



## Appendix 8.4

### Calibration Certificates

---

**APPENDIX 8.4**  
**CALIBRATION CERTIFICATES**

**A8.4.1 Measurement Position 1 (Serial no. 12070)**



## Tests report

TR-REP-10410.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 : **12070**

Identification number :

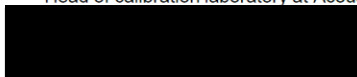
Date of issue : **23/01/2022**

This report includes **10** pages

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

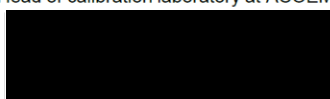
**Steve THOMAS**

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

This document may not be reproduced other than in full, except with the prior written approval of the laboratory.

01dB-Mettravib SAS - Head Office: 200 chemin des Ormeaux - F-69578 Limonest Cedex - France // Phone: +33 4 72 52 48 00 - Fax : +33 4 72 52 47 47 // [acoemgroup.com](http://acoemgroup.com)

A simplified joint stock company with a capital of 7,331,298 EUR - SIRET: 409 869 708 00019 - Lyon Trade Register: 409 869 708 - European VAT number: FR 82 409 869 708

01dB • ECOTECH • METRAVIB • ONEPROD • FIXURLASER • MEAX

Tests report:  
TR-REP-10410.xls

Page 2 of 10

**Identification :**

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 1915040
Type	CUBE	40CD	Short windscreen + RA0208 noise cone
Serial number	12070	288057	RAL135 - 10M
Firmware version	Application: 2.49 Metrology: 2.12		
<b>Calibrator</b>	<b>Calibrator of the Laboratory</b>		

**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	1/23/2022
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

Tests report:  
TR-REP-10410.xls

Page 3 of 10

**Instruments used for tests:**

Designation	Manufacturer	Type	Serial number	Identification number
Multimeter	HP	34401A	3146A27296	-
Waveform generator	KEYSIGHT	33500B	MY57301384	-
Programmable 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	Correction	Adjusted indication	Tolerance
( dB )	( dB )	( dB )	( dB )
93.7	0.3	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	9.5
Leq dBB	< 15	9.1
Leq dBC	< 20	10.4
Leq dBZ	< 21	15.3

Microphone installed	Nominal value ( dB )	Displayed value ( dB )
Leq dBA	< 20	15.3

Tests report:  
TR-REP-10410.xls

Page 4 of 10

**Acoustical signal tests of a frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>C</b> (dB)				
125 Hz	0.0			0.3	+/- 1,0
1000 Hz	0.0			0.3	+/- 0,7
8000 Hz	-0.7			0.5	-2,5 ; +1,5
0° RA208 + short windscreen	<b>C</b> (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	0.2			0.5	-2,5 ; +1,5

**Electrical signal tests of frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (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	-11.9	-12.0	0.6	-16,0 ; +2,5
0° RA208 + short windscreen	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)	Uncertainty (dB)	M.P.E. (dB)
63 Hz	0.0	0.0	0.0	0.4	+/- 1,0
125 Hz	-0.1	-0.1	0.0	0.4	+/- 1,0
250 Hz	0.0	-0.1	0.0	0.4	+/- 1,0
500 Hz	0.0	0.0	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	0.7	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

Tests report:  
TR-REP-10410.xls

Page 5 of 10

**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

Tests report:  
TR-REP-10410.xls

Page 6 of 10

**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	108.9	-0.1	0.3	+/- 0,8
114.0	113.9	-0.1	0.3	+/- 0,8
119.0	118.8	-0.2	0.3	+/- 0,8
124.0	123.8	-0.2	0.3	+/- 0,8
128.0	127.8	-0.2	0.3	+/- 0,8
129.0	128.8	-0.2	0.3	+/- 0,8
130.0	129.8	-0.2	0.3	+/- 0,8
131.0	130.8	-0.2	0.3	+/- 0,8
132.0	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	0.3	+/- 0,8
94.0	94.0	0.0	0.3	+/- 0,8
89.0	89.0	0.0	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	0.0	0.3	+/- 0,8
64.0	64.1	0.1	0.3	+/- 0,8
59.0	59.1	0.0	0.3	+/- 0,8
54.0	54.0	0.0	0.3	+/- 0,8
49.0	49.1	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.0	0.0	0.3	+/- 0,8
34.0	33.9	-0.2	0.3	+/- 0,8
29.0	29.1	0.1	0.3	+/- 0,8
26.0	26.6	0.6	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	23.8	-0.2	0.3	+/- 0,8
23.0	22.8	-0.2	0.3	+/- 0,8
22.0	22.5	0.5	0.3	+/- 0,8



