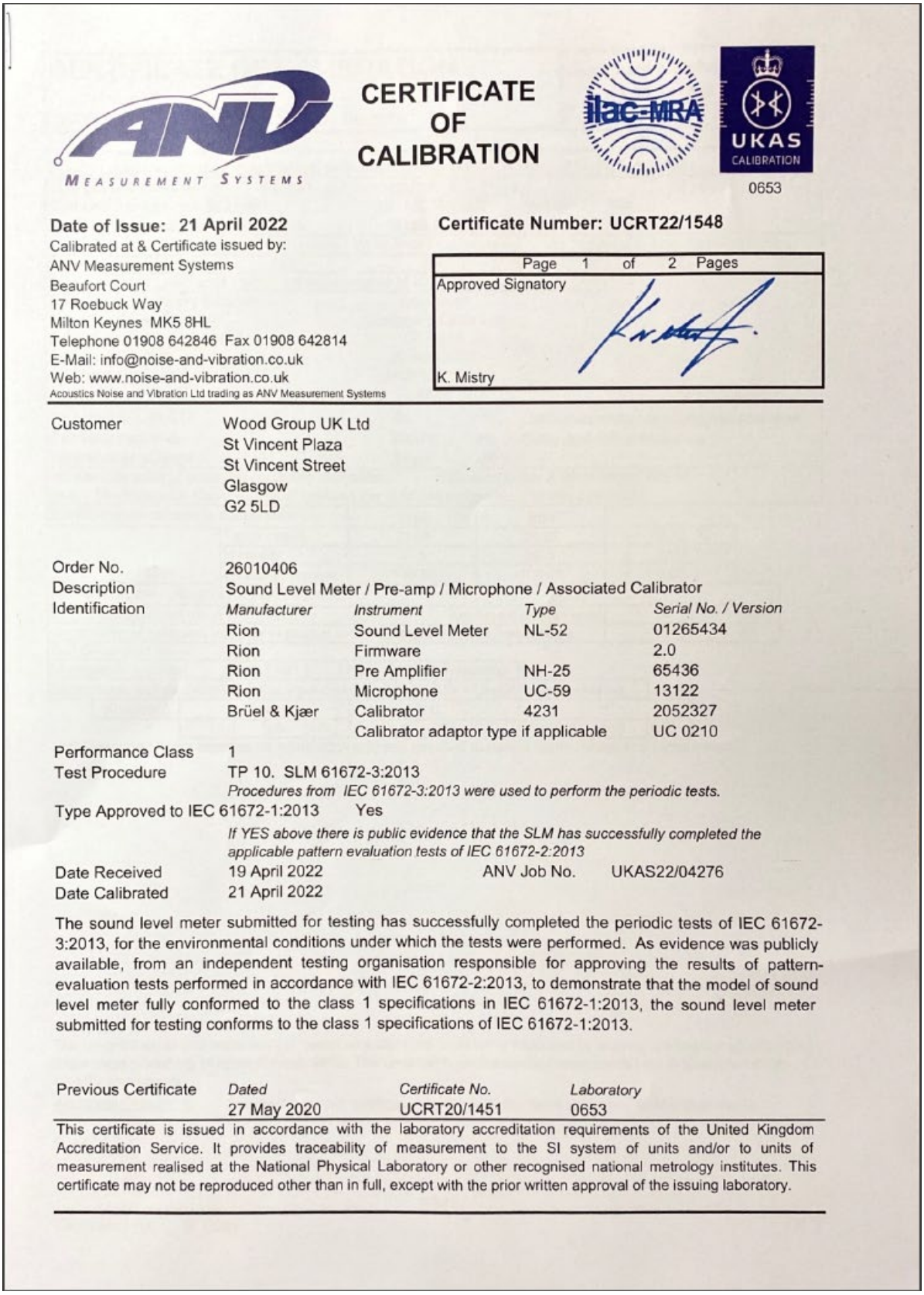
TECHNICAL APPENDIX 13.2: CALIBRATION CERTIFICATES

A.1 CALIBRATION CERTIFICATE NL52 01265434



ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 21 April 2022

Certificate Number: UCRT22/1548

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Wood Group UK Ltd St Vincent Plaza St Vincent Street Glasgow G2 5LD
Order No.	26010406
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01265434
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	65436
Rion	Microphone	UC-59	13122
Brüel & Kjær	Calibrator	4231	2052327
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 19 April 2022 ANV Job No. UKAS22/04276

Date Calibrated 21 April 2022

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	27 May 2020	UCRT20/1451	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to 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.

