Appendix 10.2 – Noise Site Survey Record Sheet

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Site Survey Record Sheet

Project Name: Nisthill Wind Farm

Site location: Mainland, Orkney

Client: Infinergy

Date of survey: 01/03/2022

Purpose of survey: Baseline survey

Surveyor: Simon Waddell

Reviewer:

Sound level meter make/model	Rion NL-52
Sound level meter serial no.	Multiple
Calibrator make/model	Rion NC-74
Calibrator serial no.	34167510
Height above ground.	1.4m – environmental monitoring kit
Relevant guidance:	ETSU-R-97, IoA GPG

NMP1 - Myres		
Calibration at start of measurement:	93.9	
Time & date at start of measurement:	11/11/21 10:40	
GPS Coordinates of NMP:	329425, 1027824	
SLM file no.(s)	0001	
Weather conditions:		
Wind speed (m/s):	Moderate to strong	
Precipitation	Short squall with rain then dry and clear skies	
Cloud cover (%)	10	
Averaging period used:	10 min	
Broad-band/octave band/ 1/3rd octave band:	Broad-band	
Dominant noise source(s):		
Buffeting from the wind. Very infrequent vehicle passes		
Transient/lesser noise sources:		
None audible during installation		
Notes on location selected – rationale:		
Cottage 'Myres' comprises an unoccupied dwelling with associated outbuildings. The property is remote from any small turbines but lies within the predicted 35 dBL_{A90} contour for the proposed Nisthill development. No boiler flue was noted and the property is semi-derelict, therefore no noise from plant or activities within the property will occur. The sound level meter (SLM) was installed within the garden area of the property and is screened from the road by an outbuilding. There was no nearby vegetation to cause rustling noise and the microphone was >3.5m from any walls or reflective surfaces. There are multiple occupied properties nearby, however many of these have associated small turbines and are therefore unsuitable as monitoring locations. No turbine noise was audible at the installed location, despite it being a windy day – the selected locations is 440 m from the closest small turbine and noise from these is considered to be negligible at the chosen location.		
Time & date at end of measurement:	22/03/22 11:00	
Calibration at end of measurement:	94.0	

NMP1 - Myres	
Photographs of SLM in position & identified noise sources	
	

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NMP1 - Myres
Location

NMP2 - Hundland		
Calibration at start of measurement:	93.9	
Time & date at start of measurement:	01/03/2022	11:40
GPS Coordinates of NMP:	HY 30092 26550	
SLM file no.(s)	0002	
Weather conditions:		
Wind speed (m/s):	Moderate to strong	
Precipitation	Dry	
Cloud cover (%)	10	
Averaging period used:	10 min	
Broad-band/octave band/ 1/3rd octave band:	Broad band	
Dominant noise source(s):		
Waves on Loch of Hundland, wind buffeting.		
Transient/lesser noise sources:		
None audible during installation		
Notes on location selected – rationale:		
Cottage at Hundland Farm is a small dwelling on the opposite (east) side of the farm and outbuildings from 3x Evance R9000 wind turbines. The property lies within the predicted 35 dBL_{A90} contour for the proposed Nisthill development. The sound level meter (SLM) was installed within the garden area of the property which is moderately sheltered. No boiler flue or likely source of anthropogenic noise was noted within the environs of the cottage garden. There is a small tree at the end of the garden which had no leaves at the time of installation; wind noise from vegetation was negligible. The microphone was >3.5m from any walls or reflective surfaces. No turbine noise was audible at the installed location due to screening by farm buildings. The monitoring location is 200m from the closest of the 3x Evance small turbines and 600m from a two-bladed larger turbine to the north. Turbine noise was audible on the western side of the farm from the Evance turbines; the large turbine to the north was switched off during installation due to grid constraints.		
Time & date at end of measurement:	22/03/2022 11:20	
Calibration at end of measurement:	93.9	

