k	114.17	81.0	140.46	81.0	128.10	81.0					
8k	145.39	81.0	180.95	81.0	128.10	81.0					
16k	273.87	80.8	340.84	80.8	128.10	81.0					
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		80.90		80.90		80.90					
		80.90		81.00		81.00					
		80.90		81.00		81.00					
		81.00		81.00		81.00					
		81.00		**81.00**		**81.00**					
		81.00		81.00		81.00					
		81.00		81.00		81.00					
		81.00		81.00		81.00					
		80.80		80.80		81.00	Type 1	Type 2	Total (+/-) dB	Lab (+/-) dB	Corrections (+/-) dB
Response re 1kHz (Deviation from Expected)		-0.10		-0.10		-0.10	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		-0.10		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		-0.10		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		**0.00**		**0.00**	± 0.7	± 1.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 3.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	+1.5; -2.5	± 5.0	**0.61**	**0.18**	**0.58**
		-0.20		-0.20		0.00	+2.5; -16.0	+5,-inf	**0.67**	**0.18**	**0.64**
Conforming		**Yes**		**Yes**		**Yes**					

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
Generator Frequency (Hz)	1k
SPL Reference (dB)	114.0
Output (mVrms)	574.0

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	0.14

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	0.14

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)	36.0
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	4117.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	± 0.8	± 1.1
26.0	104.0	104.0	0.0	± 0.8	± 1.1
21.0	109.0	109.0	0.0	± 0.8	± 1.1
16.0	114.0	114.0	0.0	± 0.8	± 1.1
11.0	119.0	119.0	0.0	± 0.8	± 1.1
10.0	120.0	120.0	0.0	± 0.8	± 1.1
9.0	121.0	121.0	0.0	± 0.8	± 1.1
8.0	122.0	122.0	0.0	± 0.8	± 1.1
7.0	123.0	123.0	0.0	± 0.8	± 1.1
6.0	124.0	Y		± 0.8	± 1.1
5.0	125.0			± 0.8	± 1.1
4.0	126.0			± 0.8	± 1.1
3.0	127.0			± 0.8	± 1.1
2.0	128.0			± 0.8	± 1.1
1.0	129.0			± 0.8	± 1.1
0.0	130.0			± 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	0.21

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
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94
Output (mVrms)	65.3
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	± 0.8	± 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
55.0	39.0	39.0	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
60.0	34.0	34.1	0.1	± 0.8	± 1.1
61.0	33.0	33.1	0.1	± 0.8	± 1.1
62.0	32.0	32.1	0.1	± 0.8	± 1.1
63.0	31.0	31.1	0.1	± 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	0.19

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)	573.8

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	0.14

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)	64.3

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	45.0	0.0	± 0.8	± 1.1
LOW	70.0	25.0	25.1	0.1	± 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	0.15

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)	124.0
Output (mVrms)	1618.0

Toneburst (ms)	# Cycles	L_{AFMax} (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	123.0	123.0	0.0	± 0.5	± 1.0
2	8	106.0	106.0	0.0	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	97.0	96.9	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	124.0
Output (mVrms)	1618.0

Toneburst (ms)	# Cycles	L_{ASMax} (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	116.6	116.6	0.0	± 0.5	± 1.0
2	8	97.0	97	0.0	+ 1.0; -3.0	+ 1.0; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	124.0
Output (mVrms)	1618.0
Integration Time (if SEL not available) (s)	

Toneburst (ms)	# Cycles	SEL				Tolerance	
		Indicated	Calc'd	Expected	Difference	Type 1	Type 2
200	800	117.0	117.0	117.0	0.0	± 0.5	± 1.0
2	8	97.0	97.0	97.0	0.0	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	87.9	87.9	88.0	-0.1	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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 acceptance limits given in IEC 61672-1.

☑ 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)	646.0

Test Signal	dB LCpeak Hold				Tolerance	
8 kHz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
1 Cycle	115.2	No	115.4	-0.2	± 2.0	± 3.0

Conforming	Yes

Uncertainty (+/-) dB	0.26

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)	453.4
Output High Level (mV)	641.2
Output Low Level (mV)	-641.2

Test Signal	dB LCpeak Hold				Tolerance	
500 Hz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
One +ve 1/2 cycle	113.9	No	114.4	-0.5	± 1.0	± 2.0
One -ve 1/2 cycle	113.9	No	114.4	-0.5	± 1.0	± 2.0

Conforming	Yes

Uncertainty (+/-) dB	0.26

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)	910.5

	Half-Cycle Signal			Tolerance	
	Positive	Negative	Difference	Type 1	Type 2
Level (dB)	123.1	123.1	0.0	± 1.5	± 1.5
Generator Output (mVrms)	1504.0	1504.0			

Conforming	Yes

Uncertainty (+/-) dB	0.20

Overload Indicated	Yes
Overload Indicator Latches	Yes

Conforming	Yes

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)	124.0
Output (mVrms)	1812.0

Time Period to Apply Signal (min)	5.0
Record SPL at Conclusion of Time Period (dB)	124.0
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	-3
Attenuator dB	0.0
Reference SPL 1kHz	131.0
Output mVrms	4084.0
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				37.5					36.4			
0.13				47.4					50.4			
0.25				73.2					75.8			
0.50				104.4					106.6			
0.71												
0.77				130.4					130.5			
0.84				130.9					131.0			
0.92				130.9					131.0			
1.00				**130.8**					**131.0**			
1.09				130.9					131.0			
1.19				130.9					131.0			
1.30				130.6					130.8			
1.41												
2.00				105.3					93.8			
4.00				73.2					31.7			
8.00				46.8					35.7			
16.00				25.1					31.4		Class 1	Class 2
Attenuation dB				93.3					94.6		+70/inf	+60/inf
				83.4					80.6		+60/inf	+54/inf
				57.6					55.2		+40.5/inf	+39.5/inf
				26.4					24.4		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
				0.4					0.5		-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
				-0.1					0.0		-0.4/+0.5	-0.6/+0.7
				-0.1					0.0		-0.4/+0.7	-0.6/+0.9
				0.2					0.2		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
				25.5					37.2		+16.6/inf	+15.6/inf
				57.6					99.3		+40.5/inf	+39.5/inf
				84.0					95.3		+60/inf	+54/inf
				105.7					99.6		+70/inf	+60/inf
Ins Loss				**-0.2**					**0.0**			
Conforming	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A		

Uncert (+/-) dB	≤80dB	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	-3.0
Attenuator dB	0.0
Reference SPL 1kHz	131.0
Output mVrms	4084.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	8kHz	16kHz	32kHz								
0.06			42.5									
0.13			60.7									
0.25			85.6									
0.50			113.3									
0.71												
0.77			130.1									
0.84			130.8									
0.92			131.0									
1.00			**131.0**									
1.09			131.0									
1.19			131.0									
1.30			131.0									
1.41												
2.00			46.5									
4.00			42.5									
8.00			62.2									
16.00			41.9								Class 1	Class 2
Attenuation dB			88.5								+70/inf	+60/inf
			70.3								+60/inf	+54/inf
			45.4								+40.5/inf	+39.5/inf
			17.7								+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
			0.9								-0.4/+1.4	-0.6/+1.7
			0.2								-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
			84.5								+16.6/inf	+15.6/inf
			88.5								+40.5/inf	+39.5/inf
			68.8								+60/inf	+54/inf
			89.1								+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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
Reference SPL 1kHz	94.0
Output mVrms	57.4

	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				93.9	93.9	93.9	94.0	94.0	94.0	94.0		
Ins Loss				-0.1	-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**	**N/A**	**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	**0.18**

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)	36.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3680.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.21

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)	36.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3619.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±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)	36.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3602.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.21

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
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	58.3
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	±0.7	±0.9
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
55.0	39.0	39.0	0.0	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	35.1	0.1	±0.7	±0.9
60.0	34.0	34.1	0.1	±0.7	±0.9
61.0	33.0	33.1	0.1	±0.7	±0.9
62.0	32.0	32.2	0.2	±0.7	±0.9
63.0	31.0	31.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.19

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
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	57.4
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	±0.7	±0.9
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
55.0	39.0	39.0	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
60.0	34.0	34.0	0.0	±0.7	±0.9
61.0	33.0	33.0	0.0	±0.7	±0.9
62.0	32.0	32.0	0.0	±0.7	±0.9
63.0	31.0	31.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.15

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
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	57.1
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	±0.7	±0.9
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
55.0	39.0	39.0	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
60.0	34.0	34.1	0.1	±0.7	±0.9
61.0	33.0	33.1	0.1	±0.7	±0.9
62.0	32.0	32.1	0.1	±0.7	±0.9
63.0	31.0	31.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.19

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)	183.8

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	0.19

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)	180.7

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

Conforming	Yes

Uncertainty (+/-) dB	0.15

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)	179.7

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	0.19

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		17.7	10.1	8.1	5.8	4.9	3.6	4.1	4.6	7.1
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	9.6	12.0	15.5							
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		16.4	10.8	9.7	7.0	2.2	0.8	-0.5	-0.9	-0.8
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	0.1	1.8	3.9							
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	5134.0
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	Class 1	Class 2
0.18										46.0		
0.33										58.5		
0.53										71.9		
0.77										102.9		
0.89												
0.92										132.0		
0.95										132.8		
0.97										132.9		
1.00										**132.9**		
1.03										132.9		
1.06										132.9		
1.09										132.8		
1.12												
1.30										106.1		
1.89										72.1		
3.07										47.4		
5.43										26.4	+70/inf	+60/inf
Attenuation dB										86.9	+60/inf	+54/inf
										74.4	+40.5/inf	+39.5/inf
										61.0	+16.6/inf	+15.6/inf
										30.0	-0.4/+5.3	-0.6/+5.8
											-0.4/+1.4	-0.6/+1.7
										0.9	-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
										0.1	-0.4/+5.3	-0.6/+5.8
											+16.6/inf	+15.6/inf
										26.8	+40.5/inf	+39.5/inf
										60.8	+60/inf	+54/inf
										85.5	+70/inf	+60/inf
										106.5		

