
# CUBE Smart Noise Monitoring Terminal

## **Tests report**, according to the IEC 61672-3

Acoustic1

01dB.com

# Tests report

**TR-REP-10337.xls**

ISSUED FOR : Sol Acoustics Limited

Unit 11
Brunel Court
Gladbrook Park
CW9 7LP Rudheath
UK

**Name and location of the laboratory of tests:**
Acoustic1 - Overdale Manordeilo, Llandeilo
Carmathenshire UK SA19 7BD

TESTED INSTRUMENT
Designation : Integrator Sound Level Meter

Manufacturer : 01dB

Type : CUBE Serial number : 11117

Identification number :

Date of issue : 26/03/2021

This report includes 10 pages

The measurements are performed according to the IEC 61672-3, Electroacoustics, - Sound level meters – Part 3: Periodic tests.

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Head of calibration laboratory at Acoustic 1

**François MAGAND**
Head of calibration laboratory at ACOEM-01dB

Maxime DONET (delegated)

THIS REPORT is compliant with THE FD X 07-012 STANDARD DOCUMENTATION

**Identification :**

| | Sound level meter | Microphone | Accessories |
|---|---|---|---|
| Manufacturer | 01dB | GRAS | PRE22 # 1610404 |
| Type | CUBE | 40CD | Short windscreen + RA0208 noise cone |
| Serial number | 11117 | 260827 | RAL135 - 10M |
| Firmware version | Application: 2.45<br>Metrology: 2.12 | | |
| **Calibrator** | **01dB-Metravib CAL21 N° 34375244 + BAC21** | | |

**Program:**

The Sound level meter has been tested on the following characteristics:

- Self-generated noise
- Acoustical signal tests of a frequency weightings
- Electrical signal tests of frequency weightings
- Frequency and time weightings at 1 kHz
- Long-term stability
- Level linearity
- Toneburst response
- C-weighted peak sound level
- Overload indication
- High-level stability

**Method:**

The instrument is tested in an air conditioned room. The characteristics are tested with multimeter and generator calibrated in amplitude and in frequency. Some manufacturer's corrections have been applied to account the acoustical effect from the case of the sound level meter and his accessories (IEC 61672-3). These corrections are available in the sound level meter user manual.

The reference frequency of the sound level meter is 1000 Hz. The reference sound pressure level of the sound level meter is 94 dB. The sound level meter possesses a single level range.

**Tests conditions:**

| | |
|---|---|
| Date of tests | 3/26/2021 |
| Operator Name | Steve Thomas |
| Tests instruction | MET.15.INS.001_D_Fr |
| Static pressure | >95,5 ; <105 kPa |
| Temperature | 23 ± 3 °C |
| Relative humidity | >25 ; <70 %HR |

## Instruments used for tests:

| Designation | Manufacturer | Type | Serial number | Identification number |
|---|---|---|---|---|
| Multimeter | HP | 34401A | 3146A27296 | - |
| Waveform generator | KEYSIGHT | 33500B | MY57301384 | - |
| Progammable Attenuator | ACOEM | OUT1694000 | 17-10-208 | - |
| Electrostatic actuator | GRAS | 14AA | 288498 | - |
| Thermometer, hygrometer, barometer | TESTO | 622 | 39517641/806 | - |
| Calibrator | ACOEM | CAL 21 | 34675324 | - |

## Results:

Mentioned expanded uncertainties correspond to two standard uncertainty types ( k=2 ). Standard uncertainties are calculated including different uncertainty components, reference standards, instruments used, environmental conditions, calibrated instrument contribution, repeatability…

The indicated Maximum Permissible Errors (M.P.E.). are the ones defined in the standard 61672-1 for a class 1 sound level meter.