NMP2 - Hundland	
Photographs of SLM in position & identified noise sources	
	

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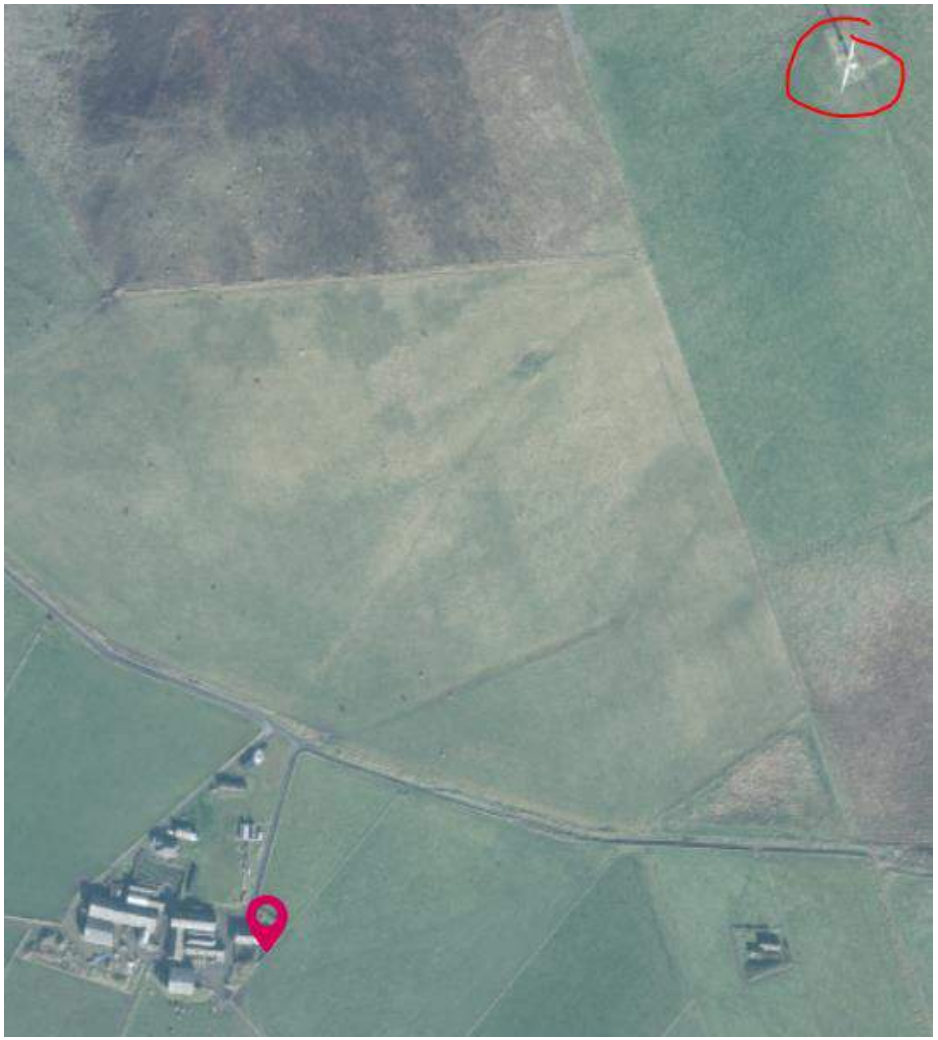
NMP2 - Hundland
Location

Small turbines circled in red, monitoring location at pink pin.

NMP2 - Hundland



Large, 2-bladed turbine circled in red, monitoring location at pink pin.

NMP3 - Lochview / Southend		
Calibration at start of measurement:	94.1	
Time & date at start of measurement:	01/03/2022	12:30
GPS Coordinates of NMP:	HY 31928,27270	
SLM file no.(s)	0003	
Weather conditions:		
Wind speed (m/s):	Moderate to strong	
Precipitation	Dry	
Cloud cover (%)	10	
Averaging period used:	10 min	
Broad-band/octave band/ 1/3rd octave band:	Broad band	
Dominant noise source(s):		
Waves on Loch of Swannay, wind buffeting		
Transient/lesser noise sources:		
None audible during installation		
Notes on location selected – rationale:		
Owner/occupier of Lochview was not present during installation and had not given prior approval for installation, therefore SLM installed at location immediately adjacent to the edge of the property's garden, at a location a similar distance from the edge of the loch to the garden area of the property. Property's garden is open with no vegetation, therefore selected location is a suitable proxy. Nearby property 'Dale' is not suitable due to extensive vegetation surrounding the property. The property lies within the predicted 35 dBL_{A90} contour for the proposed Nisthill development. The microphone was >3.5m from any walls or reflective surfaces. No turbine noise was audible at the installed location; there are no nearby small turbines and the 2-bladed turbine at Ludenhill approx. 800m away was switched off. The monitoring location is approximately 2km from the nearest wind farm.		
Time & date at end of measurement:	22/03/2022 10:40	
Calibration at end of measurement:	94.0	

NMP3 - Lochview / Southend	
Photographs of SLM in position & identified noise sources	
	