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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to

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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	5134.0
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									36.5			
0.33									49.6			
0.53									72.0			
0.77									104.1			
0.89												
0.92									132.5			
0.95									133.0			
0.97									133.0			
1.00									**133.0**			
1.03									133.0			
1.06									133.0			
1.09									132.8			
1.12												
1.30									104.7			
1.89									69.7			
3.07									39.5			
5.43									22.6		Class 1	Class 2
Attenuation dB									96.5		+70/inf	+60/inf
									83.4		+60/inf	+54/inf
									61.0		+40.5/inf	+39.5/inf
									28.9		+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
									0.2		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
									28.3		+16.6/inf	+15.6/inf
									63.3		+40.5/inf	+39.5/inf
									93.5		+60/inf	+54/inf
									110.4		+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	5134.0
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					40.1							
0.33					59.2							
0.53					81.5							
0.77					109.7							
0.89												
0.92					132.5							
0.95					133.0							
0.97					133.0							
1.00					**133.0**							
1.03					133.0							
1.06					133.0							
1.09					132.9							
1.12												
1.30					86.9							
1.89					42.5							
3.07					27.5							
5.43					28.5						Class 1	Class 2
Attenuation dB					92.9						+70/inf	+60/inf
					73.8						+60/inf	+54/inf
					51.5						+40.5/inf	+39.5/inf
					23.3						+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
					0.1						-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
					46.1						+16.6/inf	+15.6/inf
					90.5						+40.5/inf	+39.5/inf
					105.5						+60/inf	+54/inf
					104.5						+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	5134.0
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							41.4					
0.33							59.5					
0.53							81.8					
0.77							110.6					
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							132.5					
1.12												
1.30							85.2					
1.89							42.9					
3.07							37.9					
5.43							50.1				Class 1	Class 2
Attenuation dB							91.6				+70/inf	+60/inf
							73.5				+60/inf	+54/inf
							51.2				+40.5/inf	+39.5/inf
							22.4				+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
							0.5				-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
							47.8				+16.6/inf	+15.6/inf
							90.1				+40.5/inf	+39.5/inf
							95.1				+60/inf	+54/inf
							82.9				+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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
Reference SPL 1kHz	94.0
Output mVrms	57.4

	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	93.8	93.8		
Ins Loss							0.3	0.1	-0.2	-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	93.9	94.0	94.0	93.9	94.0	94.0	94.0	94.0		
Ins Loss	-0.1	-0.1	-0.1	0.0	0.0	-0.1	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	94.1				
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	**0.18**

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)	36.0
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3681.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.21

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)	36.0
Generator Frequency (Hz)	1k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3621.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±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)	36.0
Generator Frequency (Hz)	16k
SPL Reference Starting Point (dB)	94.0
Output (mVrms)	3601.0
Noise Floor (dB)	-99.0

Increasing level to Overload				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
31.0	99.0	99.0	0.0	±0.5	±0.6
26.0	104.0	104.0	0.0	±0.5	±0.6
21.0	109.0	109.0	0.0	±0.5	±0.6
16.0	114.0	114.0	0.0	±0.5	±0.6
11.0	119.0	119.0	0.0	±0.5	±0.6
10.0	120.0	120.0	0.0	±0.5	±0.6
9.0	121.0	121.0	0.0	±0.5	±0.6
8.0	122.0	122.0	0.0	±0.5	±0.6
7.0	123.0	123.0	0.0	±0.5	±0.6
6.0	124.0	124.0	0.0	±0.5	±0.6
5.0	125.0	Y		±0.5	±0.6
4.0	126.0			±0.5	±0.6
3.0	127.0			±0.5	±0.6
2.0	128.0			±0.5	±0.6
1.0	129.0			±0.5	±0.6
0.0	130.0			±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.21

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
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	58.4
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	±0.7	±0.9
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
55.0	39.0	38.9	-0.1	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	35.1	0.1	±0.7	±0.9
60.0	34.0	34.1	0.1	±0.7	±0.9
61.0	33.0	33.2	0.2	±0.7	±0.9
62.0	32.0	32.1	0.1	±0.7	±0.9
63.0	31.0	31.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.19

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
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	57.4
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	±0.7	±0.9
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
55.0	39.0	38.9	-0.1	±0.7	±0.9
58.0	36.0	36.0	0.0	±0.7	±0.9
59.0	35.0	34.9	-0.1	±0.7	±0.9
60.0	34.0	34.0	0.0	±0.7	±0.9
61.0	33.0	33.0	0.0	±0.7	±0.9
62.0	32.0	32.0	0.0	±0.7	±0.9
63.0	31.0	31.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.15

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
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	57.1
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	±0.7	±0.9
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
55.0	39.0	39.0	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
60.0	34.0	34.0	0.0	±0.7	±0.9
61.0	33.0	33.0	0.0	±0.7	±0.9
62.0	32.0	32.1	0.1	±0.7	±0.9
63.0	31.0	31.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.19

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)	183.8

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	0.19

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)	180.7

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	0.15

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)	179.7

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	0.19

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			10.6	16.3	12.3	9.6	9.0	11.1	7.3	7.2
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	6.1	3.2	1.4	0.9	1.1	0.6	0.2	-1.1	0.7	-2.0
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	-1.6	-1.2	-0.6	-0.3	0.0	0.9	1.5	2.4	3.2	4.3
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	4.8	6.0	6.8	7.6	8.6	9.8	11.0	12.1		
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			12.8	9.7	12.3	12.1	9.9	7.5	5.8	2.8
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	3.6	0.1	1.8	2.7	0.7	-1.2	-2.5	-4.0	-3.2	-4.4
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	-4.0	-4.4	-4.8	-5.1	-5.1	-5.2	-5.5	-5.0	-5.1	-4.7
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	-4.3	-4.3	-3.5	-2.6	-2.0	-1.5	-0.7	0.1		
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.

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

Certificate of Calibration
Sound Level Calibrator

Calibration Date 17/01/2024	**Job No** RD046	**Operator** KW
Client Name RENZO TONIN & ASSOCIATES (NSW) PTY LTD		
Client Address LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010		

Test Item

Calibrator Make B&K	**Model** 4231	**Serial No** #3021352 #2250-02
Accessories N/A		

Class (1 or 2)	1

Environmental Conditions	Measured	
	Start	End
Temperature (degC)	24.6	24.6
Rel. Humidity (%)	63	61.9
Air Pressure (kPa)	100.62	100.55

Applicable Standards:
IEC 60942:2017 "Electroacoustics - Sound calibrators"

Applicable Work Instruction:
RWi-08 SLM & Calibrator Verification

Laboratory Equipment :
GRAS Power Module type 12AK SN 1551616
GRAS 1/2" Pressure Microphone 40AD SN 252620 and preamplifier SN 292045
B&K4226 Multifunction Acoustic Calibrator SN 2288472
Agilent Digital Multimeter Model 34401A SN MY41004386
Vitrins Analyser Multi Instrument Pro V3.9 software
Behringer UCA222 USB Audio Interface U-Control

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 through an unbroken chain of calibrations, is ultimately traceable to the International System of Units (SI).

Scope:
This certificate is issued on the basis that the instrument complies with the manufacturer's specification.
See "Sound Level Calibrator 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 2.04.

Calibration Statement:
The sound calibrator has been shown to conform to the class 1 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. However, as public evidence was not available, from a testing organization responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2017, no general statement or conclusion can be made about conformance of the sound calibrator to the requirements of IEC 60942:2017.

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number 14966

Accredited for compliance with ISO/IEC 17025 - Calibration

Authorized Signatory:

[redacted]

Print Name: Ariel Michael Date: 17/01/2024

Template Document Name: RQT-03 (rev 76) Calibrator Verification

NATacoustic
Sound Level Calibrator Verification - Summary of Tests

Calibration Date	17/01/2024	**Job No**	RD046	**Operator**	KW
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				

1. Instrument Information & Reference Conditions

Calibrator Make	B&K	**Model**	4231	**Serial No**	#3021352 #2250-02
Accessories	N/A				

Class (1 or 2)	1

1(a). Instrument Information (Instrument Manual is Available)	Yes

1(b). Preliminary Inspection and Power Supply	**Instrument Inspected**	Yes
	Calibration Equipment Okay	Yes
	Power Supply Ok (Start)	Yes
	Power Supply Ok (End)	Yes

1(c). Environmental Conditions	**Environmental Conditions**	**Measured**	
		Start	**End**
	Temperature (degC)	24.6	24.6
	Rel. Humidity (%)	63	61.9
	Air Pressure (kPa)	100.62	100.55
	Conforming	Yes	Yes

Test Description

2(a). Absolute Sound Pressure Level	**Calibrator Setting**	**SPL**	**Uncert (+/-) dB**	**Pass**
	1	94.12	0.11	Yes
	2	114.17	0.11	Yes
	3	N/A	N/A	N/A
	4	N/A	N/A	N/A
	5	N/A	N/A	N/A

2(b). Sound Pressure Level Fluctuation	**Calibrator Setting**	**SPL**	**Uncert (+/-) dB**	**Pass**
	1	0.02	0.02	Yes
	2	0.02	0.02	Yes
	3	N/A	N/A	N/A
	4	N/A	N/A	N/A
	5	N/A	N/A	N/A

3(a). Frequency Deviation	**Calibrator Setting**	**Freq Hz**	**Uncert (+/-) %**	**Pass**
	1	1000.017	0.010	Yes
	2	1000.016	0.010	Yes
	3			N/A
	4			N/A
	5			N/A

3(b). Total Distortion	**Calibrator Setting**	**Distortion %**	**Uncert (+/-) %**	**Pass**
	1	0.18	0.21	Yes
	2	0.10	0.21	Yes
	3		0.21	N/A
	4		0.21	N/A
	5		0.21	N/A

Calibrator Overall Conforming	**Yes**

Accredited for compliance with AS ISO/IEC 17025 - General requirements for the competence of testing and calibration laboratories.

