

Appendix 11.3: Copy of Calibration Certificates for Noise Monitors

|  | <p>MTS Calibration Ltd, The Grange Business Centre, Belasis Avenue, Billingham TS23 1LG, England Telephone: 01642 876 410</p> | | | | | | | | | | | | | | | | | | | | |
|---|---|----------------------|---------------|----------------------------|---------------|--------------|--------------|----------|--------|------------|-----|--------|--------|------------|--------------|------|---------|------------------------|--------------------------|--|--|
| CERTIFICATE OF CALIBRATION | <p>Page 1 of 11 pages</p> <p>Approved Signatory:</p> <p style="text-align: center;"><i>PA Sherris</i></p> <p style="text-align: right;">Tony Sherris</p> | | | | | | | | | | | | | | | | | | | | |
| <p>Issued by: MTS Calibration Ltd</p> <p>Date of Issue: 04 February 2021 Certificate Number: 35457</p> | | | | | | | | | | | | | | | | | | | | | |
| Sound Level Meter | | | | | | | | | | | | | | | | | | | | | |
| Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1 | | | | | | | | | | | | | | | | | | | | | |
| <p>Client: Environmental Measurements Unit 12, Tallaght Business Centre Whitestown Business Park Co.Dublin 24, Ireland</p> | <p>Instrument Make: Larson Davis Instrument Model: LxT1L Serial Number: 0004647</p> | | | | | | | | | | | | | | | | | | | | |
| 9 | <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; font-weight: normal;">Associated Equipment</th> <th style="text-align: left; font-weight: normal;">Make</th> <th style="text-align: left; font-weight: normal;">Model</th> <th style="text-align: left; font-weight: normal;">Serial number</th> </tr> </thead> <tbody> <tr> <td>Preamplifier</td> <td>Larson Davis</td> <td>PRMLxT1L</td> <td>042725</td> </tr> <tr> <td>Microphone</td> <td>PCB</td> <td>377B02</td> <td>171552</td> </tr> <tr> <td>Calibrator</td> <td>Brüel & Kjær</td> <td>4231</td> <td>2326247</td> </tr> <tr> <td>Calibrator supplied by</td> <td colspan="3">MTS for this calibration</td> </tr> </tbody> </table> | Associated Equipment | Make | Model | Serial number | Preamplifier | Larson Davis | PRMLxT1L | 042725 | Microphone | PCB | 377B02 | 171552 | Calibrator | Brüel & Kjær | 4231 | 2326247 | Calibrator supplied by | MTS for this calibration | | |
| Associated Equipment | Make | Model | Serial number | | | | | | | | | | | | | | | | | | |
| Preamplifier | Larson Davis | PRMLxT1L | 042725 | | | | | | | | | | | | | | | | | | |
| Microphone | PCB | 377B02 | 171552 | | | | | | | | | | | | | | | | | | |
| Calibrator | Brüel & Kjær | 4231 | 2326247 | | | | | | | | | | | | | | | | | | |
| Calibrator supplied by | MTS for this calibration | | | | | | | | | | | | | | | | | | | | |
| Test results summary, detailed results are shown on subsequent pages. | | | | | | | | | | | | | | | | | | | | | |
| Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1 | | | | | | | | | | | | | | | | | | | | | |
| Tests performed | Section | Results of test | Page | Comments | | | | | | | | | | | | | | | | | |
| Calibration Certificate | 22 | | 1 | | | | | | | | | | | | | | | | | | |
| Additional information | | | 2 | | | | | | | | | | | | | | | | | | |
| Indication with Calibrator Supplied | 10 | No Limit | 3 | | | | | | | | | | | | | | | | | | |
| Self-Generated Noise | 11 | No Limit | 3 | | | | | | | | | | | | | | | | | | |
| Frequency and Time-weightings at 1kHz | 14 | Complies | 3 | | | | | | | | | | | | | | | | | | |
| Long term stability | 15 | Complies | 3 | | | | | | | | | | | | | | | | | | |
| High stability | 21 | Complies | 3 | | | | | | | | | | | | | | | | | | |
| Acoustic Tests | 12 | Complies | 4 | | | | | | | | | | | | | | | | | | |
| Frequency Weighting A | 13 | Complies | 5 | | | | | | | | | | | | | | | | | | |
| Frequency Weighting C | 13 | Complies | 6 | | | | | | | | | | | | | | | | | | |
| Frequency Weighting Z | 13 | Complies | 7 | | | | | | | | | | | | | | | | | | |
| Level Linearity | 16 | Complies | 8 | | | | | | | | | | | | | | | | | | |
| Level Linearity Range Control | 17 | | n/a | SLM only has one range | | | | | | | | | | | | | | | | | |
| Tone-burst Response | 18 | Complies | 9 | | | | | | | | | | | | | | | | | | |
| Peak C sound level | 19 | Complies | 10 | | | | | | | | | | | | | | | | | | |
| Overload indication | 20 | Complies | 11 | | | | | | | | | | | | | | | | | | |
| The instrument required repair in order to meet the above specifications. | | | | | | | | | | | | | | | | | | | | | |
| The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013 | | | | | | | | | | | | | | | | | | | | | |
| Additional tests performed | | Reference | | | | | | | | | | | | | | | | | | | |
| Microphone full frequency response | | 35459 | | See additional certificate | | | | | | | | | | | | | | | | | |
| Filter calibration, third octave or octave | | 35457F | | See additional certificate | | | | | | | | | | | | | | | | | |



MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Page 1 of 11 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

RA Sherris

Date of Issue: **02 February 2021** Certificate Number: **35442**

Tony Sherris

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005660

| Associated Equipment | Make | Model | Serial number |
|------------------------|--------------------------|----------|---------------|
| Preamplifier | Larson Davis | PRMLxT1L | 055806 |
| Microphone | PCB | 377B02 | 316352 |
| Calibrator | Briel & Kjaer | 4231 | 3014620 |
| Calibrator supplied by | MTS for this calibration | | |

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

| Tests performed | Section | Results of test | Page | Comments |
|---------------------------------------|---------|-----------------|------|------------------------|
| Calibration Certificate | 22 | | 1 | |
| Additional Information | | | 2 | |
| Indication with Calibrator Supplied | 10 | No Limit | 3 | |
| Self-Generated Noise | 11 | No Limit | 3 | |
| Frequency and Time-weightings at 1kHz | 14 | Complies | 3 | |
| Long term stability | 15 | Complies | 3 | |
| High stability | 21 | Complies | 3 | |
| Acoustic Tests | 12 | Complies | 4 | |
| Frequency Weighting A | 13 | Complies | 5 | |
| Frequency Weighting C | 13 | Complies | 6 | |
| Frequency Weighting Z | 13 | Complies | 7 | |
| Level Linearity | 16 | Complies | 8 | |
| Level Linearity Range Control | 17 | | n/a | SLM only has one range |
| Tone-burst Response | 18 | Complies | 9 | |
| Peak C sound level | 19 | Complies | 10 | |
| Overload indication | 20 | Complies | 11 | |

The instrument was within the above specification as received - no modifications were made

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

| Additional tests performed | Reference | |
|--|-----------|----------------------------|
| Microphone full frequency response | 35444 | See additional certificate |
| Filter calibration, third octave or octave | 35442F | See additional certificate |

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MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Page 1 of 11 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

RA Sherris

Date of issue: 21 January 2020 Certificate Number: 34094

Tony Sherris

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0004667

| Associated Equipment | Make | Model | Serial number |
|------------------------|--------------------------|----------|---------------|
| Preamplifier | PCB | PRMLxT1L | 069931 |
| Microphone | PCB | 377B02 | 316126 |
| Calibrator | Larson Davis | CAL200 | 9175 |
| Calibrator supplied by | MTS for this calibration | | |

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

| Tests performed | Section | Results of test | Page | Comments |
|---------------------------------------|---------|-----------------|------|------------------------|
| Calibration Certificate | 22 | | 1 | |
| Additional information | | | 2 | |
| Indication with Calibrator Supplied | 10 | No Limit | 3 | |
| Self-Generated Noise | 11 | No Limit | 3 | |
| Frequency and Time-weightings at 1kHz | 14 | Complies | 3 | |
| Long term stability | 15 | Complies | 3 | |
| High stability | 21 | Complies | 3 | |
| Acoustic Tests | 12 | Complies | 4 | |
| Frequency Weighting A | 13 | Complies | 6 | |
| Frequency Weighting C | 13 | Complies | 6 | |
| Frequency Weighting Z | 13 | Complies | 7 | |
| Level Linearity | 16 | Complies | 8 | |
| Level Linearity Range Control | 17 | n/a | n/a | SLM only has one range |
| Tone-burst Response | 18 | Complies | 9 | |
| Peak C sound level | 19 | Complies | 10 | |
| Overload indication | 20 | Complies | 11 | |