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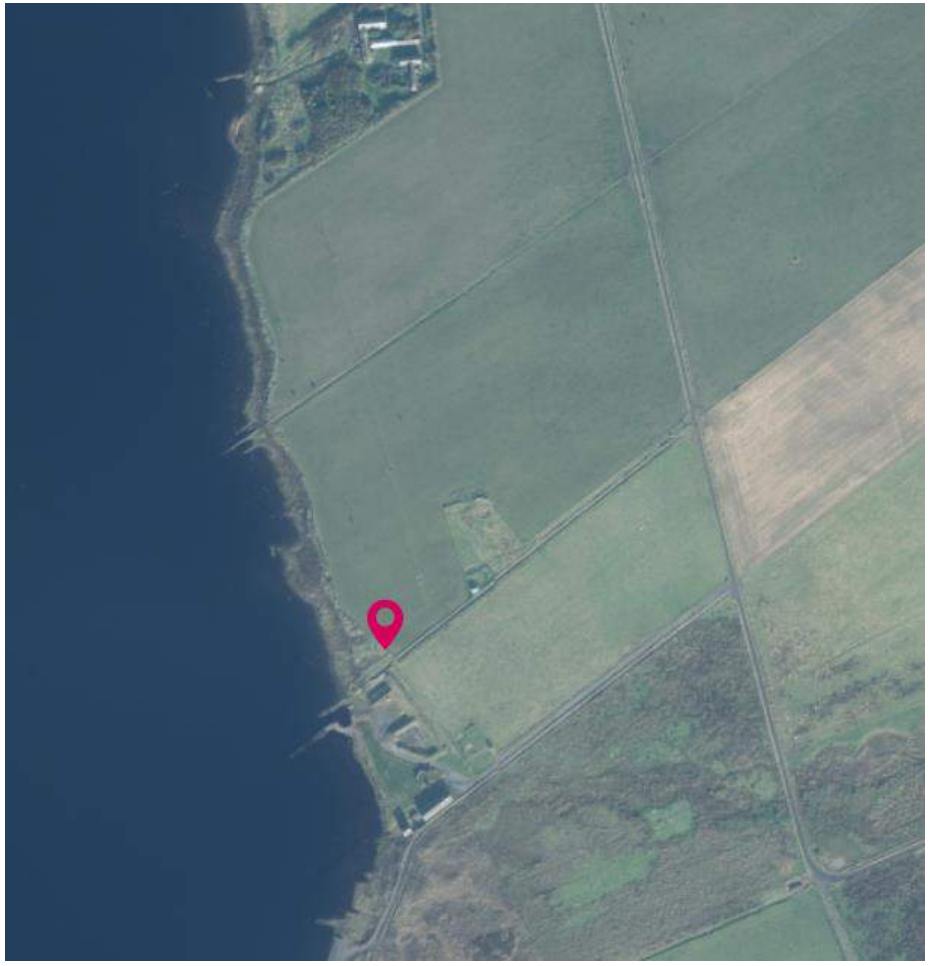
NMP3 - Lochview / Southend
Location



Calibration Certificates

Calibrator

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 06 January 2022 **Certificate Number: UCRT22/1014**

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	ANV Measurement Systems Beaufort Court 17 Roebuck Way Milton Keynes MK5 8HL
Order No.	ANV MS HIRE
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-74	34536108

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.	UKAS22/01004
Date Received	05 January 2022
Date Calibrated	06 January 2022

Previous Certificate		
	Dated	12 February 2021
	Certificate No.	UCRT21/1212
	Laboratory	0653

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1014

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	1001.45	±	0.12 Hz
The total distortion was	1.25	±	0.09 % Distortion

During the measurements environmental conditions were

Temperature	23	to	24	°C
Relative Humidity	35	to	41	%
Barometric Pressure	100.4	to	100.5	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

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Calibration Certificates

SLM

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 14 February 2022 **Certificate Number: UCRT22/1226**

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
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes
MK5 8HL

Order No. ANV MS HIRE
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00620868
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	20928
Rion	Microphone	UC-59	03922
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 10 February 2022 ANV Job No. UKAS22/02103
Date Calibrated 14 February 2022

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	24 February 2021	UCRT21/1262	ANV Measurement Systems

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1226

Page 2 of 2 Pages

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

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52	
SLM instruction manual ref / issue		11-03	
SLM instruction manual source		Manufacturer	
Internet download date if applicable		N/A	
Case corrections available		Yes	
Uncertainties of case corrections		Yes	
Source of case data		Manufacturer	
Wind screen corrections available		Yes	
Uncertainties of wind screen corrections		Yes	
Source of wind screen data		Manufacturer	
Mic pressure to free field corrections		Yes	
Uncertainties of Mic to F.F. corrections		Yes	
Source of Mic to F.F. corrections		Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002		Yes	
Specified or equivalent Calibrator		Specified	
Customer or Lab Calibrator		Lab Calibrator	
Calibrator adaptor type if applicable		NC-74-002	
Calibrator cal. date		17 January 2022	
Calibrator cert. number		UCRT22/1064	
Calibrator cal cert issued by		0653	
Calibrator SPL @ STP	93.98	dB	Calibration reference sound pressure level
Calibrator frequency	1002.02	Hz	Calibration check frequency
Reference level range	25 - 130	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.05	22.98	± 0.30 °C
Humidity	37.0	36.8	± 3.00 %RH
Ambient Pressure	98.73	98.76	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	93.9	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than		N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±		N/A	dB	