Periodic tests were performed in accordance with procedures from IEC 60942 Ed. 4.0 2017-11 Electroacuostics - Sound calibrators.

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Template Document Name: RQT-03 (rev 76) Calibrator Verification

1. Calibrator Information & Reference Conditions

Calibration Date	17/01/2024	**Job No**	RD046	**Operator**	KW
Client Name	RENZO TONIN & ASSOCIATES (NSW) PTY LTD				
Client Address	LEVEL 1 418A ELIZABETH ST SURRY HILLS 2010				
Calibrator Make	B&K	**Model**	4231	**Serial No**	#3021352 #2250-02
Accessories	N/A				

Microphone Type	GRAS 40AD Preamp SN: 292045 Capsule SN: 252620
Adaptor	Nil

1(a). Instrument Information

Class (1 or 2)	1

Calibrator Setting	Nominal Settings		4226 Settings	
No	**Freq Hz**	**SPL**	**SPL**	**Uncert.**
1	1k	94.0	94.04	0.06
2	1k	114.0	114.03	0.06
3				
4				
5				

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

Instruction Manual Title (Clause 6.3, IEC 60942:2017)	B&K Sound Level Calibrator Type 4231 Product Data
Version	1
Publication Date	2/8/2005
Source of Document (& Date of Download if Applicable)	Internet
Conforming	**Yes**

Pattern Evaluation Test Report (Annex A, IEC 60942:2017)	
Reference Number or Page Number	
Publication Date	
Source of Document (& Date of Download if Applicable)	
Conforming	**No**

1(b). Preliminary Inspection and Power Supply

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

1(c). Environmental Conditions

Environmental Conditions	Measured		Uncert.	Limits	
	Start	**End**		**Min**	**Max**
Air Temp. (°C)	24.6	24.6	0.4	20	26
Rel. Humidity (%)	63.0	61.9	6.8	25	90
Air Pressure (kPa)	100.6	100.6	0.13	80	105
Conforming	**Yes**	**Yes**			

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2. Sound Pressure Level

Calibrator Setting 1	
SLM & 4226 Settings	
Nominal SPL dB	94.0
Nominal Frequency Hz	1k
Reference B&K4226 SPL	94.04
B&K4226 Setting "Microphone"	b
B&K4226 Setting "Sound Field"	Pressure

SPL Deviation from Nominal							Tolerance	
Trial No	Ref mV rms	Test mV rms	dB	Mean	Corr Mean	Deviation	Class 1	Class 2
#1	417.34	420.49	0.07	0.08	0.12	0.12	0.25	0.40
#2	416.12	419.82	0.08					
#3	414.69	419.78	0.11					

Fluctuation in SPL	Tolerance	
Deviation	Class 1	Class 2
0.02	0.07	0.15

Pass SPL	Yes	Uncertainty dB	0.11
Pass Fluctuation in SPL	Yes	Uncertainty dB	0.02

Calibrator Setting 2	
SLM & 4226 Settings	
Nominal SPL dB	114.0
Nominal Frequency Hz	1k
Reference B&K4226 SPL	114.03
B&K4226 Setting "Microphone"	b
B&K4226 Setting "Sound Field"	Pressure

SPL Deviation from Nominal							Tolerance	
Trial No	Ref mV rms	Test mV rms	dB	Mean	Corr Mean	Deviation	Class 1	Class 2
#1	4136.19	4195.64	0.12	0.14	0.17	0.17	0.25	0.40
#2	4131.60	4199.63	0.14					
#3	4115.83	4194.17	0.16					

Fluctuation in SPL	Tolerance	
Deviation	Class 1	Class 2
0.02	0.07	0.15

Pass SPL	Yes	Uncertainty dB	0.11
Pass Fluctuation in SPL	Yes	Uncertainty dB	0.02

Calibrator Setting 3	
SLM & 4226 Settings	
Nominal SPL dB	
Nominal Frequency Hz	
Reference B&K4226 SPL	
B&K4226 Setting "Microphone"	b
B&K4226 Setting "Sound Field"	Pressure

SPL Deviation from Nominal							Tolerance	
Trial No	Ref mV rms	Test mV rms	dB	Mean	Corr Mean	Deviation	Class 1	Class 2
#1								
#2								
#3								

Fluctuation in SPL	Tolerance	
Deviation	Class 1	Class 2

Pass SPL	N/A	Uncertainty dB	N/A
Pass Fluctuation in SPL	N/A	Uncertainty dB	N/A

Calibrator Setting 4	
SLM & 4226 Settings	
Nominal SPL dB	
Nominal Frequency Hz	
Reference B&K4226 SPL	
B&K4226 Setting "Microphone"	b
B&K4226 Setting "Sound Field"	Pressure

SPL Deviation from Nominal							Tolerance	
	Ref	Test			Corr			

Trial No	mV rms	mV rms	dB	Mean	Mean	Deviation	Class 1	Class 2
#1								
#2								
#3								

Fluctuation in SPL		Tolerance	
	Deviation	Class 1	Class 2

Pass SPL	N/A	Uncertainty dB	N/A
Pass Fluctuation in SPL	N/A	Uncertainty dB	N/A

Calibrator Setting 5	
SLM & 4226 Settings	
Nominal SPL dB	
Nominal Frequency Hz	
Reference B&K4226 SPL	
B&K4226 Setting "Microphone"	b
B&K4226 Setting "Sound Field"	Pressure

SPL Deviation from Nominal							Tolerance	
Trial No	Ref mV rms	Test mV rms	dB	Mean	Corr Mean	Deviation	Class 1	Class 2
#1								
#2								
#3								

Fluctuation in SPL		Tolerance	
	Deviation	Class 1	Class 2

Pass SPL	N/A	Uncertainty dB	N/A
Pass Fluctuation in SPL	N/A	Uncertainty dB	N/A

Description of Test

2. Sound Pressure Level (Clause B.4.6.3 Measurements)

B.4.6.3.1 Using the method described in B.4.6.2.1 or B.4.6.2.2, the principal sound pressure level at the principal frequency shall be measured at least three times. The microphone shall be coupled to the sound calibrator before each measurement and uncoupled after each measurement. The microphone shall be rotated around its axis at each coupling so that the rotational orientation of the microphone is evenly distributed over the measurements. The absolute value of the difference between the mean measured sound pressure level and the specified sound pressure level shall not exceed the acceptance limits given in Table 2 for the class of sound calibrator. Actual uncertainties of measurement, calculated for a coverage probability of 95 %, shall not exceed those given in Table A.1 for the class of sound calibrator.

B.4.6.3.2 For multi-frequency sound calibrators, unless not required by the customer (under B.1.2) measurements of the principal sound pressure level, as described in B.4.6.3.1, shall be repeated for the maximum and minimum frequency settings of the sound calibrator for which the instruction manual states that the instrument conforms to the requirements of this document.

B.4.6.3.3 The measurement of sound pressure level shall be repeated (excluding replications) for all other combinations of sound pressure level and frequency settings for which the instruction manual states that the instrument conforms to the requirements of this document, or for those combinations required by the customer (as described in B.1.2). The absolute value of the difference between each measured sound pressure level and the corresponding specified sound pressure level shall not exceed the acceptance limits given in Table 2 for the class of sound calibrator. Actual uncertainties of measurement, calculated for a coverage probability of 95 %, shall not exceed those given in Table A.1 for the class of sound calibrator. It is recommended that testing is normally performed for one model of microphone only.

Interpretation: The "Mean" is the average value of the three trials (Trial 1,2,3). The "Corr Mean" is the deviation of the sound pressure level from the required value. The "Deviation" is the absolute value of the Corr Mean which is to be compared to the "Tolerance" value for the class of instrument.

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3(a). Frequency & 3(b). Distortion

3(a). Frequency							
Calibrator Setting	Nominal Hz	Observed Hz	Deviation %	Tolerance % Class 1	Tolerance % Class 2	Pass	Uncertainty %
1	1000	1000.017	0.00	0.7	1.7	Yes	0.010
2	1000	1000.016	0.00	0.7	1.7	Yes	0.010
3				0.7	1.7	N/A	
4				0.7	1.7	N/A	
5				0.7	1.7	N/A	

3(b). Distortion						
Calibrator Setting	Nominal Hz	Observed %THD		Tolerance % Class 1	Tolerance % Class 2	Pass
1	1000	0.18		2.5	3	Yes
2	1000	0.10		2.5	3	Yes
3						N/A
4						N/A
5						N/A

Uncertainty %THD	0.21

Description of Test

3. Frequency (Clause B4.7 Frequency)
The frequency of the sound generated by the sound calibrator coupled to the microphone used in B.4.6 shall be measured as an average over a period of between 20 s and 25 s of operation, at the principal sound pressure level, for each frequency setting of the sound calibrator for which the instruction manual states that the instrument conforms to the requirements of this document, or for the principal frequency and for any other combinations of sound pressure level setting and frequency setting specified by the customer. The absolute value of the difference in per cent between each measured frequency and the corresponding specified frequency shall not exceed the acceptance limits given in Table 4 for the class of sound calibrator. Actual uncertainties of measurement, calculated for a coverage probability of 95 %, shall not exceed those given in Table A.2 for the class of sound calibrator.