### Indication at the calibration check frequency

| Initial indication ( dB ) | Correction ( dB ) | Adjusted indication ( dB ) | Tolerance ( dB ) |
|---|---|---|---|
| 93.0 | 1.0 | 93.8 | +/- 1,0 |

### Self-generated noise

0° RA208 + short windscreen

| Microphone replaced by the electrical input-signal device | Nominal value ( dB ) | Displayed value ( dB ) |
|---|---|---|
| Leq dBA | < 14 | 11.0 |
| Leq dBB | < 15 | 10.0 |
| Leq dBC | < 20 | 11.3 |
| Leq dBZ | < 21 | 18.6 |

| Microphone installed | Nominal value ( dB ) | Displayed value ( dB ) |
|---|---|---|
| Leq dBA | < 20 | 16.4 |

**Acoustical signal tests of a frequency weightings**

| 90° RA208 + short windscreen | Measurement error *C* (dB) | Uncertainty (dB) | Maximum Permissible Error (dB) |
|---|---|---|---|
| 125 Hz | 0.0 | 0.3 | +/- 1,0 |
| 1000 Hz | 0.0 | 0.3 | +/- 0,7 |
| 8000 Hz | -0.5 | 0.5 | -2,5 ; +1,5 |
| 0° RA208 + short windscreen | *C* (dB) | Uncertainty (dB) | M.P.E. (dB) |
| 125 Hz | 0.0 | 0.3 | +/- 1,0 |
| 1000 Hz | 0.0 | 0.3 | +/- 0,7 |
| 8000 Hz | 0.3 | 0.5 | -2,5 ; +1,5 |

**Electrical signal tests of frequency weightings**

| 90° RA208 + short windscreen | Measurement error *Z* (dB) | *A* (dB) | *C* (dB) | Uncertainty (dB) | Maximum Permissible Error (dB) |
|---|---|---|---|---|---|
| 63 Hz | -0.1 | -0.1 | -0.1 | 0.4 | +/- 1,0 |
| 125 Hz | -0.1 | -0.2 | 0.0 | 0.4 | +/- 1,0 |
| 250 Hz | -0.1 | -0.2 | -0.1 | 0.4 | +/- 1,0 |
| 500 Hz | -0.1 | -0.2 | -0.1 | 0.4 | +/- 1,0 |
| 1000 Hz | 0.0 | 0.0 | 0.0 | 0.4 | +/- 0,7 |
| 2000 Hz | -0.1 | -0.1 | -0.1 | 0.4 | +/- 1,0 |
| 4000 Hz | 0.7 | 0.6 | 0.6 | 0.4 | +/- 1,0 |
| 8000 Hz | -0.7 | -1.2 | -1.2 | 0.6 | -2,5 ; +1,5 |
| 16000 Hz | -6.6 | -12.0 | -12.0 | 0.6 | -16,0 ; +2,5 |
| 0° RA208 + short windscreen | *Z* (dB) | *A* (dB) | *C* (dB) | Uncertainty (dB) | M.P.E. (dB) |
| 63 Hz | 0.0 | 0.0 | -0.1 | 0.4 | +/- 1,0 |
| 125 Hz | -0.1 | -0.2 | 0.0 | 0.4 | +/- 1,0 |
| 250 Hz | 0.0 | -0.1 | 0.0 | 0.4 | +/- 1,0 |
| 500 Hz | 0.0 | -0.1 | 0.0 | 0.4 | +/- 1,0 |
| 1000 Hz | 0.0 | 0.0 | 0.0 | 0.4 | +/- 0,7 |
| 2000 Hz | -0.1 | 0.0 | 0.0 | 0.4 | +/- 1,0 |
| 4000 Hz | 0.7 | 0.6 | 0.6 | 0.4 | +/- 1,0 |
| 8000 Hz | 0.3 | -0.3 | -0.2 | 0.6 | -2,5 ; +1,5 |
| 16000 Hz | -4.5 | -9.8 | -9.9 | 0.6 | -16,0 ; +2,5 |