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

Weighting	A			C			Z		
	11.8	dB	UR	15.1	dB	UR	21.0	dB	UR
Uncertainty of the electrical self generated noise ±				0.12				dB	

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.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: C. Hirlav R 2

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

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Calibration Certificates

SLM

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 11 January 2022 **Certificate Number: UCRT22/1039**

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
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes
MK5 8HL

Order No. ANV MS HIRE
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00821105
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	21146
Rion	Microphone	UC-59	04086
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 05 January 2022 ANV Job No. UKAS22/01006
Date Calibrated 11 January 2022

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	11 January 2021	UCRT21/1058	0653

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1039

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

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52	
SLM instruction manual ref / issue		11-03	
SLM instruction manual source		Manufacturer	
Internet download date if applicable		N/A	
Case corrections available		Yes	
Uncertainties of case corrections		Yes	
Source of case data		Manufacturer	
Wind screen corrections available		Yes	
Uncertainties of wind screen corrections		Yes	
Source of wind screen data		Manufacturer	
Mic pressure to free field corrections		Yes	
Uncertainties of Mic to F.F. corrections		Yes	
Source of Mic to F.F. corrections		Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002		Yes	
Specified or equivalent Calibrator		Specified	
Customer or Lab Calibrator		Lab Calibrator	
Calibrator adaptor type if applicable		NC-74-002	
Calibrator cal. date		14 December 2021	
Calibrator cert. number		UCRT21/2515	
Calibrator cal cert issued by		0653	
Calibrator SPL @ STP	94.04	dB	Calibration reference sound pressure level
Calibrator frequency	1001.94	Hz	Calibration check frequency
Reference level range	25 - 130	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End		
Temperature	23.38	23.75	± 0.30	°C
Humidity	51.2	47.8	± 3.00	%RH
Ambient Pressure	101.86	101.88	± 0.03	kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting	
Uncertainty of the microphone installed self generated noise ±	N/A	dB		

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

Weighting	A			C			Z		
	11.5	dB	UR	15.1	dB	UR	21.8	dB	UR
Uncertainty of the electrical self generated noise ±				0.12				dB	

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.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Giles R 1

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Calibration Certificates

SLM

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 10 January 2022 **Certificate Number: UCRT22/1029**

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
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes
MK5 8HL

Order No. ANV MS HIRE
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00620864
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	21000
Rion	Microphone	UC-59	03877
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 05 January 2022 ANV Job No. UKAS22/01006
Date Calibrated 10 January 2022

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	08 January 2021	UCRT21/1053	0653

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1029

Page 2 of 2 Pages

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

SLM instruction manual title	Sound Level Meter NL-42 / NL-52		
SLM instruction manual ref / issue	11-03		
SLM instruction manual source	Manufacturer		
Internet download date if applicable	N/A		
Case corrections available	Yes		
Uncertainties of case corrections	Yes		
Source of case data	Manufacturer		
Wind screen corrections available	Yes		
Uncertainties of wind screen corrections	Yes		
Source of wind screen data	Manufacturer		
Mic pressure to free field corrections	Yes		
Uncertainties of Mic to F.F. corrections	Yes		
Source of Mic to F.F. corrections	Manufacturer		
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes		
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	14 December 2021		
Calibrator cert. number	UCRT21/2515		
Calibrator cal cert issued by	0653		
Calibrator SPL @ STP	94.04	dB	Calibration reference sound pressure level
Calibrator frequency	1001.94	Hz	Calibration check frequency
Reference level range	25 - 130	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End		
Temperature	23.06	23.16	± 0.30	°C
Humidity	40.2	40.0	± 3.00	%RH
Ambient Pressure	100.67	100.76	± 0.03	kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1 dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10	dB

Self Generated Noise This test is currently not performed by this Lab.
Microphone installed (if requested by customer) = Less Than N/A dB A Weighting
Uncertainty of the microphone installed self generated noise ± N/A dB

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

Weighting	A			C			Z		
	11.6	dB	UR	15.4	dB	UR	21.5	dB	UR
Uncertainty of the electrical self generated noise ±							0.12	dB	

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.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Giles R 1

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None