Tests report:  
TR-REP-10410.xls

Page 7 of 10

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	103.9	-0.1	0.3	+/- 0,8
109.0	108.9	-0.1	0.3	+/- 0,8
114.0	113.9	-0.1	0.3	+/- 0,8
119.0	118.8	-0.2	0.3	+/- 0,8
124.0	123.8	-0.2	0.3	+/- 0,8
128.0	127.8	-0.2	0.3	+/- 0,8
129.0	128.8	-0.2	0.3	+/- 0,8
130.0	129.8	-0.2	0.3	+/- 0,8
131.0	130.8	-0.2	0.3	+/- 0,8
132.0	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	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	59.1	0.1	0.3	+/- 0,8
54.0	54.0	0.0	0.3	+/- 0,8
49.0	49.1	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.0	0.0	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	29.3	0.3	0.3	+/- 0,8
26.0	26.3	0.3	0.3	+/- 0,8
25.0	25.0	0.0	0.3	+/- 0,8
24.0	23.9	-0.1	0.3	+/- 0,8
23.0	23.2	0.2	0.3	+/- 0,8
22.0	22.5	0.5	0.3	+/- 0,8

Tests report:  
TR-REP-10410.xls

Page 8 of 10

**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	115.9	-0.1	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	0	0.0	+/- 0,5
Lpmax 134 dB 4000 Hz A fast 2 ms	116	0	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	97.8	-0.2	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	133.5	1.1	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	131.2	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

Tests report:  
TR-REP-10410.xls

**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			
108.9	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			
135.8	135.8	0.0	0.1	+/- 0,1

Tests report:  
TR-REP-10410.xls

Page 10 of 10

### Conclusion

CEI 61672-3 CEI:2013 Chapter:	Tests	Results
5	Preliminary inspection	Compliant
7	Environmental conditions	Compliant
9	Sound calibrator	Not applicable
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

<b>CUBE user manual</b>	DOC1144 February 2018 version M
<b>Type-approval certificate</b>	France: LNE-29639 revision 1 dated 04/04/2017 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

**A8.4.2 Measurement Position 2 (serial no. 12068)**



## Tests report

TR-REP-10394.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 : **12068**

Identification number :

Date of issue : **13/01/2022**

This report includes **10** pages

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

**Steve THOMAS**

Head of calibration laboratory at Acoustic 1

**François MAGAND**

Head of calibration laboratory at ACOEM-01dB

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

This document may not be reproduced other than in full, except with the prior written approval of the laboratory.

01dB-Mettravib SAS - Head Office: 200 chemin des Ormeaux - F-69578 Limonest Cedex - France // Phone: +33 4 72 52 48 00 - Fax : +33 4 72 52 47 47 // [acoemgroup.com](http://acoemgroup.com)

A simplified joint stock company with a capital of 7,331,298 EUR - SIRET: 409 869 708 00019 - Lyon Trade Register: 409 869 708 - European VAT number: FR 82 409 869 708

01dB • ECOTECH • METRAVIB • ONEPROD • FIXTURLASER • MEAX

Tests report:  
TR-REP-10394.xls

Page 2 of 10

**Identification :**

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 1936010
Type	CUBE	40CD	Short windscreen + RA0208 noise cone
Serial number	12068	292577	RAL135 - 10M
Firmware version	Application: 2.49 Metrology: 2.12		
<b>Calibrator</b>	<b>Calibrator of the Laboratory</b>		

**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	1/13/2022
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

Tests report:  
TR-REP-10394.xls

Page 3 of 10

**Instruments used for tests:**

Designation	Manufacturer	Type	Serial number	Identification number
Multimeter	HP	34401A	3146A27296	-
Waveform generator	KEYSIGHT	33500B	MY57301384	-
Programmable 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	Correction	Adjusted indication	Tolerance
( dB )	( dB )	( dB )	( dB )
94.0	0.0	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	9.7
Leq dBB	< 15	9.5
Leq dBC	< 20	10.8
Leq dBZ	< 21	15.8