Interpretation: The "Deviation %" column represents the percentage difference of the observed frequency Hz from the nominal frequency Hz.

Total Distortion (Clause B4.8 Total distortion + noise)
The total distortion + noise of the sound pressure signal generated by the sound calibrator shall be measured over a bandwidth of 22,4 Hz (nominal frequency) to 22,4 kHz (nominal frequency), as an average over a period of between 20 s and 25 s of operation with the microphone used in B.4.6, at the maximum and minimum sound pressure level settings available at each frequency for which the instruction manual states that the instrument conforms to the requirements of this document, or for the principal sound pressure level and principal frequency and for any other combinations of sound pressure level setting and frequency setting specified by the customer. The total distortion + noise can be measured using a rejection filter device (distortion factor meter) or an appropriate FFT analyser, and the method of measurement shall be reported. The measured total distortion + noise shall not exceed the acceptance limits given in Table 7 for the class of sound calibrator. Actual uncertainties of measurement, calculated for a coverage probability of 95 %, shall not exceed those given in Table A.3 for the class of sound calibrator. An instrument that measures total harmonic distortion only is not suitable.

Interpretation: The "%THD" column is the observed Percent Total Harmonic Distortion.

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Certificate of Calibration
Sound Level Meter

Calibration Date	01/03/2023	Job No	RC045	Operator	EF
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
Microphone Make	NTI	Model	MC230A	Serial No	#A23491
Preamplifier Make	NTI	Model	MA220	Serial No	#3336
Ext'n Cable Make	NTI	Model	N/A	Serial No	N/A
Accessories	Nil			Firmware	V4.8

SLM Class	1
Filters Class	1

Environmental Conditions	Measured	
	Start	End
Air Temp. (°C)	24.3	23.9
Rel. Humidity (%)	63.1	61.5
Air Pressure (kPa)	100.1	100.6

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 33511B SN MY59001831
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 through an unbroken chain of calibrations, is ultimately traceable to the International System of Units (SI).

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 2.04.

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:

[redacted]

Print Name: Ariel Michael Date: 03/03/2023

Template Document Name: RQT-05 SLM IEC61672 Verification (r86)

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	01/03/2023	**Job No**	RC045	**Operator**	EF
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
Microphone Make	NTI	**Model**	MC230A	**Serial No**	#A23491
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#3336
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	V4.8

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

SLM Class	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)	24.3	23.9
	Rel. Humidity (%)	63.1	61.5
	Air Pressure (kPa)	100.1	100.6
	Conforming	Yes	Yes

Test Description			**Value / Conforming**	**Uncert (+/-)**
4(a). Initial Calibration		**Calibration Frequency Hz**	1000.0	N/A
		Indicated Level Before Adjustment (dB)	115.6	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	14.4	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	0.00
		C	Yes	0.00
		Z	Yes	0.00
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.14
		Z	Yes	0.14
		FLAT	N/A	0.14
	8(b). Time Weighting	**Slow**	Yes	0.14
		Leq	Yes	0.14
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.19
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.19
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.17
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.17
11. Toneburst Response		**Fast**	Yes	0.20
		Slow	Yes	0.20
		SEL/Leq	Yes	0.20
12. Peak C sound level		**8 kHz**	Yes	0.16
		500 Hz	Yes	0.16
13. Overload indication		**Conforming**	Yes	0.20
		Latches	Yes	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.16
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.16
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.18
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.19
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.15
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.19
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.20
18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.17
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.20
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.20
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.17
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.20
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	0.16
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.16
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.16
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.16
22. Third Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.18

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.19
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.15
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.19
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.20
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.17
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.20
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.20
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.17
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.20
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**	

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 SLM IEC61672 Verification (r86)

1(a). Instrument Information

Calibration Date	01/03/2023	Job No	RC045	Operator	EF

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		
Microphone Make	NTI	Model	MC230A	Serial	#A23491	pF	15
Preampifier Make	NTI	Model	MA220	Serial	#3336		
Ext'n Cable Make	NTI	Model		Serial			
Accessories	Nil			Firmware	V4.8		

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

Notes
Tests 16 & 22 low frequency results ignored due to unremovable
filter in preamp

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 (A weighting)	40.0	120.0
8kHz Leq (A weighting)	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)	Type Approval Certificate
Reference Number or Page Number	PTB-1.53-4058763
Publication Date	14/01/2013
Source of Document (& Date of Download if Applicable)	N/A

Conforming	Yes

☑ Checked

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
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 %.

☑ Checked

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

2. Preliminary Inspection and Power Supply

Instrument Inspected	Yes
Laboratory Calibration Equipment Ok	Yes
Laboratory Equipment Check	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)	24.3	23.9	1.3	0.9	0.4	1.70	1.30	3	Yes	20	26
Rel. Humidity (%)	63.1	61.5	15.6	14.0	6.8	22.40	20.80	22.5	Yes	25	70
Air Pressure (kPa)	100.1	100.6	7.6	8.1	0.13	7.73	8.23	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)	44.3

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)	115.6
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.

☑ Checked

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

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

Results				
Freq Wt	Observed	Quoted	Tolerance	Conforming
A	17.0	16.5	+5,-inf	Yes

Uncertainty (+/-) dB	0.09

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	14.4	20.2	1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			Avg			

Results		
Freq Wt	Observed	Quoted
A	10.7	12.4
C	14.4	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.
For information purposes, this laboratory compares the quoted noise floor to the measured value. This comparison is not used to check conformance to a specific requirement.

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	110.9	110.90	0.11	111.01	0.00	0.00	0.00	0.00	111.01	-2.96	-3.00	0.04	± 1.5	± 3.0	Yes	0.43	0.14	0.41
63	113.2	113.2	113.2	113.20	0.02	113.22	0.00	0.00	0.00	0.00	113.22	-0.75	-0.80	0.05	± 1.0	± 2.0	Yes	0.42	0.12	0.41
125	113.9	113.9	114.0	113.93	0.01	113.94	0.00	0.00	0.00	0.00	113.94	-0.03	-0.20	0.17	± 1.0	± 1.5	Yes	0.42	0.12	0.41
250	114.0	114.0	114.0	114.00	-0.01	113.99	0.00	0.00	0.00	0.00	113.99	0.02	0.00	0.02	± 1.0	± 1.5	Yes	0.42	0.12	0.41
500	114.1	114.0	114.1	114.07	-0.01	114.06	0.00	0.00	0.00	0.00	114.06	0.09	0.00	0.09	± 1.0	± 1.5	Yes	0.42	0.12	0.41
1k	**114.0**	**114.0**	**114.0**	**114.00**	**-0.03**	**113.97**	**0.00**	**0.00**	**0.00**	**0.00**	**113.97**	**0.00**	**0.00**	0.00	± 0.7	± 1.0	Yes	0.42	0.11	0.41
2k	113.8	113.7	113.7	113.73	0.02	113.75	0.30	0.00	0.00	0.00	114.05	0.08	-0.20	0.28	± 1.0	± 2.0	Yes	0.43	0.13	0.41
4k	113.0	112.9	113.1	113.00	-0.26	112.74	0.70	0.00	0.00	0.00	113.44	-0.53	-0.80	0.27	± 1.0	± 3.0	Yes	0.43	0.14	0.41
8k	108.5	108.3	108.5	108.43	-0.13	108.30	2.60	0.00	0.00	0.00	110.90	-3.07	-3.00	-0.07	+1.5; -2.5	± 5.0	Yes	0.60	0.15	0.58
12.5k	100.2	100.5	100.2	100.30	0.00	100.30	6.00	0.00	0.00	0.00	106.30	-7.67	-6.20	-1.47	+2.0; -5.0	+5,-inf	Yes	0.68	0.21	0.64
16k	96.7	96.9	96.8	96.80	0.20	97.00	7.30	0.00	0.00	0.00	104.30	-9.67	-8.50	-1.17	+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)	53.00

Freq Hz	Output (mV)	Indication A	Output (mV)	Indication C	Output (mV)	Indication Z	Tolerance		Uncertainty		
63	1082.12	74.9	58.11	74.9	53.00	75.0					
125	338.28	74.9	54.23	75.0	53.00	75.0					
250	142.65	74.9	53.00	75.0	53.00	75.0					
500	76.61	75.0	53.00	75.0	53.00	75.0					
1k	53.00	**75.0**	53.00	**75.0**	53.00	**75.0**					
2k	46.16	75.0	54.23	75.0	53.00	75.0					
4k	47.24	75.0	58.11	75.0	53.00	75.0					
8k	60.16	75.0	74.86	75.0	53.00	75.0					
16k	113.31	74.8	141.02	74.8	53.00	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		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					
		75.00		75.00		75.00					
		74.80		74.80		75.00	Type 1	Type 2	Total (+/-) dB	Lab (+/-) dB	Corrections (+/-) dB
Response re 1kHz (Deviation from Expected)		-0.10		-0.10		0.00	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		-0.10		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		-0.10		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		**0.00**		**0.00**	± 0.7	± 1.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 3.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	+1.5; -2.5	± 5.0	**0.61**	**0.18**	**0.58**
		-0.20		-0.20		0.00	+2.5; -16.0	+5,-inf	**0.67**	**0.18**	**0.64**
Conforming		**Yes**		**Yes**		**Yes**					

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
Generator Frequency (Hz)	1k
SPL Reference (dB)	114.0
Output (mVrms)	473.0

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	0.14

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	0.14

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)	1903.0
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	0.19

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
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94
Output (mVrms)	54.0
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	54.1	0.1	± 0.8	± 1.1
45.0	49.0	49.0	0.0	± 0.8	± 1.1
49.0	45.0	45.1	0.1	± 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	0.20