**Frequency and time weightings at 1 kHz**

| 90° RA208 + short windscreen | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty (dB) | M.P.E. (dB) |
|---|---|---|---|---|
| Lp dBA / 1000 Hz Fast | 93.8 | Reference | 0.1 | |
| Lp dBA / 1000 Hz Slow | 93.8 | 0.0 | 0.1 | +/- 0,1 |
| LEQ dBA / 1000 Hz | 93.8 | 0.0 | 0.1 | +/- 0,1 |
| Lp dBC / 1000 Hz Fast | 93.8 | 0.0 | 0.1 | +/- 0,2 |
| Lp dBZ / 1000 Hz Fast | 93.8 | 0.0 | 0.1 | +/- 0,2 |
| 0° RA208 + short windscreen | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty (dB) | M.P.E. (dB) |
| Lp dBA / 1000 Hz Fast | 94.1 | Reference | 0.1 | |
| Lp dBA / 1000 Hz Slow | 94.1 | 0.0 | 0.1 | +/- 0,1 |
| LEQ dBA / 1000 Hz | 94.1 | 0.0 | 0.1 | +/- 0,1 |
| Lp dBC / 1000 Hz Fast | 94.1 | 0.0 | 0.1 | +/- 0,2 |
| Lp dBZ / 1000 Hz Fast | 94.1 | 0.0 | 0.1 | +/- 0,2 |

**Long-term stability**

90° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Initial indication | Final indication | | | |
| 94.0 | 94.0 | 0.0 | 0.1 | +/- 0,1 |

0° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Initial indication | Final indication | | | |
| 93.9 | 93.9 | 0.0 | 0.1 | +/- 0,1 |

**Level linearity**

90° RA208 + short windscreen

| Nominal value ( dB ) | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| 94.0 | 94.0 | 0.0 | 0.3 | +/- 0,8 |
| 99.0 | 99.1 | 0.1 | 0.3 | +/- 0,8 |
| 104.0 | 104.1 | 0.1 | 0.3 | +/- 0,8 |
| 109.0 | 109.0 | 0.0 | 0.3 | +/- 0,8 |
| 114.0 | 114.0 | 0.0 | 0.3 | +/- 0,8 |
| 119.0 | 118.9 | -0.1 | 0.3 | +/- 0,8 |
| 124.0 | 123.9 | -0.2 | 0.3 | +/- 0,8 |
| 128.0 | 127.9 | -0.1 | 0.3 | +/- 0,8 |
| 129.0 | 128.9 | -0.1 | 0.3 | +/- 0,8 |
| 130.0 | 129.9 | -0.1 | 0.3 | +/- 0,8 |
| 131.0 | 130.9 | -0.1 | 0.3 | +/- 0,8 |
| 132.0 | 131.9 | -0.1 | 0.3 | +/- 0,8 |
| 133.0 | 132.9 | -0.1 | 0.3 | +/- 0,8 |
| 94.0 | 94.0 | 0.0 | 0.3 | +/- 0,8 |
| 89.0 | 89.1 | 0.1 | 0.3 | +/- 0,8 |
| 84.0 | 84.1 | 0.1 | 0.3 | +/- 0,8 |
| 79.0 | 79.1 | 0.0 | 0.3 | +/- 0,8 |
| 74.0 | 74.0 | 0.0 | 0.3 | +/- 0,8 |
| 69.0 | 69.1 | 0.1 | 0.3 | +/- 0,8 |
| 64.0 | 64.1 | 0.1 | 0.3 | +/- 0,8 |
| 59.0 | 59.1 | 0.1 | 0.3 | +/- 0,8 |
| 54.0 | 54.0 | 0.0 | 0.3 | +/- 0,8 |
| 49.0 | 49.1 | 0.0 | 0.3 | +/- 0,8 |
| 44.0 | 44.2 | 0.2 | 0.3 | +/- 0,8 |
| 39.0 | 39.2 | 0.2 | 0.3 | +/- 0,8 |
| 34.0 | 33.9 | -0.1 | 0.3 | +/- 0,8 |
| 29.0 | 28.7 | -0.3 | 0.3 | +/- 0,8 |
| 26.0 | 26.5 | 0.5 | 0.3 | +/- 0,8 |
| 25.0 | 25.6 | 0.6 | 0.3 | +/- 0,8 |
| 24.0 | 24.0 | 0.0 | 0.3 | +/- 0,8 |
| 23.0 | 22.7 | -0.3 | 0.3 | +/- 0,8 |
| 22.0 | 21.8 | -0.2 | 0.3 | +/- 0,8 |