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

Tests report:  
TR-REP-10394.xls

Page 4 of 10

**Acoustical signal tests of a frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>C</b> (dB)				
125 Hz	0.0			0.3	+/- 1,0
1000 Hz	0.0			0.3	+/- 0,7
8000 Hz	-1.3			0.5	-2,5 ; +1,5
0° RA208 + short windscreen	<b>C</b> (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	-0.4			0.5	-2,5 ; +1,5

**Electrical signal tests of frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)		
63 Hz	-0.1	-0.1	-0.1	0.4	+/- 1,0
125 Hz	-0.1	-0.2	-0.1	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	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)	Uncertainty (dB)	M.P.E. (dB)
63 Hz	-0.1	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	0.0	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	0.7	0.4	+/- 1,0
8000 Hz	0.3	-0.2	-0.2	0.6	-2,5 ; +1,5
16000 Hz	-4.5	-9.8	-9.9	0.6	-16,0 ; +2,5



Tests report:  
TR-REP-10394.xls

Page 5 of 10

**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

Tests report:  
TR-REP-10394.xls

Page 6 of 10

**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	-0.1	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	0.1	0.3	+/- 0,8
64.0	64.1	0.1	0.3	+/- 0,8
59.0	59.1	0.0	0.3	+/- 0,8
54.0	54.0	0.0	0.3	+/- 0,8
49.0	49.1	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.1	0.1	0.3	+/- 0,8
34.0	33.9	-0.1	0.3	+/- 0,8
29.0	28.9	-0.1	0.3	+/- 0,8
26.0	26.1	0.1	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	24.7	0.7	0.3	+/- 0,8
23.0	23.7	0.7	0.3	+/- 0,8
22.0	22.5	0.5	0.3	+/- 0,8

Tests report:  
TR-REP-10394.xls

Page 7 of 10

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	104.1	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	-0.1	0.3	+/- 0,8
128.0	127.9	-0.1	0.3	+/- 0,8
129.0	129.0	-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	0.1	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	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.1	0.1	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	29.1	0.1	0.3	+/- 0,8
26.0	26.3	0.3	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	24.2	0.2	0.3	+/- 0,8
23.0	23.2	0.2	0.3	+/- 0,8
22.0	22.1	0.0	0.3	+/- 0,8

Tests report:  
TR-REP-10394.xls

**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	133.1	0.1	0.1	+/- 0,5
Lpmax 134 dB 4000 Hz A fast 2 ms	115.9	-0.1	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	97.8	-0.2	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	107.1	0.1	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	116	0	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	127.1	0.1	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	97.8	-0.2	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	134.4	0.0	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

Tests report:  
TR-REP-10394.xls

Page 9 of 10

**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			
110.7	110.9	-0.3	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			
109.5	109.7	-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			
135.7	135.7	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

Tests report:  
TR-REP-10394.xls

Page 10 of 10

### Conclusion

CEI 61672-3 CEI:2013 Chapter:	Tests	Results
5	Preliminary inspection	Compliant
7	Environmental conditions	Compliant
9	Sound calibrator	Not applicable
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

<b>CUBE user manual</b>	DOC1144 February 2018 version M
<b>Type-approval certificate</b>	France: LNE-29639 revision 1 dated 04/04/2017 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

**A8.4.3 Boundary Measurement Position 1 (serial no. 11571)**



## Tests report

TR-REP-10369.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 : [11571](#)

Identification number :

Date of issue : [06/08/2021](#)

This report includes [10](#) pages

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

**Steve THOMAS**

Head of calibration laboratory at Acoustic 1

**François MAGAND**

Head of calibration laboratory at ACOEM-01dB

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

This document may not be reproduced other than in full, except with the prior written approval of the laboratory.