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)	474.0

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	0.14

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)	53.0

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	45.0	0.0	± 0.8	± 1.1
LOW	70.0	25.0	25.2	0.2	± 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	0.17

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)	593.0

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	89.8	-0.2	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	593.0

Toneburst (ms)	# Cycles	LASMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	109.6	109.5	-0.1	± 0.5	± 1.0
2	8	90.0	89.9	-0.1	+ 1.0; -3.0	+ 1.0; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	593.0
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	89.9	89.9	90.0	-0.1	+ 1.0; -1.5	+ 1.0; -2.5
0.25	1	80.8	80.8	81.0	-0.2	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	532.0

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	0.16

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)	374.0
Output High Level (mV)	528.9
Output Low Level (mV)	-528.9

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	0.16

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)	804.9

	Half-Cycle Signal			Tolerance	
	Positive	Negative	Difference	Type 1	Type 2
Level (dB)	136.1	136.3	-0.2	± 1.5	± 1.5
Generator Output (mVrms)	5619.9	5739.7			

Conforming	Yes

Uncertainty (+/-) dB	0.20

Overload Indicated	Yes
Overload Indicator Latches	Yes

Conforming	Yes

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)	839.0

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	4195.0
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				41.0					37.9			
0.13				51.8					52.5			
0.25				75.1					77.8			
0.50				106.3					108.6			
0.71												
0.77				132.3					132.5			
0.84				132.8					132.9			
0.92				132.8					133.0			
1.00				**132.8**					**133.0**			
1.09				132.8					133.0			
1.19				132.7					133.0			
1.30				132.6					132.7			
1.41												
2.00				107.2					95.8			
4.00				75.1					32.8			
8.00				48.8					33.3			
16.00				38.1					32.8		Class 1	Class 2
Attenuation dB				91.8					95.1		+70/inf	+60/inf
				81.0					80.5		+60/inf	+54/inf
				57.7					55.2		+40.5/inf	+39.5/inf
				26.5					24.4		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
				0.5					0.5		-0.4/+1.4	-0.6/+1.7
				0.0					0.1		-0.4/+0.7	-0.6/+0.9
				0.0					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
				0.1					0.0		-0.4/+0.7	-0.6/+0.9
				0.2					0.3		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
				25.6					37.2		+16.6/inf	+15.6/inf
				57.7					100.2		+40.5/inf	+39.5/inf
				84.0					99.7		+60/inf	+54/inf
				94.7					100.2		+70/inf	+60/inf
Ins Loss				-0.2					0.0			
Conforming	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A		

Uncert (+/-) dB	≤80dB	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	4195.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	8kHz	16kHz	32kHz								
0.06			44.3									
0.13			62.7									
0.25			87.6									
0.50			115.2									
0.71												
0.77			132.1									
0.84			132.8									
0.92			132.9									
1.00			**133.0**									
1.09			133.0									
1.19			133.0									
1.30			133.0									
1.41												
2.00			46.5									
4.00			43.4									
8.00			45.6									
16.00			43.8								Class 1	Class 2
Attenuation dB			88.7								+70/inf	+60/inf
			70.3								+60/inf	+54/inf
			45.4								+40.5/inf	+39.5/inf
			17.8								+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
			0.9								-0.4/+1.4	-0.6/+1.7
			0.2								-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
			86.5								+16.6/inf	+15.6/inf
			89.6								+40.5/inf	+39.5/inf
			87.4								+60/inf	+54/inf
			89.2								+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	10
Reference SPL 1kHz	94.0
Output mVrms	150.0

	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	93.9	94.0	94.0	94.0	94.0	94.0	94.0		
Ins Loss			0.3	-0.1	0.0	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	**0.18**

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)	1710.0
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	0.19

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)	1670.0
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	0.15

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)	1670.0
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	0.19

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)	10
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	152.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.1	0.1	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.2	0.2	±0.7	±0.9
63.0	41.0	41.2	0.2	±0.7	±0.9
64.0	40.0	40.2	0.2	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	10
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	150.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.1	0.1	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.2	0.2	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.17

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)	10
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	149.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.1	0.1	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.2	0.2	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	152.0

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
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	150.0

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	0.17

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)	149.0

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	0.20

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		16.2	13.4	12.4	9.1	7.6	5.8	6.0	7.6	9.0
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	11.3	14.0	17.2							
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		11.8	13.0	8.6	8.2	5.9	4.0	4.3	3.5	2.4
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	2.8	4.1	5.9							
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	4229.0
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										51.5		
0.33										59.0		
0.53										73.1		
0.77										102.9		
0.89												
0.92										132.0		
0.95										132.8		
0.97										132.9		
1.00										**132.8**		
1.03										132.9		
1.06										132.9		
1.09										132.8		
1.12												
1.30										106.1		
1.89										72.1		
3.07										47.4		
5.43										30.4	Class 1	Class 2
Attenuation dB										81.3	+70/inf	+60/inf
										73.8	+60/inf	+54/inf
										59.7	+40.5/inf	+39.5/inf
										29.9	+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
										0.8	-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
										-0.1	-0.4/+0.5	-0.6/+0.7
										-0.1	-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
										26.7	+16.6/inf	+15.6/inf
										60.7	+40.5/inf	+39.5/inf
										85.4	+60/inf	+54/inf
										102.4	+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to

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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	4229.0
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									44.6			
0.33									53.8			
0.53									72.4			
0.77									104.2			
0.89												
0.92									132.5			
0.95									133.0			
0.97									133.0			
1.00									**133.0**			
1.03									133.0			
1.06									133.0			
1.09									132.8			
1.12												
1.30									104.8			
1.89									69.7			
3.07									39.5			
5.43									24.0		Class 1	Class 2
Attenuation dB									88.4		+70/inf	+60/inf
									79.2		+60/inf	+54/inf
									60.6		+40.5/inf	+39.5/inf
									28.8		+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
									0.2		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
									28.2		+16.6/inf	+15.6/inf
									63.3		+40.5/inf	+39.5/inf
									93.5		+60/inf	+54/inf
									109.0		+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	4229.0
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					41.7							
0.33					59.2							
0.53					81.5							
0.77					109.7							
0.89												
0.92					132.5							
0.95					133.0							
0.97					133.0							
1.00					**133.0**							
1.03					133.0							
1.06					133.0							
1.09					132.9							
1.12												
1.30					86.9							
1.89					42.6							
3.07					28.4							
5.43					28.2						Class 1	Class 2
Attenuation dB					91.3						+70/inf	+60/inf
					73.8						+60/inf	+54/inf
					51.5						+40.5/inf	+39.5/inf
					23.3						+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
					0.1						-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
					46.1						+16.6/inf	+15.6/inf
					90.4						+40.5/inf	+39.5/inf
					104.6						+60/inf	+54/inf
					104.8						+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	4229.0
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	Class 1	Class 2
0.18							42.2					
0.33							59.4					
0.53							81.8					
0.77							110.7					
0.89												
0.92							132.8					
0.95							133.0					
0.97							133.0					
1.00							**133.0**					
1.03							133.0					
1.06							133.0					
1.09							132.6					
1.12												
1.30							85.3					
1.89							41.2					
3.07							38.3					
5.43							41.5				+70/inf	+60/inf
Attenuation dB							90.8				+60/inf	+54/inf
							73.6				+40.5/inf	+39.5/inf
							51.2				+16.6/inf	+15.6/inf
							22.3				-0.4/+5.3	-0.6/+5.8
											-0.4/+1.4	-0.6/+1.7
							0.2				-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				-0.4/+5.3	-0.6/+5.8
											+16.6/inf	+15.6/inf
							47.7				+40.5/inf	+39.5/inf
							91.8				+60/inf	+54/inf
							94.7				+70/inf	+60/inf
							91.5					

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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	10
Reference SPL 1kHz	94.0
Output mVrms	150.0

	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						94.2	94.3	94.1	93.9	93.9		
Ins Loss						0.2	0.3	0.1	-0.1	-0.1	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Freq	**40Hz**	**50Hz**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**	**200Hz**	**250Hz**	**315Hz**	**Class 1**	**Class 2**
Measured	93.9	94.0	93.9	94.0	94.0	94.0	94.0	94.0	94.0	94.0		
Ins Loss	-0.1	0.0	-0.1	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	94.1	94.1	94.1				
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.1	0.1	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	**0.18**

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.

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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)	1710.0
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	0.19

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)	1670.0
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	0.15

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)	1670.0
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	0.19

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)	10
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	152.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.1	0.1	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	41.9	-0.1	±0.7	±0.9
63.0	41.0	41.4	0.4	±0.7	±0.9
64.0	40.0	40.4	0.4	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	10
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	149.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	44.9	-0.1	±0.7	±0.9
60.0	44.0	43.9	-0.1	±0.7	±0.9
61.0	43.0	43.0	0.0	±0.7	±0.9
62.0	42.0	42.0	0.0	±0.7	±0.9
63.0	41.0	41.0	0.0	±0.7	±0.9
64.0	40.0	40.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.17

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)	10
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	149.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.1	0.1	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.0	0.0	±0.7	±0.9
62.0	42.0	42.0	0.0	±0.7	±0.9
63.0	41.0	41.0	0.0	±0.7	±0.9
64.0	40.0	40.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	152.0

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
					± 0.5	± 0.6

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	149.0

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	0.17

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)	149.0

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	0.20

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			12.4	10.5	9.7	11.2	10.6	7.9	8.9	7.7
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	6.2	7.5	3.5	2.8	3.4	2.7	1.7	2.1	1.8	1.8
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	1.3	2.0	1.6	2.9	2.4	3.0	3.3	4.2	4.9	6.2
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	6.6	7.2	8.1	9.3	10.1	11.3	12.6	13.7		
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			15.1	6.6	10.1	10.7	11.8	8.7	8.5	5.4
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	5.6	7.8	3.4	3.3	4.7	2.1	1.9	0.5	0.4	0.2
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	U	U	U	U	U	U	U	U	U	U
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	U	U	U	U	U	0.7	1.2	1.9		
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

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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	1/02/2023	Job No	RC040	Operator	EF
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-05312-E0 #RTA06-004
Microphone Make	GRAS	Model	40AE	Serial No	#165474
Preamplifier Make	NTI	Model	MA220	Serial No	#11043
Ext'n Cable Make	NTI	Model	N/A	Serial No	N/A
Accessories	Nil			Firmware	V4.82

SLM Class	1
Filters Class	1

Environmental Conditions	Measured	
	Start	End
Air Temp. (°C)	24.4	24.7
Rel. Humidity (%)	63.0	63.2
Air Pressure (kPa)	100.7	100.7

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 33511B SN MY59001831
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 through an unbroken chain of calibrations, is ultimately traceable to the International System of Units (SI).