0° RA208 + short windscreen

| Nominal value ( dB ) | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| 94.0 | 94.0 | 0.0 | 0.3 | +/- 0,8 |
| 99.0 | 99.1 | 0.1 | 0.3 | +/- 0,8 |
| 104.0 | 104.0 | 0.0 | 0.3 | +/- 0,8 |
| 109.0 | 109.0 | 0.0 | 0.3 | +/- 0,8 |
| 114.0 | 113.9 | -0.1 | 0.3 | +/- 0,8 |
| 119.0 | 118.9 | -0.1 | 0.3 | +/- 0,8 |
| 124.0 | 123.9 | -0.1 | 0.3 | +/- 0,8 |
| 128.0 | 127.9 | -0.1 | 0.3 | +/- 0,8 |
| 129.0 | 128.9 | -0.1 | 0.3 | +/- 0,8 |
| 130.0 | 129.9 | -0.1 | 0.3 | +/- 0,8 |
| 131.0 | 130.9 | -0.1 | 0.3 | +/- 0,8 |
| 132.0 | 131.9 | -0.1 | 0.3 | +/- 0,8 |
| 133.0 | 132.9 | -0.1 | 0.3 | +/- 0,8 |
| 94.0 | 94.0 | 0.0 | 0.3 | +/- 0,8 |
| 89.0 | 89.1 | 0.0 | 0.3 | +/- 0,8 |
| 84.0 | 84.1 | 0.1 | 0.3 | +/- 0,8 |
| 79.0 | 79.1 | 0.1 | 0.3 | +/- 0,8 |
| 74.0 | 74.0 | 0.0 | 0.3 | +/- 0,8 |
| 69.0 | 69.1 | 0.0 | 0.3 | +/- 0,8 |
| 64.0 | 64.1 | 0.1 | 0.3 | +/- 0,8 |
| 59.0 | 59.2 | 0.2 | 0.3 | +/- 0,8 |
| 54.0 | 54.0 | 0.0 | 0.3 | +/- 0,8 |
| 49.0 | 49.0 | 0.0 | 0.3 | +/- 0,8 |
| 44.0 | 44.1 | 0.1 | 0.3 | +/- 0,8 |
| 39.0 | 39.2 | 0.2 | 0.3 | +/- 0,8 |
| 34.0 | 34.2 | 0.2 | 0.3 | +/- 0,8 |
| 29.0 | 29.2 | 0.2 | 0.3 | +/- 0,8 |
| 26.0 | 25.9 | -0.1 | 0.3 | +/- 0,8 |
| 25.0 | 25.1 | 0.1 | 0.3 | +/- 0,8 |
| 24.0 | 24.5 | 0.5 | 0.3 | +/- 0,8 |
| 23.0 | 23.4 | 0.4 | 0.3 | +/- 0,8 |
| 22.0 | 22.2 | 0.2 | 0.3 | +/- 0,8 |

## Toneburst response

90° RA208 + short windscreen

| Description | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Lpmax 134 dB 4000 Hz A Slow 200 ms | 126.6 | 0 | 0.1 | +/- 0,5 |
| Lpmax 134 dB 4000 Hz A Slow 2 ms | 107 | 0 | 0.1 | -3,0 ; +1,0 |
| Lpmax 134 dB 4000 Hz A fast 200 ms | 133 | 0 | 0.1 | +/- 0,5 |
| Lpmax 134 dB 4000 Hz A fast 2 ms | 115.8 | -0.2 | 0.1 | -1,5 ; +1,0 |
| Lpmax 134 dB 4000 Hz A fast 0.25 ms | 106.7 | -0.3 | 0.1 | -3,0 ; +1,0 |
| Leq 134 dB 4000 Hz A 1000 200 ms | 127 | 0 | 0.1 | +/- 0,5 |
| Leq 134 dB 4000 Hz A 1000 2 ms | 107 | 0 | 0.1 | -1,5 ; +1,0 |
| Leq 134 dB 4000 Hz A 1000 0.25 ms | 97.7 | -0.3 | 0.1 | -3,0 ; +1,0 |