01dB-Mettravib SAS - Head Office: 200 chemin des Ormeaux - F-69578 Limonest Cedex - France // Phone: +33 4 72 52 48 00 - Fax : +33 4 72 52 47 47 // [acoemgroup.com](http://acoemgroup.com)

A simplified joint stock company with a capital of 7,331,298 EUR - SIRET: 409 869 708 00019 - Lyon Trade Register: 409 869 708 - European VAT number: FR 82 409 869 708

01dB • ECOTECH • METRAVIB • ONEPROD • FIXURLASER • MEAX

Tests report:  
TR-REP-10369.xls

Page 2 of 10

**Identification :**

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 1805255
Type	CUBE	40CD	Short windscreen + RA0208 noise cone
Serial number	11571	331595	RAL135 - 10M
Firmware version	Application: 2.46 Metrology: 2.12		
<b>Calibrator</b>	<b>Calibrator of the Laboratory</b>		

**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	8/6/2021
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



Tests report:  
TR-REP-10369.xls

Page 3 of 10

**Instruments used for tests:**

Designation	Manufacturer	Type	Serial number	Identification number
Multimeter	HP	34401A	3146A27296	-
Waveform generator	KEYSIGHT	33500B	MY57301384	-
Programmable 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	Correction	Adjusted indication	Tolerance
( dB )	( dB )	( dB )	( dB )
93.7	0.4	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	9.4
Leq dBB	< 15	9.0
Leq dBC	< 20	10.6
Leq dBZ	< 21	15.9

Microphone installed	Nominal value ( dB )	Displayed value ( dB )
Leq dBA	< 20	15.5

Tests report:  
TR-REP-10369.xls

Page 4 of 10

**Acoustical signal tests of a frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>C</b> (dB)				
125 Hz	0.0			0.3	+/- 1,0
1000 Hz	0.0			0.3	+/- 0,7
8000 Hz	-1.2			0.5	-2,5 ; +1,5
0° RA208 + short windscreen	<b>C</b> (dB)			Uncertainty (dB)	M.P.E. (dB)
125 Hz	0.1			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			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (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	0.7	0.6	0.4	+/- 1,0
8000 Hz	-0.7	-1.2	-1.2	0.6	-2,5 ; +1,5
16000 Hz	-6.6	-11.9	-12.0	0.6	-16,0 ; +2,5
0° RA208 + short windscreen	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)	Uncertainty (dB)	M.P.E. (dB)
63 Hz	0.0	-0.1	0.0	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	0.0	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	0.7	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

Tests report:  
TR-REP-10369.xls

Page 5 of 10

**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

Tests report:  
TR-REP-10369.xls

Page 6 of 10

**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	104.0	0.0	0.3	+/- 0,8
109.0	108.9	-0.1	0.3	+/- 0,8
114.0	113.9	-0.1	0.3	+/- 0,8
119.0	118.8	-0.2	0.3	+/- 0,8
124.0	123.8	-0.2	0.3	+/- 0,8
128.0	127.8	-0.2	0.3	+/- 0,8
129.0	128.8	-0.2	0.3	+/- 0,8
130.0	129.8	-0.2	0.3	+/- 0,8
131.0	130.8	-0.2	0.3	+/- 0,8
132.0	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	0.3	+/- 0,8
94.0	94.0	0.0	0.3	+/- 0,8
89.0	89.0	0.0	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	0.0	0.3	+/- 0,8
64.0	64.1	0.1	0.3	+/- 0,8
59.0	59.1	0.0	0.3	+/- 0,8
54.0	54.0	0.0	0.3	+/- 0,8
49.0	49.1	0.1	0.3	+/- 0,8
44.0	44.1	0.0	0.3	+/- 0,8
39.0	39.0	0.0	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	29.3	0.3	0.3	+/- 0,8
26.0	26.3	0.3	0.3	+/- 0,8
25.0	24.9	-0.1	0.3	+/- 0,8
24.0	24.1	0.1	0.3	+/- 0,8
23.0	23.4	0.4	0.3	+/- 0,8
22.0	22.4	0.4	0.3	+/- 0,8



Tests report:  
TR-REP-10369.xls

Page 7 of 10

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	108.9	-0.1	0.3	+/- 0,8
114.0	113.9	-0.1	0.3	+/- 0,8
119.0	118.9	-0.2	0.3	+/- 0,8
124.0	123.8	-0.2	0.3	+/- 0,8
128.0	127.9	-0.2	0.3	+/- 0,8
129.0	128.9	-0.1	0.3	+/- 0,8
130.0	129.8	-0.2	0.3	+/- 0,8
131.0	130.8	-0.2	0.3	+/- 0,8
132.0	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	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	0.1	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	59.2	0.2	0.3	+/- 0,8
54.0	54.0	0.0	0.3	+/- 0,8
49.0	49.1	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.1	0.1	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	29.3	0.3	0.3	+/- 0,8
26.0	26.3	0.3	0.3	+/- 0,8
25.0	25.0	0.0	0.3	+/- 0,8
24.0	24.4	0.4	0.3	+/- 0,8
23.0	23.3	0.3	0.3	+/- 0,8
22.0	22.6	0.6	0.3	+/- 0,8