The instrument was within the above specification as received - no modifications were made

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

Additional tests performed

| | Reference | |
|--|-----------|----------------------------|
| Microphone full frequency response | 34270 | See additional certificate |
| Filter calibration, third octave or octave | 34084F | See additional certificate |

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The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Page 1 of 3 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

PA Sherris

Date of Issue: 06 January 2021 Certificate Number: 35346F

Tony Sherris

Third Octave Band Filter Third-Octave Band Filter verification to BS EN 61260:1996

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1
Serial Number: 0005009

Associated Sound Level Meter

Instrument Make: Larson Davis
Instrument Model: LxT1
Serial Number: 0005009
Calibrated by: MTS Calibration
Certificate Number: 35346
Date: of SLM calibration: 06 January 2021
Date: of receipt: 04 December 2021

Associated Preamplifier

Instrument Make: Larson Davis
Instrument Model: PRELxT1L
Serial Number: 033671

Test results summary. Detailed results are shown on subsequent pages.
Third-Octave Band Filter Compliance with BS EN 61260: 1996 Class 1

| | Comments |
|---------------------------------|---------------------|
| - Tabular Data | See Page 2 |
| - Graphic Data for 125Hz filter | Complies See Page 3 |
| - Graphic Data for 1kHz filter | Complies See Page 3 |
| - Graphic Data for 8kHz filter | Complies See Page 3 |

Because each digital filter will have the same amplitude characteristic relative to its centre frequency, only three filters were measured at each of the test frequencies specified by BS EN 61260:1996 for exact base 10 distribution. The measurements made were relative to the attenuation of the 1kHz filter at 1kHz input frequency and input level V. Because the measurements include a linearity contribution from the sound level meter, and could be variable with frequency, the assessment is valid only for this pairing. The sound level meter was set for "Linear" frequency response on the lowest range setting which did not give overload at any test frequency or test level. Its compliance with the standard was assessed by referring the measurements to the tolerances specified.

Comments

The sound level meter and preamplifier were calibrated as a unit.
The input level used is selected to produce a sound level at 1kHz that is close to but not exceeding the maximum level on the reference range.
The centre frequency sequence of this filter set follows the exact base 10 midband frequency sequence of IEC 61260 and the measurements have been made accordingly.

| Measurement Conditions: | | | | Uncertainties of measurements: | | | |
|-------------------------|--------------|--------|------------|--|----------|------|----|
| Temperature | 23.0 | °C | ± 1 °C | Within Passband (0.89 to 1.12 of centre frequency) | | 0.42 | dB |
| Atmospheric Pressure | 1019.6 | mBar | ± 2 mBar | Outside Passband | | 2.48 | dB |
| Relative Humidity | 34.9 | % | ± 5 % | | | | |
| Test Equipment: | | | | | | | |
| Equipment | Manufacturer | Model | Serial No. | Traceability Ref. | Cal. Due | | |
| Signal Generator (x2) | Agilent | 33120A | MY40007806 | TE 160 | Oct-21 | | |

Calibration Certificate

Certificate Number 2021014391

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number LxT SE
Serial Number 0006869
Test Results **Pass**
Initial Condition As Manufactured
Description Sound Expert LxT
Class 1 Sound Level Meter
Firmware Revision: 2.404

Procedure Number D0001,8378
Technician Ron Harris
Calibration Date 10 Nov 2021
Calibration Due
Temperature 23.41 °C ± 0.25 °C
Humidity 53.2 %RH ± 2.0 %RH
Static Pressure 86.63 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRMLxT1L S/N 070113 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23.6 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001,8384:

| | |
|------------------------|----------------------------|
| IEC 60651:2001 Type 1 | ANSI S1,4-2014 Class 1 |
| IEC 60804:2000 Type 1 | ANSI S1,4 (R2006) Type 1 |
| IEC 61252:2002 | ANSI S1.25 (R2007) |
| IEC 61672:2013 Class 1 | ANSI S1,43 (R2007) Type 1 |
| IEC 61260:2001 Class 1 | ANSI S1,11 (R2009) Class 1 |

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

LARSON DAVIS - A PCB PIEZOTRONICS DIV.
1681 West 820 North
Provo, UT 84601, United States
716-684-0001



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A PCB DIVISION