0° RA208 + short windscreen

| Description | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Lpmax 134 dB 4000 Hz A Slow 200 ms | 126.6 | 0 | 0.1 | +/- 0,5 |
| Lpmax 134 dB 4000 Hz A Slow 2 ms | 107 | 0 | 0.1 | -3,0 ; +1,0 |
| Lpmax 134 dB 4000 Hz A fast 200 ms | 133.1 | 0.1 | 0.0 | +/- 0,5 |
| Lpmax 134 dB 4000 Hz A fast 2 ms | 115.9 | -0.1 | 0.0 | -1,5 ; +1,0 |
| Lpmax 134 dB 4000 Hz A fast 0.25 ms | 106.9 | -0.1 | 0.0 | -3,0 ; +1,0 |
| Leq 134 dB 4000 Hz A 1000 200 ms | 127 | 0 | 0.0 | +/- 0,5 |
| Leq 134 dB 4000 Hz A 1000 2 ms | 107 | 0 | 0.0 | -1,5 ; +1,0 |
| Leq 134 dB 4000 Hz A 1000 0.25 ms | 97.9 | -0.1 | 0.0 | -3,0 ; +1,0 |

## C-weighted peak sound level

90° RA208 + short windscreen

| Description | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| 8000 Hz Complete cycle | 133.6 | 1.2 | 0.1 | +/- 2,0 |
| 500 Hz Positive one-half-cycle | 134.3 | -0.1 | 0.1 | +/- 1,0 |
| 500 Hz Negative one-half-cycle | 134.3 | -0.1 | 0.1 | +/- 1,0 |

0° RA208 + short windscreen

| Description | Displayed value ( dB ) | Measurement error ( dB ) | Uncertainty ( dB ) | Erreur Maximale Tolérée (dB) |
|---|---|---|---|---|
| 8000 Hz Complete cycle | 131.3 | 1.8 | 0.1 | +/- 2,0 |
| 500 Hz Positive one-half-cycle | 133.8 | -0.6 | 0.1 | +/- 1,0 |
| 500 Hz Negative one-half-cycle | 133.8 | -0.6 | 0.1 | +/- 1,0 |

## Overload indication

90° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Positive one-half-cycle | Negative one-half-cycle | | | |
| 110.1 | 110.3 | -0.2 | 0.1 | +/- 1,5 |

0° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Positive one-half-cycle | Negative one-half-cycle | | | |
| 108.8 | 109.1 | -0.2 | 0.1 | +/- 1,5 |

## High-level stability

90° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Initial indication | Final indication | | | |
| 135.6 | 135.6 | 0.0 | 0.1 | +/- 0,1 |

0° RA208 + short windscreen

| Displayed value ( dB ) | | Measured deviation ( dB ) | Uncertainty ( dB ) | Maximum Permissible Error (dB) |
|---|---|---|---|---|
| Initial indication | Final indication | | | |
| 135.9 | 135.9 | 0.0 | 0.1 | +/- 0,1 |

# Conclusion

| CEI 61672-3 CEI:2013 Chapter: | Tests | Results |
|---|---|---|
| 5 | Preliminary inspection | Compliant |
| 7 | Environmental conditions | Compliant |
| 9 | Sound calibrator | Compliant |
| 10 | Indication at the calibration check frequency | Compliant |
| 11 | Self-generated noise | Compliant |
| 12 | Acoustical signal tests of a frequency weighting | Compliant |
| 13 | Electrical signal tests of frequency weightings | Compliant |
| 14 | Frequency and time weightings at 1 kHz | Compliant |
| 15 | Long-term stability | Compliant |
| 16 | Level linearity on the reference level range | Compliant |
| 18 | Toneburst response | Compliant |
| 19 | C-weighted peak sound level | Compliant |
| 20 | Overload indication | Compliant |
| 21 | High-level stability | Compliant |

| | |
|---|---|
| **CUBE user manual** | DOC1144 February 2018 version M |
| **Type-approval certificate** | France: LNE-29639 revision 1 dated 04/04/2017<br>Deutschland: DE-16-M-PTB-0008 dated 28/09/2016 |

The sound level meter submitted for testing 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 organization 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.

End of tests report