Tests report:  
TR-REP-10369.xls

**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	97.8	-0.2	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	116	0	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	127.1	0.1	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	131.0	1.6	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

Tests report:  
TR-REP-10369.xls

Page 9 of 10

**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			
110.0	110.2	-0.3	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	109.0	-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	135.8	0.0	0.1	+/- 0,1

Tests report:  
TR-REP-10369.xls

Page 10 of 10

### Conclusion

CEI 61672-3 CEI:2013 Chapter:	Tests	Results
5	Preliminary inspection	Compliant
7	Environmental conditions	Compliant
9	Sound calibrator	Not applicable
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

<b>CUBE user manual</b>	DOC1144 February 2018 version M
<b>Type-approval certificate</b>	France: LNE-29639 revision 1 dated 04/04/2017 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



**A8.4.4 Boundary Measurement Position 2 (serial no. 11348)**



## Tests report

TR-REP-10368.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 : [11348](#)

Identification number :

Date of issue : [06/08/2021](#)

This report includes [10](#) pages

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

**Steve THOMAS**

Head of calibration laboratory at Acoustic 1

**François MAGAND**

Head of calibration laboratory at ACOEM-01dB

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

This document may not be reproduced other than in full, except with the prior written approval of the laboratory.

01dB-Mettravib SAS - Head Office: 200 chemin des Ormeaux - F-69578 Limonest Cedex - France // Phone: +33 4 72 52 48 00 - Fax : +33 4 72 52 47 47 // [acoemgroup.com](http://acoemgroup.com)

A simplified joint stock company with a capital of 7,331,298 EUR - SIRET: 409 869 708 00019 - Lyon Trade Register: 409 869 708 - European VAT number: FR 82 409 869 708

01dB • ECOTECH • METRAVIB • ONEPROD • FIXURLASER • MEAX

Tests report:  
TR-REP-10368.xls

Page 2 of 10

**Identification :**

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 1805363
Type	CUBE	40CD	Short windscreen + RA0208 noise cone
Serial number	11348	260642	RAL135 - 10M
Firmware version	Application: 2.46 Metrology: 2.12		
<b>Calibrator</b>	<b>Calibrator of the Laboratory</b>		

**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	8/6/2021
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

Tests report:  
TR-REP-10368.xls

Page 3 of 10

**Instruments used for tests:**

Designation	Manufacturer	Type	Serial number	Identification number
Multimeter	HP	34401A	3146A27296	-
Waveform generator	KEYSIGHT	33500B	MY57301384	-
Programmable 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	Correction	Adjusted indication	Tolerance
( dB )	( dB )	( dB )	( dB )
94.1	-0.1	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	8.8
Leq dBB	< 15	8.2
Leq dBC	< 20	9.5
Leq dBZ	< 21	15.9

Microphone installed	Nominal value ( dB )	Displayed value ( dB )
Leq dBA	< 20	15.5