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 2.04.

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:

[redacted]

Print Name: Ariel Michael Date: 28/02/2023

Template Document Name: RQT-05 SLM IEC61672 Verification (r85)

NATacoustic
Sound Level Meter Verification - Summary of Tests

Calibration Date	1/02/2023	**Job No**	RC040	**Operator**	EF
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-05312-E0 #RTA06-004
Microphone Make	GRAS	**Model**	40AE	**Serial No**	#165474
Preamplifier Make	NTI	**Model**	MA220	**Serial No**	#11043
Ext'n Cable Make	NTI	**Model**	N/A	**Serial No**	N/A
Accessories	Nil			**Firmware**	V4.82

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

SLM Class	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)	24.4	24.7
	Rel. Humidity (%)	63.0	63.2
	Air Pressure (kPa)	100.7	100.7
	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**	17.1	0.09
5(b). Self-Generated Noise, Electrical		**A**	7.2	0.09
		C	11.1	0.09
		Z	17.2	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	0.00
		C	Yes	0.00
		Z	Yes	0.00
8. Frequency & Time Weightings 1kHz	**8(a). Frequency Weighting**	**C**	Yes	0.14
		Z	Yes	0.14
		FLAT	N/A	0.14
	8(b). Time Weighting	**Slow**	Yes	0.14
		Leq	Yes	0.14
9(a). Level Linearity 8kHz (Increasing)		**Conforming**	Yes	0.19
9(b). Level Linearity 8kHz (Decreasing)		**Conforming**	Yes	0.19
10(a). Level Linearity Including the Level Range (Reference Signal)		**Conforming**	Yes	0.17
10(b). Level Linearity Including the Level range (5dB Above Under-range)		**Conforming**	Yes	0.17
11. Toneburst Response		**Fast**	Yes	0.16
		Slow	Yes	0.16
		SEL/Leq	Yes	0.16
12. Peak C sound level		**8 kHz**	Yes	0.16
		500 Hz	Yes	0.16
13. Overload indication		**Conforming**	Yes	0.16
		Latches	Yes	N/A
14. High-level Stability		**Conforming**	Yes	0.09
15(a). Octave Band Filter Relative Attenuation (≤2kHz)		**Conforming**	Yes	0.16
15(b). Octave Band Filter Relative Attenuation (>2kHz)		**Conforming**	Yes	0.16
16. Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.18
17(a). Octave Band Filter Level Linearity 31.5Hz (Increasing)		**31.5Hz**	Yes	0.19
17(b). Octave Band Filter Level Linearity 1kHz (Increasing)		**1kHz**	Yes	0.15
17(c). Octave Band Filter Level Linearity 16kHz (Increasing)		**16kHz**	Yes	0.19
18(a). Octave Band Filter Level Linearity 31.5Hz (Decreasing)		**31.5Hz**	Yes	0.20
18(b). Octave Band Filter Level Linearity 1kHz (Decreasing)		**1kHz**	Yes	0.17
18(c). Octave Band Filter Level Linearity 16kHz (Decreasing)		**16kHz**	Yes	0.20
19(a). Octave Level Linearity Including the Level range (31.5Hz)		**31.5Hz**	Yes	0.20
19(b). Octave Level Linearity Including the Level range (1kHz)		**1kHz**	Yes	0.17
19(c). Octave Level Linearity Including the Level range (16kHz)		**16kHz**	Yes	0.20
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	0.16
21(b). Third Octave Band Filter Relative Attenuation (40Hz-315Hz)		**Conforming**	Yes	0.16
21(c). Third Octave Band Filter Relative Attenuation (400Hz-3.15kHz)		**Conforming**	Yes	0.16
21(d). Third Octave Band Filter Relative Attenuation (≥4kHz)		**Conforming**	Yes	0.16
22. Third Octave Band Filter Relative Attenuation at Midband Frequency		**Conforming**	Yes	0.18

23(a). Third Octave Band Filter Level Linearity 31.5Hz (Increasing)	**31.5Hz**	Yes	0.19
23(b). Third Octave Band Filter Level Linearity 1kHz (Increasing)	**1kHz**	Yes	0.15
23(c). Third Octave Band Filter Level Linearity 16kHz (Increasing)	**16kHz**	Yes	0.19
24(a). Third Octave Band Filter Level Linearity 31.5Hz (Decreasing)	**31.5Hz**	Yes	0.20
24(b). Third Octave Band Filter Level Linearity 1kHz (Decreasing)	**1kHz**	Yes	0.17
24(c). Third Octave Band Filter Level Linearity 16kHz (Decreasing)	**16kHz**	Yes	0.20
25(a). Third Octave Level Linearity Including the Level range (31.5Hz)	**31.5Hz**	Yes	0.20
25(b). Third Octave Level Linearity Including the Level range (1kHz)	**1kHz**	Yes	0.17
25(c). Third Octave Level Linearity Including the Level range (16kHz)	**16kHz**	Yes	0.20
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**	

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 SLM IEC61672 Verification (r85)

1(a). Instrument Information

Calibration Date	1/02/2023	Job No	RC040	Operator	EF

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	Serial	#A2A-05312-E0 #RTA06-004		
Microphone Make	GRAS	Model	40AE	Serial	#165474	pF	15
Preampifier Make	NTI	Model	MA220	Serial	#11043		
Ext'n Cable Make	NTI	Model		Serial			
Accessories	Nil			Firmware	V4.82		

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

Notes
MA220 preampfailed test 15 when subjected to a very low frequency
(<10hz) signal. Preamp was replaced and tests were redone after
which the SLM passed all tests satisfactorily .

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 (A weighting)	40.0	120.0
8kHz Leq (A weighting)	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	4.02.01
Publication Date	04/2018
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	0.20								0.20	0.41
2k	0.45								0.45	0.41
4k	1.05								1.05	0.41
8k	3.20								3.20	0.58
12.5k	5.60								5.60	0.64
16k	7.10								7.10	0.64

Source of Mic FF to Pressure Correction	Interpolated from GRAS Calibration Curve
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 %.

☑ Checked

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

2. Preliminary Inspection and Power Supply

Instrument Inspected	Yes
Laboratory Calibration Equipment Ok	Yes
Laboratory Equipment Check	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)	24.4	24.7	1.4	1.7	0.4	1.80	2.10	3	Yes	20	26
Rel. Humidity (%)	63.0	63.2	15.5	15.7	6.8	22.30	22.50	22.5	Yes	25	70
Air Pressure (kPa)	100.7	100.7	8.2	8.2	0.13	8.33	8.33	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)	50.6

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)	113.9
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.

☑ Checked

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

Observed Values		
Leq	N/A	
17.1	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	Avg	

Results				
Freq Wt	Observed	Quoted	Tolerance	Conforming
A	17.1	16.0	+5,-inf	Yes

Uncertainty (+/-) dB	0.09

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
7.2	11.1	17.2	1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			Avg			

Results		
Freq Wt	Observed	Quoted
A	7.2	12.4
C	11.1	13.5
Z	17.2	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.
For information purposes, this laboratory compares the quoted noise floor to the measured value. This comparison is not used to check conformance to a specific requirement.

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	111.0	111.0	110.9	110.97	0.11	111.08	0.00	0.00	0.00	0.00	111.08	-3.03	-3.00	-0.03	± 1.5	± 3.0	Yes	0.43	0.14	0.41
63	113.3	113.2	113.1	113.20	0.02	113.22	0.00	0.00	0.00	0.00	113.22	-0.88	-0.80	-0.08	± 1.0	± 2.0	Yes	0.42	0.12	0.41
125	114.0	114.0	113.8	113.93	0.01	113.94	0.00	0.00	0.00	0.00	113.94	-0.16	-0.20	0.04	± 1.0	± 1.5	Yes	0.42	0.12	0.41
250	114.0	114.0	114.0	114.00	-0.01	113.99	0.00	0.00	0.00	0.00	113.99	-0.11	0.00	-0.11	± 1.0	± 1.5	Yes	0.42	0.12	0.41
500	114.0	114.0	113.9	113.97	-0.01	113.96	0.00	0.00	0.00	0.00	113.96	-0.15	0.00	-0.15	± 1.0	± 1.5	Yes	0.42	0.12	0.41
1k	**114.0**	**113.9**	**113.9**	**113.93**	**-0.03**	**113.90**	**0.20**	**0.00**	**0.00**	**0.00**	**114.10**	**0.00**	**0.00**	0.00	± 0.7	± 1.0	Yes	0.42	0.11	0.41
2k	113.6	113.6	113.5	113.57	0.02	113.59	0.45	0.00	0.00	0.00	114.04	-0.07	-0.20	0.13	± 1.0	± 2.0	Yes	0.43	0.13	0.41
4k	112.8	112.6	112.6	112.67	-0.26	112.41	1.05	0.00	0.00	0.00	113.46	-0.65	-0.80	0.15	± 1.0	± 3.0	Yes	0.43	0.14	0.41
8k	109.5	109.2	109.0	109.23	-0.13	109.10	3.20	0.00	0.00	0.00	112.30	-1.80	-3.00	1.20	+1.5; -2.5	± 5.0	Yes	0.60	0.15	0.58
12.5k	104.1	103.5	103.3	103.63	0.00	103.63	5.60	0.00	0.00	0.00	109.23	-4.87	-6.20	1.33	+2.0; -5.0	+5,-inf	Yes	0.68	0.21	0.64
16k	100.4	99.6	99.3	99.77	0.20	99.97	7.10	0.00	0.00	0.00	107.07	-7.04	-8.50	1.46	+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)	60.70