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1548

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013 — YES

Specified or equivalent Calibrator	Equivalent		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	UC 0210		
Calibrator cal. date	20 April 2022		
Calibrator cert. number	UCRT22/1540		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.11	dB	Calibration reference sound pressure level
Calibrator frequency	999.79	Hz	Calibration check frequency
Reference level range	Single	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15

Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	23.68	24.32	± 0.30 °C
Humidity	41.1	39.9	± 3.00 %RH
Ambient Pressure	100.33	100.28	± 0.03 kPa

Indication at the Calibration Check Frequency

Initial indicated level	94.1 dB	Adjusted indicated level	94.1 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10 dB

Self Generated Noise

Microphone installed - Less Than 17.9 dB A Weighting

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	13.1	dB	UR	17.4	dB	UR	22.8	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

..... END .....

Calibrated by: B. Giles R 3

A.2 CALIBRATION CERTIFICATE NL52 01265412

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 21 April 2022

Certificate Number: UCRT22/1552

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Wood Group UK Ltd St Vincent Plaza St Vincent Street Glasgow G2 5LD
Order No.	26010406
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01265412
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	65414
Rion	Microphone	UC-59	10633
Brüel & Kjær	Calibrator	4231	2052327
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 19 April 2022 ANV Job No. UKAS22/04276

Date Calibrated 21 April 2022

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	22 May 2020	UCRT20/1446	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to 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.

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1552

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES		
Specified or equivalent Calibrator	Equivalent		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	UC 0210		
Calibrator cal. date	20 April 2022		
Calibrator cert. number	UCRT22/1540		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.11	dB	Calibration reference sound pressure level
Calibrator frequency	999.79	Hz	Calibration check frequency
Reference level range	Single	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15

Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	24.50	24.30	± 0.30 °C
Humidity	40.6	42.2	± 3.00 %RH
Ambient Pressure	100.24	100.20	± 0.03 kPa

Indication at the Calibration Check Frequency					
Initial indicated level	94.2	dB	Adjusted indicated level	94.1	dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±				0.10	dB

Self Generated Noise									
Microphone installed -	Less Than	17.9	dB	A Weighting					
Microphone replaced with electrical input device -				UR = Under Range indicated					

Weighting	A			C			Z		
	11.7	dB	UR	15.5	dB	UR	20.8	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

..... END .....

Calibrated by: B. Giles R 3

A.3 CALIBRATION CERTIFICATE DUO 10510

Acoustic1 01dB

Tests report

TR-REP-10564.xls

ISSUED FOR : Wood Group
319 St Vincent St

G2 7EA Glasgow
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 : DUO + DMK Serial number : 10510

Identification number :

Date of issue : 28/03/2023

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

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

Tests report:
TR-REP-10564.xls

Identification :

	Sound level meter	Microphone	Accessories
Manufacturer	01dB	GRAS	PRE22 # 10275
Type	DUO + DMK	40CD	Short windscreen + RA0208 noise cone
Serial number	10510	154425	RAL135 - 10M
Firmware version	See Tests report of DUO without DMK		
Calibrator	Calibrator of the Laboratory		

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	3/28/2023
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
Insulated Chamber	SKC Acoustic	-	-	-
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)
0.0	0.0	0.0	+/- 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	9.6
Leq dBB	< 15	9.8
Leq dBC	< 20	12.0
Leq dBZ	< 21	15.7

Microphone installed	Nominal value (dB)	Displayed value (dB)
Leq dBA	< 20	15.6

Tests report:
TR-REP-10564.xls

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	-1.0	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	-0.2	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	-0.1	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	-11.9	-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	-0.1	0.0	-0.1	0.4	+/- 1,0
125 Hz	0.0	-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

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-10564.xls

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	103.9	-0.1	0.3	+/- 0,8
109.0	108.9	-0.1	0.3	+/- 0,8
114.0	113.8	-0.2	0.3	+/- 0,8
119.0	118.8	-0.2	0.3	+/- 0,8
124.0	123.7	-0.3	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	-0.3	0.3	+/- 0,8
131.0	130.7	-0.3	0.3	+/- 0,8
132.0	131.8	-0.3	0.3	+/- 0,8
133.0	132.7	-0.3	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	49.0	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	34.1	0.1	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	25.2	0.2	0.3	+/- 0,8
24.0	24.5	0.5	0.3	+/- 0,8
23.0	23.1	0.1	0.3	+/- 0,8
22.0	22.2	0.2	0.3	+/- 0,8