Tests report:  
TR-REP-10368.xls

Page 4 of 10

**Acoustical signal tests of a frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>C</b> (dB)				
125 Hz	0.0			0.3	+/- 1,0
1000 Hz	0.0			0.3	+/- 0,7
8000 Hz	-1.2			0.5	-2,5 ; +1,5
0° RA208 + short windscreen	<b>C</b> (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			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)		
63 Hz	-0.1	-0.1	-0.1	0.4	+/- 1,0
125 Hz	-0.1	-0.2	-0.1	0.4	+/- 1,0
250 Hz	-0.1	-0.2	-0.1	0.4	+/- 1,0
500 Hz	-0.2	-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	-0.2	0.4	+/- 1,0
4000 Hz	0.5	0.6	0.1	0.4	+/- 1,0
8000 Hz	0.1	-1.2	-1.8	0.6	-2,5 ; +1,5
16000 Hz	-7.4	-12.0	-12.8	0.6	-16,0 ; +2,5
0° RA208 + short windscreen	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)	Uncertainty (dB)	M.P.E. (dB)
63 Hz	0.0	-0.1	0.1	0.4	+/- 1,0
125 Hz	0.0	-0.2	0.2	0.4	+/- 1,0
250 Hz	0.1	-0.1	0.1	0.4	+/- 1,0
500 Hz	0.1	0.0	0.1	0.4	+/- 1,0
1000 Hz	0.0	0.0	0.0	0.4	+/- 0,7
2000 Hz	-0.1	0.0	-0.1	0.4	+/- 1,0
4000 Hz	0.4	0.6	0.2	0.4	+/- 1,0
8000 Hz	1.5	-0.3	-0.7	0.6	-2,5 ; +1,5
16000 Hz	-5.2	-15.8	-10.5	0.6	-16,0 ; +2,5

Tests report:  
TR-REP-10368.xls

Page 5 of 10

**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	94.0	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

Tests report:  
TR-REP-10368.xls

Page 6 of 10

**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	104.0	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	-0.2	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	89.0	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	69.0	0.0	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	0.1	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.0	0.0	0.3	+/- 0,8
34.0	33.9	-0.1	0.3	+/- 0,8
29.0	29.2	0.2	0.3	+/- 0,8
26.0	26.5	0.5	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	23.9	-0.1	0.3	+/- 0,8
23.0	22.8	-0.2	0.3	+/- 0,8
22.0	22.3	0.3	0.3	+/- 0,8

Tests report:  
TR-REP-10368.xls

Page 7 of 10

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	131.8	-0.2	0.3	+/- 0,8
133.0	132.4	-0.6	0.3	+/- 0,8
94.0	94.0	0.0	0.3	+/- 0,8
89.0	89.0	0.0	0.3	+/- 0,8
84.0	83.4	-0.6	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	69.0	0.0	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	49.0	0.0	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.1	0.1	0.3	+/- 0,8
34.0	33.9	-0.1	0.3	+/- 0,8
29.0	28.9	-0.1	0.3	+/- 0,8
26.0	26.2	0.2	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	24.2	0.2	0.3	+/- 0,8
23.0	23.0	0.0	0.3	+/- 0,8
22.0	21.9	-0.1	0.3	+/- 0,8

Tests report:  
TR-REP-10368.xls

**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	133.1	0.1	0.1	+/- 0,5
Lpmax 134 dB 4000 Hz A fast 2 ms	116	0	0.1	-1,5 ; +1,0
Lpmax 134 dB 4000 Hz A fast 0.25 ms	106.6	-0.4	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	97.8	-0.2	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	134.4	0.0	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	131.0	1.6	0.1	+/- 2,0
500 Hz Positive one-half-cycle	133.8	-0.6	0.1	+/- 1,0
500 Hz Negative one-half-cycle	133.9	-0.5	0.1	+/- 1,0



Tests report:  
TR-REP-10368.xls

Page 9 of 10

**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			
109.1	109.3	-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			
107.9	108.0	-0.1	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

Tests report:  
TR-REP-10368.xls

Page 10 of 10

### Conclusion

CEI 61672-3 CEI:2013 Chapter:	Tests	Results
5	Preliminary inspection	Compliant
7	Environmental conditions	Compliant
9	Sound calibrator	Not applicable
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

<b>CUBE user manual</b>	DOC1144 February 2018 version M
<b>Type-approval certificate</b>	France: LNE-29639 revision 1 dated 04/04/2017 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

**A8.4.5 Boundary Measurement Position 3 (serial no. 11495)**



## Tests report

TR-REP-10370.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 : [11495](#)

Identification number :

Date of issue : [08/08/2021](#)

This report includes [10](#) pages

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

**Steve THOMAS**

Head of calibration laboratory at Acoustic 1



**François MAGAND**

Head of calibration laboratory at ACOEM-01dB

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

This document may not be reproduced other than in full, except with the prior written approval of the laboratory.