Freq Hz	Output (mV)	Indication A	Output (mV)	Indication C	Output (mV)	Indication Z	Tolerance		Uncertainty		
63	1239.33	75.0	66.56	75.0	60.70	75.1					
125	387.43	75.0	62.11	75.1	60.70	75.1					
250	163.38	75.0	60.70	75.0	60.70	75.0					
500	87.74	75.0	60.70	75.1	60.70	75.0					
1k	60.70	**75.0**	60.70	**75.0**	60.70	**75.0**					
2k	52.87	75.0	62.11	75.1	60.70	75.0					
4k	54.10	75.0	66.56	75.0	60.70	75.0					
8k	68.90	75.0	85.74	75.0	60.70	75.0					
16k	129.77	74.9	161.51	75.0	60.70	75.1					
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		75.00		75.00		75.10					
		75.00		75.10		75.10					
		75.00		75.00		75.00					
		75.00		75.10		75.00					
		75.00		**75.00**		**75.00**					
		75.00		75.10		75.00					
		75.00		75.00		75.00					
		75.00		75.00		75.00			Total	Lab	Corrections
		74.90		75.00		75.10	Type 1	Type 2	(+/-) dB	(+/-) dB	(+/-) dB
Response re 1kHz (Deviation from Expected)		0.00		0.00		0.10	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		0.00		0.10		0.10	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		0.10		0.00	± 1.0	± 1.5	**0.44**	**0.18**	**0.41**
		0.00		**0.00**		**0.00**	± 0.7	± 1.0	**0.44**	**0.18**	**0.41**
		0.00		0.10		0.00	± 1.0	± 2.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	± 1.0	± 3.0	**0.44**	**0.18**	**0.41**
		0.00		0.00		0.00	+1.5; -2.5	± 5.0	**0.61**	**0.18**	**0.58**
		-0.10		0.00		0.10	+2.5; -16.0	+5,-inf	**0.67**	**0.18**	**0.64**
Conforming		**Yes**		**Yes**		**Yes**					

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
Generator Frequency (Hz)	1k
SPL Reference (dB)	114.0
Output (mVrms)	536.0

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	0.14

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	0.14

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)	1896.0
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	0.19

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)	10
Generator Frequency (Hz)	8k
SPL Reference Starting Point (dB)	94
Output (mVrms)	169.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	± 0.8	± 1.1
20.0	84.0	84.0	0.0	± 0.8	± 1.1
25.0	79.0	79.0	0.0	± 0.8	± 1.1
30.0	74.0	74.0	0.0	± 0.8	± 1.1
35.0	69.0	69.0	0.0	± 0.8	± 1.1
40.0	64.0	64.0	0.0	± 0.8	± 1.1
45.0	59.0	59.0	0.0	± 0.8	± 1.1
50.0	54.0	54.0	0.0	± 0.8	± 1.1
55.0	49.0	49.0	0.0	± 0.8	± 1.1
59.0	45.0	45.0	0.0	± 0.8	± 1.1
60.0	44.0	44.0	0.0	± 0.8	± 1.1
61.0	43.0	43.0	0.0	± 0.8	± 1.1
62.0	42.0	42.0	0.0	± 0.8	± 1.1
63.0	41.0	41.0	0.0	± 0.8	± 1.1
64.0	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	0.20

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)	539.0

Settings	Level (dB)			Tolerance	
Range	Expected	Indicated	Difference	Type 1	Type 2
HIGH	114.0	113.9	-0.1	± 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	0.14

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)	60.0

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	45.0	0.0	± 0.8	± 1.1
LOW	70.0	25.0	25.2	0.2	± 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	0.17

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)	673.0

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	0.16

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)	673.0

Toneburst (ms)	# Cycles	LASMax (dB)			Tolerance	
		Expected	Indicated	Difference	Type 1	Type 2
200	800	109.6	109.5	-0.1	± 0.5	± 1.0
2	8	90.0	89.9	-0.1	+ 1.0; -3.0	+ 1.0; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.16

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)	673.0
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	80.8	80.8	81.0	-0.2	+ 1.0; -3.0	+ 1.5; -5.0

Conforming	Yes

Uncertainty (+/-) dB	0.16

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)	602.0

Test Signal	dB LCpeak Hold				Tolerance	
8 kHz	Indication	O'Load?	Expected	Difference	Type 1	Type 2
1 Cycle	115.3	No	115.4	-0.1	± 2.0	± 3.0

Conforming	Yes

Uncertainty (+/-) dB	0.16

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)	422.0
Output High Level (mV)	596.8
Output Low Level (mV)	-596.8

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	0.16

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)	878.7

	Half-Cycle Signal			Tolerance	
	Positive	Negative	Difference	Type 1	Type 2
Level (dB)	135.1	136.0	-0.9	± 1.5	± 1.5
Generator Output (mVrms)	5667.5	6641.6			

Conforming	Yes

Uncertainty (+/-) dB	0.16

Overload Indicated	Yes
Overload Indicator Latches	Yes

Conforming	Yes

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)	958.0

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	4817.0
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				39.0					37.5			
0.13				48.6					52.4			
0.25				74.4					77.8			
0.50				105.9					108.6			
0.71												
0.77				132.4					132.5			
0.84				132.9					132.9			
0.92				133.0					133.0			
1.00				**132.9**					**133.0**			
1.09				133.0					133.0			
1.19				133.0					133.0			
1.30				132.7					132.7			
1.41												
2.00				107.3					95.8			
4.00				75.1					33.6			
8.00				48.7					36.6			
16.00				26.7					32.5		Class 1	Class 2
Attenuation dB				93.9					95.5		+70/inf	+60/inf
				84.3					80.6		+60/inf	+54/inf
				58.5					55.2		+40.5/inf	+39.5/inf
				27.0					24.4		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
				0.5					0.5		-0.4/+1.4	-0.6/+1.7
				0.0					0.1		-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
				-0.1					0.0		-0.4/+0.5	-0.6/+0.7
				-0.1					0.0		-0.4/+0.7	-0.6/+0.9
				0.2					0.3		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
				25.6					37.2		+16.6/inf	+15.6/inf
				57.8					99.4		+40.5/inf	+39.5/inf
				84.2					96.4		+60/inf	+54/inf
				106.2					100.5		+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	4817.0
Noise Floor dB	-99.0

Ratio	1	2	3	4	5	6	7	8	9	10	Tolerance	
Freq	4kHz	8kHz	16kHz	32kHz								
0.06			43.6									
0.13			62.7									
0.25			87.6									
0.50			115.2									
0.71												
0.77			132.1									
0.84			132.8									
0.92			132.9									
1.00			**133.0**									
1.09			133.0									
1.19			132.9									
1.30			132.9									
1.41												
2.00			47.4									
4.00			52.9									
8.00			48.4									
16.00			51.4								Class 1	Class 2
Attenuation dB			89.4								+70/inf	+60/inf
			70.3								+60/inf	+54/inf
			45.4								+40.5/inf	+39.5/inf
			17.8								+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
			0.9								-0.4/+1.4	-0.6/+1.7
			0.2								-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
			0.1								-0.4/+0.7	-0.6/+0.9
			0.1								-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
			85.6								+16.6/inf	+15.6/inf
			80.1								+40.5/inf	+39.5/inf
			84.6								+60/inf	+54/inf
			81.6								+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

☑ 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	10
Reference SPL 1kHz	94.0
Output mVrms	169.0

	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		93.8	93.8	93.9	93.9	94.0	94.0	94.0	94.0	94.0		
Ins Loss		-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.4/+0.4	-0.6/+0.6
Conforming	**N/A**	**Yes**	**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	**0.18**

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)	1929.0
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	0.19

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)	1889.0
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	103.9	-0.1	±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	115.9	-0.1	±0.5	±0.6
8.0	117.0	116.9	-0.1	±0.5	±0.6
7.0	118.0	117.9	-0.1	±0.5	±0.6
6.0	119.0	118.9	-0.1	±0.5	±0.6
5.0	120.0	119.9	-0.1	±0.5	±0.6
4.0	121.0	120.9	-0.1	±0.5	±0.6
3.0	122.0	121.9	-0.1	±0.5	±0.6
2.0	123.0	122.9	-0.1	±0.5	±0.6
1.0	124.0	123.9	-0.1	±0.5	±0.6
0.0	125.0	124.9	-0.1	±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.15

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)	1889.0
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	0.19

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)	10
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	172.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.0	0.0	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	10
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	169.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.0	0.0	±0.7	±0.9
62.0	42.0	42.0	0.0	±0.7	±0.9
63.0	41.0	41.0	0.0	±0.7	±0.9
64.0	40.0	40.0	0.0	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.17

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)	10
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	169.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.1	0.1	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.1	0.1	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	172.0