Tests report:
TR-REP-10564.xls

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	113.8	-0.2	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	132.7	-0.3	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	39.1	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	25.3	0.3	0.3	+/- 0,8
24.0	24.4	0.4	0.3	+/- 0,8
23.0	23.5	0.5	0.3	+/- 0,8
22.0	22.5	0.5	0.3	+/- 0,8

Tests report:
TR-REP-10564.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	126.7	0.1	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	127.1	0.1	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	0	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	134.3	-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	133.9	-0.5	0.1	+/- 1,0

Tests report:
TR-REP-10564.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			
109.4	109.6	-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			
108.2	108.4	-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			
135.8	135.8	0.0	0.1	+/- 0,1

Conclusion

CEI 61672-3 CEI:2013 Chapter:	Tests	Results
5	Preliminary inspection	Compliant
7	Environmental conditions	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

DUO user manual	DOC1112 version K August 2017
Type-approval certificate	France: LNE-21674 revision 4 dated 04/04/2017 Deutschland: DE-16-M-PTB-0007 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

A.4 CALIBRATION CERTIFICATE NL52 00175536

ANV MEASUREMENT SYSTEMS

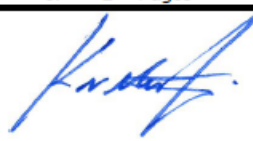
CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 25 May 2022 **Certificate Number: UCRT22/1695**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory



K. Mistry

Customer	Wood Group St. Vincent Plaza (Floor 2) 319 St. Vincent Street Glasgow G2 5LP
Order No.	26010406
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00175536
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	65638
	Rion	Microphone	UC-59	13128
	Rion	Calibrator	NC-74	34178103
		Calibrator adaptor type if applicable		NC-74-002

Performance Class	1
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*
Date Received	23 May 2022 ANV Job No. UKAS22/05346
Date Calibrated	25 May 2022

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	26 May 2020	UCRT20/1449	0653

CERTIFICATE OF CALIBRATION

Certificate Number
UCRT22/1695

UKAS Accredited Calibration Laboratory No. 0653

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1			
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion	
Date provided or internet download date	19 March 2021			

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES		
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	24 May 2022		
Calibrator cert. number	UCRT22/1682		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.02	dB	Calibration reference sound pressure level
Calibrator frequency	1001.97	Hz	Calibration check frequency
Reference level range	Single	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	24.65	24.37	± 0.30 °C
Humidity	48.5	48.7	± 3.00 %RH
Ambient Pressure	100.05	100.05	± 0.03 kPa

Indication at the Calibration Check Frequency				
Initial indicated level	94.3	dB	Adjusted indicated level	94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±				0.10 dB

Self Generated Noise

Microphone installed - Less Than 19.1 dB A Weighting

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	13.1	dB	UR	16.9	dB	UR	23.1	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

END

Calibrated by: B. Bogdan R 2

A.5 CALIBRATION CERTIFICATE NC74 34178103

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 24 May 2022

Certificate Number: UCRT22/1682

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Wood Group St. Vincent Plaza (Floor 2) 319 St. Vincent Street Glasgow G2 5LP
Order No.	26010406
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-74	34178103

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	UKAS22/05346	
Date Received	23 May 2022	
Date Calibrated	24 May 2022	
Previous Certificate	*Dated*	22 May 2020
	Certificate No.	UCRT20/1440
	Laboratory	0653

CERTIFICATE OF CALIBRATION	Certificate Number UCRT22/1682
UKAS Accredited Calibration Laboratory No. 0653	Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	*Manufacturer*	*Type*
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.02 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1001.97	±	0.12 Hz
The total distortion was	1.61	±	0.11 % Distortion

During the measurements environmental conditions were

Temperature	23	to	24	°C
Relative Humidity	44	to	51	%
Barometric Pressure	99.4	to	99.5	kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END .....

Note:

Calibrator adjusted prior to calibration?	NO	
Initial Level	N/A	dB
Initial Frequency	N/A	Hz

Additional Comments: The results on this certificate only relate to the items calibrated as identified above.

None

Calibrated by: B. Bogdan R 2