01dB-Mettravib SAS - Head Office: 200 chemin des Ormeaux - F-69578 Limonest Cedex - France // Phone: +33 4 72 52 48 00 - Fax: +33 4 72 52 47 47 // [acoemgroup.com](http://acoemgroup.com)

A simplified joint stock company with a capital of 7,331,298 EUR - SIRET: 409 869 708 00019 - Lyon Trade Register: 409 869 708 - European VAT number: FR 82 409 869 708

01dB • ECOTECH • METRAVIB • ONEPROD • FIXTURLASER • MEAX

Tests report:  
TR-REP-10370.xls

Page 2 of 10

**Identification :**

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 1805327
Type	CUBE	40CD	Short windscreen + RA0208 noise cone
Serial number	11495	331753	RAL135 - 10M
Firmware version	Application: 2.46 Metrology: 2.12		
<b>Calibrator</b>	<b>Calibrator of the Laboratory</b>		

**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	8/8/2021
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

Tests report:  
TR-REP-10370.xls

Page 3 of 10

**Instruments used for tests:**

Designation	Manufacturer	Type	Serial number	Identification number
Multimeter	HP	34401A	3146A27296	-
Waveform generator	KEYSIGHT	33500B	MY57301384	-
Programmable 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	Correction	Adjusted indication	Tolerance
( dB )	( dB )	( dB )	( dB )
93.6	0.4	93.9	+/- 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	10.8
Leq dBB	< 15	11.2
Leq dBC	< 20	14.1
Leq dBZ	< 21	19.5

Microphone installed	Nominal value ( dB )	Displayed value ( dB )
Leq dBA	< 20	15.8

Tests report:  
TR-REP-10370.xls

Page 4 of 10

**Acoustical signal tests of a frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>C</b> (dB)				
125 Hz	0.0			0.3	+/- 1,0
1000 Hz	0.0			0.3	+/- 0,7
8000 Hz	-0.9			0.5	-2,5 ; +1,5
0° RA208 + short windscreen	<b>C</b> (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	-0.1			0.5	-2,5 ; +1,5

**Electrical signal tests of frequency weightings**

90° RA208 + short windscreen	Measurement error			Uncertainty (dB)	Maximum Permissible Error (dB)
	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)		
63 Hz	-0.1	-0.2	-0.1	0.4	+/- 1,0
125 Hz	-0.1	-0.2	-0.1	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	0.7	0.6	0.4	+/- 1,0
8000 Hz	-0.7	-1.2	-1.2	0.6	-2,5 ; +1,5
16000 Hz	-6.6	-11.9	-12.0	0.6	-16,0 ; +2,5
0° RA208 + short windscreen	<b>Z</b> (dB)	<b>A</b> (dB)	<b>C</b> (dB)	Uncertainty (dB)	M.P.E. (dB)
63 Hz	-0.1	-0.1	-0.1	0.4	+/- 1,0
125 Hz	-0.1	-0.1	0.0	0.4	+/- 1,0
250 Hz	0.0	-0.1	0.0	0.4	+/- 1,0
500 Hz	0.0	0.0	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	0.7	0.4	+/- 1,0
8000 Hz	0.2	-0.2	-0.2	0.6	-2,5 ; +1,5
16000 Hz	-4.5	-9.8	-9.8	0.6	-16,0 ; +2,5

Tests report:  
TR-REP-10370.xls

Page 5 of 10

**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

Tests report:  
TR-REP-10370.xls

Page 6 of 10

**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	104.0	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	118.8	-0.2	0.3	+/- 0,8
124.0	123.8	-0.2	0.3	+/- 0,8
128.0	127.8	-0.2	0.3	+/- 0,8
129.0	128.8	-0.2	0.3	+/- 0,8
130.0	129.8	-0.2	0.3	+/- 0,8
131.0	130.8	-0.2	0.3	+/- 0,8
132.0	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	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	0.1	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	44.1	0.1	0.3	+/- 0,8
39.0	39.1	0.1	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	28.9	-0.1	0.3	+/- 0,8
26.0	26.2	0.2	0.3	+/- 0,8
25.0	25.6	0.5	0.3	+/- 0,8
24.0	24.8	0.8	0.3	+/- 0,8
23.0	23.2	0.2	0.3	+/- 0,8
22.0	22.6	0.6	0.3	+/- 0,8