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	0.20

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)	169.0

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	0.17

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)	169.0

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	0.20

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		13.1	11.8	8.6	6.7	4.8	3.7	4.3	5.9	7.6
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	10.0	12.7	16.2							
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		13.2	12.3	8.0	5.4	3.2	2.6	1.0	1.4	0.9
Conforming	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Freq	4kHz	8kHz	16kHz	32kHz						
Measured	1.3	2.6	4.8							
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	4817.0
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										49.5		
0.33										58.1		
0.53										72.5		
0.77										102.9		
0.89												
0.92										132.0		
0.95										132.9		
0.97										133.0		
1.00										**133.0**		
1.03										133.0		
1.06										133.0		
1.09										132.9		
1.12												
1.30										106.1		
1.89										72.1		
3.07										47.4		
5.43										25.9	Class 1	Class 2
Attenuation dB										83.5	+70/inf	+60/inf
										74.9	+60/inf	+54/inf
										60.5	+40.5/inf	+39.5/inf
										30.1	+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
										1.0	-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
										0.1	-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
										26.9	+16.6/inf	+15.6/inf
										60.9	+40.5/inf	+39.5/inf
										85.6	+60/inf	+54/inf
										107.1	+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	N/A	Yes		

Uncert (+/-) dB	≤80dB	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to

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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	4817.0
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									39.4			
0.33									51.6			
0.53									71.9			
0.77									104.1			
0.89												
0.92									132.4			
0.95									132.9			
0.97									133.0			
1.00									**133.0**			
1.03									133.0			
1.06									133.0			
1.09									132.8			
1.12												
1.30									104.7			
1.89									69.6			
3.07									39.4			
5.43									24.0		Class 1	Class 2
Attenuation dB									93.6		+70/inf	+60/inf
									81.4		+60/inf	+54/inf
									61.1		+40.5/inf	+39.5/inf
									28.9		+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
									0.6		-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
									0.2		-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
									28.3		+16.6/inf	+15.6/inf
									63.4		+40.5/inf	+39.5/inf
									93.6		+60/inf	+54/inf
									109.0		+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	4817.0
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					40.7							
0.33					59.1							
0.53					81.5							
0.77					109.6							
0.89												
0.92					132.4							
0.95					132.9							
0.97					133.0							
1.00					**133.0**							
1.03					133.0							
1.06					133.0							
1.09					132.8							
1.12												
1.30					86.9							
1.89					42.5							
3.07					28.1							
5.43					28.5						Class 1	Class 2
Attenuation dB					92.3						+70/inf	+60/inf
					73.9						+60/inf	+54/inf
					51.5						+40.5/inf	+39.5/inf
					23.4						+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
					0.6						-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
					0.2						-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
					46.1						+16.6/inf	+15.6/inf
					90.5						+40.5/inf	+39.5/inf
					104.9						+60/inf	+54/inf
					104.5						+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	4817.0
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							41.5					
0.33							59.4					
0.53							81.8					
0.77							110.6					
0.89												
0.92							132.7					
0.95							132.9					
0.97							133.0					
1.00							**133.0**					
1.03							133.0					
1.06							132.9					
1.09							132.5					
1.12												
1.30							85.2					
1.89							42.2					
3.07							38.2					
5.43							42.2				Class 1	Class 2
Attenuation dB							91.5				+70/inf	+60/inf
							73.6				+60/inf	+54/inf
							51.2				+40.5/inf	+39.5/inf
							22.4				+16.6/inf	+15.6/inf
											-0.4/+5.3	-0.6/+5.8
							0.3				-0.4/+1.4	-0.6/+1.7
							0.1				-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
							0.1				-0.4/+0.7	-0.6/+0.9
							0.5				-0.4/+1.4	-0.6/+1.7
											-0.4/+5.3	-0.6/+5.8
							47.8				+16.6/inf	+15.6/inf
							90.8				+40.5/inf	+39.5/inf
							94.8				+60/inf	+54/inf
							90.8				+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	0.16	>80dB	0.48

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.
The ≤80dB uncertainty applies to those "Attenuation dB" cells where the value is less than or equal to 80, while the >80dB uncertainty applies to the remaining "Attenuation dB" cells.

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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	10
Reference SPL 1kHz	94.0
Output mVrms	169.0

	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	93.9	94.0	94.0	93.8	93.9	93.9	93.9		
Ins Loss			-0.3	-0.1	0.0	0.0	-0.2	-0.1	-0.1	-0.1	-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	93.9	94.0	94.0	94.1	94.1	94.0	94.0	94.0		
Ins Loss	0.0	0.0	-0.1	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	94.1	94.1				
Ins Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	**0.18**

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)	1929.0
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	0.19

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)	1900.0
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	Y		±0.5	±0.6

Conforming	Yes

Uncertainty (+/-) dB	0.15

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)	1900.0
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	0.19

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)	10
Generator Frequency (Hz)	31.5
SPL Reference Starting Point (dB)	94
Output (mVrms)	172.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	10
Generator Frequency (Hz)	1kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	172.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.0	0.0	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.0	0.0	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.2	0.2	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.17

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)	10
Generator Frequency (Hz)	16kHz
SPL Reference Starting Point (dB)	94
Output (mVrms)	169.0
Noise Floor (dB)	-99.0

Decreasing level to Underange				Tolerance	
Atten	Expected	Indicator	Diff	Type 1	Type 2
15.0	89.0	89.0	0.0	±0.5	±0.6
20.0	84.0	84.0	0.0	±0.5	±0.6
25.0	79.0	79.0	0.0	±0.7	±0.9
30.0	74.0	74.0	0.0	±0.7	±0.9
35.0	69.0	69.0	0.0	±0.7	±0.9
40.0	64.0	64.1	0.1	±0.7	±0.9
45.0	59.0	59.0	0.0	±0.7	±0.9
50.0	54.0	54.0	0.0	±0.7	±0.9
55.0	49.0	49.0	0.0	±0.7	±0.9
59.0	45.0	45.0	0.0	±0.7	±0.9
60.0	44.0	44.1	0.1	±0.7	±0.9
61.0	43.0	43.1	0.1	±0.7	±0.9
62.0	42.0	42.1	0.1	±0.7	±0.9
63.0	41.0	41.1	0.1	±0.7	±0.9
64.0	40.0	40.1	0.1	±0.7	±0.9

Conforming	Yes

Uncertainty (+/-) dB	0.20

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)	172.0

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	0.20

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)	169.0

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	0.17

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)	169.0

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	0.20

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			6.7	6.6	6.4	5.3	5.7	5.2	6.9	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	2.5	1.7	2.0	1.3	1.0	0.7	U	U	0.4	0.3
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	U	0.5	0.9	0.5	1.2	1.4	2.2	2.6	3.4	4.4
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	5.2	6.4	6.9	8.0	9.0	10.3	11.5	12.4		
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			10.1	8.1	10.3	6.7	5.8	6.7	4.0	4.3
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	3.1	2.0	1.8	1.7	0.8	U	U	U	U	U
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	U	U	U	U	U	U	U	U	U	U
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	U	U	U	U	U	U	U	0.7		
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.

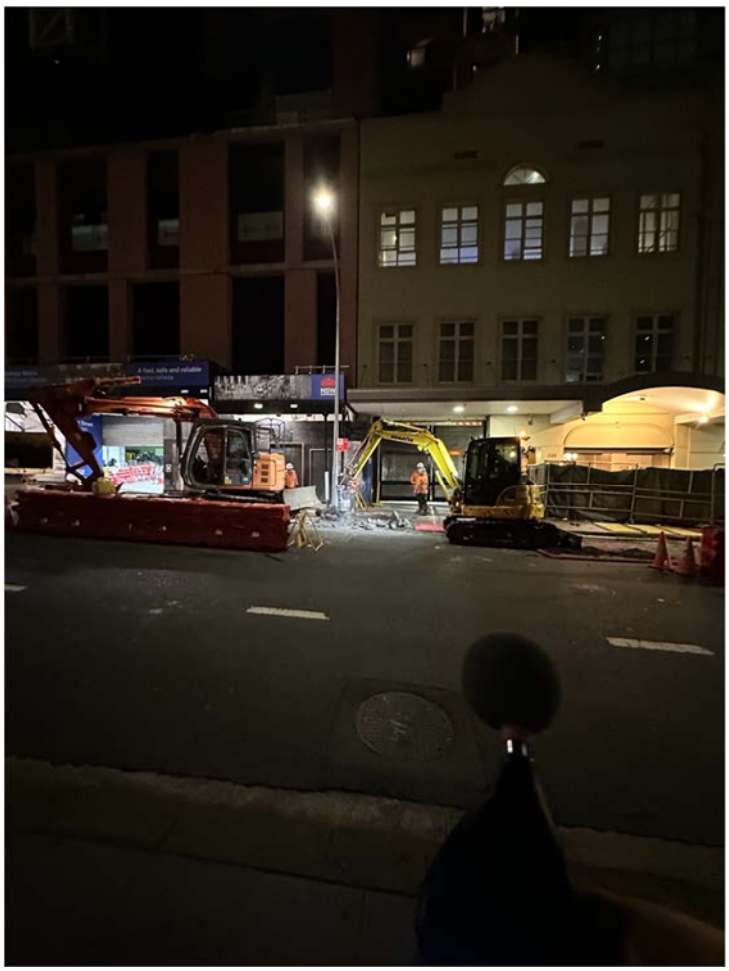
☑ Checked

Appendix D – Attended Monitoring Photos

24 January 2024 (South Site – Street Utilities Works, 3 Crews Working)

Work Zone 1 – viewed from Level 10 of Greenland Tower

Work Zone 2 – viewed from Level 10 of Greenland Tower



Work Zone 3 – viewed from footpath in front of Kimpton Margot