Tests report:  
TR-REP-10370.xls

Page 7 of 10

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	108.9	-0.1	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	123.8	-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	131.8	-0.2	0.3	+/- 0,8
133.0	132.8	-0.2	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	0.1	0.3	+/- 0,8
74.0	74.0	0.0	0.3	+/- 0,8
69.0	69.0	0.0	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	49.0	0.0	0.3	+/- 0,8
44.0	44.1	0.1	0.3	+/- 0,8
39.0	39.2	0.1	0.3	+/- 0,8
34.0	34.0	0.0	0.3	+/- 0,8
29.0	29.0	0.0	0.3	+/- 0,8
26.0	26.1	0.1	0.3	+/- 0,8
25.0	25.4	0.4	0.3	+/- 0,8
24.0	24.5	0.5	0.3	+/- 0,8
23.0	23.6	0.6	0.3	+/- 0,8
22.0	22.4	0.4	0.3	+/- 0,8

Tests report:  
TR-REP-10370.xls

Page 8 of 10

**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	133.1	0.1	0.1	+/- 0,5
Lpmax 134 dB 4000 Hz A fast 2 ms	116	0	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	97.8	-0.2	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	106.8	-0.2	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	134.4	0.0	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	133.9	-0.5	0.1	+/- 1,0

Tests report:  
TR-REP-10370.xls

Page 9 of 10

**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			
109.6	109.8	-0.3	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			
108.3	108.6	-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			
135.8	135.8	0.0	0.1	+/- 0.1

**A8.4.6 Acoustic Calibrator (serial no. 34675320)**

<h1>Certificate of Calibration</h1> <p>Issued by University of Salford (Acoustic Calibration Laboratory)</p>		
Page 1 of 2		
APPROVED SIGNATORIES Claire Lomax [x]     Andy Moorhouse [ ] Gary Phillips [ ]     Danny McCaul [ ]		
<b>acoustic calibration laboratory</b> <small>The University of Salford, Salford, Greater Manchester, M5 4WT, UK <a href="http://www.acoustics.salford.ac.uk">http://www.acoustics.salford.ac.uk</a> t 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk</small>		
Certificate Number: 05342/1		Date of Issue: 1 July 2021
<h2>CALIBRATION OF A SOUND CALIBRATOR</h2>		
FOR: Sol Acoustics Ltd Unit 11, Brunel Court Gadbrook Park Rudheath, Northwich CW09 7LP		
FOR THE ATTENTION OF: Brian Horner		
DESCRIPTION: Calibrator with housing for one-inch microphones and adaptor type BAC21 for half- inch microphones.		
MANUFACTURER: 01dB		
TYPE: CAL 21		
SERIAL NUMBER: 34675320 (2017)		
DATE RECEIVED: 17 June 2021		
DATE OF CALIBRATION: 18 June 2021		
LOCATION OF CALIBRATION: Acoustic Calibration Laboratory, Newton G31, University of Salford.		
TEST PROCEDURE: CTP06 (Laboratory Manual)		
Test Engineer (initial): GP		Name: Gary Phillips
<p><i>Results in this certificate relate only to instruments tested.</i></p>		
<p><small>This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.</small></p>		

## Certificate of Calibration

Issued by University of Salford (Acoustic Calibration Laboratory)  
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Page 2 of 2

Certificate Number: 05342/1

Date of Issue: 1 July 2021

### MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, B&K 4192 WS2P condenser microphone. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The measured sound pressure level has been corrected for the effects of the load volume of the B&K 4192 reference microphone so that the stated output level is correct for use with a 01dB MCE 212 microphone. Consult the manufacturer's instruction manual for any corrections, due to slight differences in microphone load volumes, to the stated level which may be required when using this sound calibrator with other microphone models.

The manufacturer states that automatic compensation is applied for the effects of changes in atmospheric pressure.

### RESULTS

Coupler configuration:	Half-inch
Calibration output level correct for microphone type:	01dB MCE 212
Output level (dB re 20µPa):	94.03 dB ± 0.09 dB
Frequency (Hz):	1001.87 Hz ± 0.12 Hz
Total Distortion (%):	1.24 % ± 0.22 %

Average environmental conditions at the time of measurement were:

Pressure:	101.310 kPa ± 0.015 kPa
Temperature:	21.7 °C ± 0.4 °C
Relative humidity:	44.8 % ± 2.1 %

*The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.*

*All measurement results are retained at the acoustic calibration laboratory for at least four years.*

-----END OF CERTIFICATE-----

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.